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研究課題名（和文）Behaviour Change Through Best Practice Climate Change Education

研究課題名（英文）Behaviour Change Through Best Practice Climate Change Education

研究代表者

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研究成果の概要（和文）：本研究は中等教育の気候変動教育（CCE）教材や戦略の開発における問題点を明らかにするものである。

CCEの教材やカリキュラムの質的分析から、3カ国のCCEでは、抽象的で身近ではないCCの問題を生徒の日常生活と結びつけることができず、この結果から、CCEには場所に根ざしたアプローチが適していることが示された。さらに、CCEにおける現在の教育実践を分析した結果、ソーシャル・エモーショナル・ラーニングアプローチが、より高いレベルの生徒の関与と環境行動への波及効果を達成するのに役立つ可能性があることが示唆された。主な成果として、複数の学会発表と3本の学術論文（現在、査読中）がある。

研究成果の学術的意義や社会的意義

The overall project has analyzed teaching practices and materials in Climate Change Education across three different countries. The study helps to develop effective strategies for future teaching approaches based on everyday life specific elements of CC and transformative pedagogical tools.

研究成果の概要（英文）：The research project focused on formal (secondary school) Climate Change Education (CCE) in Japan, Germany and Australia. In all three countries, significant efforts have been made to develop effective CCE materials and strategies. However, the project uncovered some problematic shortcomings in current CCE approaches. Based on a qualitative review of CCE teaching materials and curricula it was shown that CCE largely fails to connect abstract and distant problems of CC to students' everyday life. A more place-based approach to CCE was encouraged by these findings. Moreover, the analysis of current teaching practices in CCE suggested that a social-emotional pedagogical approach might be helpful in achieving higher levels of student engagement and possible spill-over effects on environmental behaviors. Main research outputs are multiple conference presentations as well as three journal articles (currently under review).

研究分野：Climate Change Education

キーワード：Climate Change Education Teacher Training

1. 研究開始当初の背景 (Research Background)

Climate change education (CCE) is firmly situated within education for sustainable development (ESD) initiatives and focusses on the causes and consequences of climate change. CCE aims to prepare students to live with the impacts of climate change and to empower them to adopt a more sustainable lifestyle (UNESCO, 2015). Interest in CCE has increased dramatically in recent years (Trenberth, Fasullo & Shepherd, 2015). A deep concern of global environmental, social and economic changes due to climate change have resulted in CCE to be an essential tool in many national education strategies (Adger et al., 2013; Bellard et al., 2012; Wheeler & von Braun, 2013). Unprecedented extreme weather events in Japan, such as typhoons, heavy rainfall, flooding and landslides, illustrate how important and urgent it is to foster pro-environmental behaviors among students. However, how to change individuals' behavior remains unclear and is still a major challenge for governments, organizations and institutions worldwide (Gifford, 2011; Weber & Johnson, 2012; Whitmarsh, Lorenzoni & O'Neill, 2012).

Environmental attitudes and knowledge have very different effects on behavior change depending on geographic contextual factors (Braun, Cottrell & Dierkes, 2017). Research in place-based education claims people who feel more connected to their environment show higher intentions to engage in pro-environmental actions (Zelenika et al., 2018) and are more willing to change their behaviors (Dietz et al., 2009; Nisbet et al., 2009). Therefore, we need to teach climate change (CC) in a way that connects the abstract and distant problems (e.g., sea level rise or global temperature increase) to students