CURRENT SITUATION AND CHALLENGES IN TEACHER EDUCATION FOR CLIMATE CHANGE EDUCATION: TOWARD EXPANSION IN ASIA

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Abstract

In general, teacher education for climate change education (CCE) has not progressed much compared to school education for CCE. It is limited to the development of courses, and educational strategies and systematic educational programs have made little progress. Directing teacher education for CCE is an urgent and challenging task. In this study, the current situation and challenges of teacher education for CCE are presented. The basis for this attempt are discussions on the following sections:1) Global calls to accelerate CCE; 2) development of CCE's research and practices in schools; and 3) implementation of teacher education for CCE based on Education for Sustainable Development (ESD). Additionally, a new project to tackle this challenge in collaboration with Asian countries is introduced. The objectives of this project are to create a framework for the teacher education program for CCE in Asia, develop a dissemination guide for the framework, and promote mainstreaming CCE in teacher education institutions and schools.

Keywords: Teacher Education, Climate Change Education, Education for Sustainable Development, Asia.

Introduction

Education for Sustainable Development (ESD), stipulated in the Sustainable Development Goals (SDGs) - target 4.7, is a new area of education that pursues and advocates for the sustainability of life and society on earth. Climate change rests at the heart of

ESD themes and thus, is inextricably linked to almost all ESD themes, for example, renewable energy, biodiversity, disaster risk reduction, sustainable consumption and production, poverty, peace, and international understanding. Consequently, United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations Framework Convention on Climate Change (UNFCCC) (2016) have urgently called for "Action for Climate Empowerment (ACE)," providing a flexible, phased approach to the strategic and systematic implementation of ACE activities at the national level. They emphasize that in the process of national ACE strategy development, special attention must be given to stakeholder participation. In addition, UNESCO (2017) has proposed learning objectives for achieving SDGs. Therefore, it is imperative to consider the school level (or the level of a learner's development) and the subject and learning areas in which we will implement practices in line with the learning objectives of SDG 13 - "Climate action: Take urgent action to combat climate change and its impacts."

Globally, advanced efforts in climate change education (CCE) have been developed by UNESCO Associated Schools. One of these is a worldwide school network project entitled "Getting Climate-Ready." This effort introduced whole-school approaches to climate action (for example, UNESCO, 2016; Sustainability and Education Policy Network, 2018). The outcomes of this project involve identifying good practices and accumulating cases throughout each country. Furthermore, another UNESCO CCE project "Sandwatch: Adapting to climate change and educating for sustainable development" (Cambers & Diamond, 2010) has provided a framework for children, youth, and adults, with the help of teachers and local communities, to work together to critically evaluate the problems and conflicts facing their beach environments and to develop sustainable approaches to address these issues.

Teacher education for CCE has been also expanding in conjunction with school education for CCE. However, its efforts are often aimed at the development of teaching materials and courses in each teacher education institution. Notably, the educational strategies

and development of systematic educational programs for CCE has made little progress, particularly in Asia. Directing teacher education for CCE is an urgent and challenging task. In this study, the current situation and challenges in teacher education for CCE and a future direction of its research and practice in Asia countries will be presented.

Global calls to accelerate climate change education

A global agreement on the promotion for CCE began in Article 6 of UNFCCC in 1992. The article focuses on six priority areas: education, training, public awareness, public participation, public access to information, and international cooperation on these issues. Both education and training aim to foster a better understanding and ability to address climate change and its effects (UNESCO & UNFCCC, 2016). Furthermore, the objective of education is to change habits in the long term while that of training is to develop practical skills.

Subsequently, the implementation of Article 6 is currently guided by the Doha Work Program which adopted by the 18th Conference of the Parties (COP 18) of UNFCCC in 2012. The section □ of the program outlines the following activities: *"Promote and enhance the inclusion of climate change in school curricula at all levels and across disciplines. Efforts could be made to develop materials and promote teacher training focused on climate change at the regional and international levels where appropriate."* School education and teacher education as formal education hold an important position in promoting CCE. Incorporating CCE into these curricula and developing CCE teaching/learning materials will facilitate action regarding climate empowerment.

To achieve the United Nations Sustainable Development Goals (SDGs), UNESCO (2017) has advocated the idea of "Education for Sustainable Development Goals (ESDGs)," which is an expansion of ESD. The idea is based on an understanding that SDGs are a big agenda and cannot be achieved without education, thereby, implying the ideal way of education for achieving SDGs with ESD as the core. The aim of ESDGs is to develop "sustainability

citizens" who are able to connect, interact, create, and engage in the transformation needed in today's increasingly complex and uncertain world. Furthermore, the citizens need to acquire competencies for sustainability, such as systems thinking; anticipatory; normative; strategic; collaboration; critical thinking; self-awareness; and integrated problem-solving competencies.

For each goal for SDGs, ESDGs draws the learning objectives of three domains of learning, that is, the cognitive, socio-emotional, and behavioral domains. In SDG 13 - "Climate action: Take urgent action to combat climate change and its impacts," the important points in each domain are as follows.

In the cognitive domain, it is necessary to acquire basic knowledge and understanding of the phenomenon of climate change and its human factors, consequences, and measures against climate change - prevention, mitigation, and adaptation. The most notable is the multi-faceted understanding of the consequences of climate change from ecological, social, cultural, and economic perspectives. These understandings require anticipatory and system thinking competencies. In the socio-emotional domain, the primary requirement is to connect with others for climate protection and to reflect on one's values and actions. It is necessary to correlate various competencies, such as collaboration, self-awareness, norms, critical thinking, and strategies. Finally, in the behavioral domain, it is necessary to begin with reflecting on one's own actions, determine what actions should be taken, and ensure their transmission from an individual to a social level: there is also a need to enhance general empathy and promote empathic leadership. To achieve these learning objectives in the behavioral domain, it is important to make full use of competencies such as critical thinking, self-awareness, collaboration, and strategies, as well as to exercise an integrated problem-solving competency.

Development of climate change education's research and practices in schools

How much progress is being made in CCE in schools? Internationally, there is a pioneering project of CCE at UNESCO Associated Schools titled "Getting Climate-Ready" (for example,

UNESCO, 2016; Sustainability and Education Policy Network, 2018). The project implemented in the duration of two years (2016-2018) and mobilized comprehensive and coordinated action in approximately 10 schools in each of the participating 25 countries worldwide, and involved identifying good practices and accumulating cases in each country. Furthermore, the project was characterized by introducing whole-school approaches to climate action, specifically school reforms in four areas: school governance, teaching and learning, facilities and operations, and community partnership. As with ESD, CCE does not extend with the efforts of only one teacher. The whole efforts of the students, as well as other teachers and principals, and the local community are crucial.

Another UNESCO CCE project "Sandwatch: Adapting to climate change and educating for sustainable development" (Cambers & Diamond, 2010), started in the Caribbean in 1999, has become an international activity involving more than 45 countries, as of 2013. According to its introduction by UNESCO, it is an educational program through which students, teachers, and local communities learn and work together in the field to monitor their coastal environments; identify and evaluate the threats, problems and conflicts facing them; and develop sustainable approaches to address them. The program involves to investigate different aspects of the beach, such as beach erosion and accretion, sediment composition, impact of human activities on the beach, beach debris and pollution, waves, currents, and plants and animals. Emphasizing on observation and adaptation strategies relating to the impact of climate change and natural disasters, the participants to the Sandwatch program have contributed to building ecosystem resilience and adapting to climate change.

Highlighting UNESCO Associated Schools in Japan here, in an annual survey conducted in the term from December 2019 to January 2020, the SDGs taken up in school activities are as follows: Goal 11 Sustainable cities and communities (53%), Goal 3 Good health and well-being (30%), Goal 4 Quality education (26%), Goal 16 Peace, justice and strong institutions (20%), Goal

12 Responsible consumption and production (18%), Goal 15 Life on land (18%), Goal 17 Partnerships for the goals (14%), Goal 7 Affordable and clean energy (13%), Goal 10 Reduced inequalities (13%), Goal 14 Life below water (12%), Goal 13 Climate action (12%), Goal 1 No poverty (9%), Goal 6 Clean water and sanitation (8%), Goal 5 Gender equality (6%), Goal 8 Decent work and economic growth (3%), Goal 2 Zero hunger (3%), and Goal 9 Industry, innovation and infrastructure (1%) (Asia-Pacific Cultural Centre for UNESCO, 2020). In an annual survey in the term from December 2017 to January 2018, 40% of the schools responded that they were willing to work on Goal 13. Although the interest in and willingness to CCE are high, the efforts have not yet been activated in reality.

Focusing on school subjects and areas, for example, in the field of science education, there are many discussions concerning CCE teaching and learning via school science (for example, Torkar, 2013). The introduction of CCE learning contents into curricula standards at the national and state levels is also progressing (for example, NGSS Lead States, 2013). CCE in the US's science curricula has been discussed on topics such as climate literacy, eco-justice, emotional domain, cross-cutting concepts, systems thinking, socio-scientific issues, argumentation, learning progression, and so on (Shepardson et al., 2017).

Implementing climate change education in teacher education

There are several tools and activities that have been proven in the implementation of CCE in international level. These cover teacher education as well as school education. For example, "Climate Change in the Classroom" offered by UNESCO is a six-days online course to enable secondary teachers from diverse subject areas to introduce CCE for sustainable development across the curriculum (UNESCO, 2013). The course materials are organized into four parts: (1) Course framework and overview, (2) Teachers' education course daily materials, (3) Regional resource packs, and (4) Daily classroom materials for teachers. Furthermore, the third part of the course involves: Day 1. introduction to theory and practice of

ESD and CCE; Day 2. teaching and learning about climate change across time, with the themes of intergenerational justice and accountability; Day 3. climate change mitigation and adaptation focused on disaster risk reduction; Day 4. local community and school-based climate change learning, including an exploration of how schools and communities can work to build a culture of safety and resilience; Day 5. global perspectives of climate change in relation the cross-cutting issues such as gender, health, human rights, peace, and social justice; and Day 6. commitment to action for climate empowerment.

Likewise, the Global Learning and Observations to Benefit the Environment (GLOBE) program, started in 1995 with the sponsorship of the National Aeronautics and Space Administration and the National Science Foundation in the US, aims to help students understand, sustain, and improve the Earth's environment (The GLOBE Implementation Office, n.d.). The program encourages innovative approaches for youth to think globally but act locally, such as adopting a highway and focusing on fuel efficiency. As of 30 April 2021, it has been implemented in 125 countries, training more than 25,687 teachers and engaging 22,315 schools and 559,330 students all over the world.

However, generally speaking, teacher education for CCE has not progressed much compared to school education for CCE. Of course, there is an accumulation of research and practice in teacher education for CCE (for example, Hestness et al., 2014). In these efforts, teacher education for CCE is often aimed at the development of teaching materials and courses in each teacher education institutions. Notably, the strategies and development of systematic educational programs for CCE has made little progress, particularly in Asia.

There are several obstacles that need to be addressed. The following points noted in teacher education for ESD (Wolff et al, 2017; Stevenson et al, 2015) also apply to teacher education for CCE. First, because the universities operate autonomously, a standard set of guidelines and recommendations on ESD does not exist. Second, teacher education mainly constitutes mainly

mandatory attendance courses; the practical issue of calibrating courses from other degrees with the teacher education schedule is unresolved. Third, ESD often depends on teacher educators' interests and therefore, is frequently uneven. Fourth, typically, there are only a limited number of compulsory courses on ESD, with marginally more electives. Developing teacher education for CCE requires teacher educators to make efforts to overcome these obstacles.

Under these situations, supported by Japan Society for the Promotion of Science Core-to-Core Program and Japanese Official Development Assistance Grants for UNESCO Activities, in collaboration with 34 institutions in 16 countries in Asia Pacific, we have achieved the results of ESD teacher education over the past four years. We developed the Asia-Pacific ESD Teacher Competency Framework and its dissemination guide (Okayama University ESD Promotion Centre, 2020). This was the world's first international framework for ESD teacher competency. There is great significance for what has been achieved in the Asia-Pacific region with a remarkable diversity of nature, society and culture. Furthermore, we build centers of excellence for ESD research and education and their network in Asia Pacific, and fostered the next generation of young researchers.

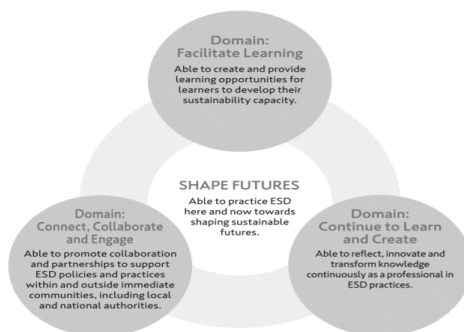*Figure 1: Overview of the Asia-Pacific ESD Teacher Competency Framework*

Figure 1 shows the overview of the Asia-Pacific ESD Teacher Competency Framework. The center is positioned with competency for "Shape Future", which is the competency for teachers

to practice ESD here and now towards shaping sustainable futures. Subsequently, there are three competency domains that support the competency Shape Future. The first is the domain of "Facilitate Learning", which is competencies for teachers to create and provide learning opportunities for learners to develop their sustainability capacity. The second is the domain of "Continue to Learn and Create", which is competencies for teachers to reflect, innovate, and transform knowledge continuously as a professional in ESD practices. The third is the domain of "Connect, Collaborate and Engage", which is competencies for teachers to promote collaboration and partnerships to support ESD policies and practices within and outside immediate communities, including local and national authorities.

To date, some teacher education institutions in the Asia-Pacific have applied this framework to develop, implement, and evaluate ESD teacher education strategies, programs, and courses. We reached the stage where teacher education for CCE can be expanded, based on this preceding framework.

Conclusion

We argue that directing teacher education for CCE is an urgent and challenging task. Based on our experiences in teacher education for ESD, we have launched a new project to tackle this challenge in collaboration with Asian countries. This project entitled "Promoting Teacher Education for Climate Change Education through Collaboration between Asian Centers of Excellence on Education for Sustainable Development (ATECCE)" focuses on cross-country exchanges of expertise and collaboration between teacher education institutions and schools. The fruitful results of these endeavors will create a framework for the teacher education program for CCE in Asia, develop a dissemination guide for the framework, and promote mainstreaming CCE in teacher education institutions and schools.

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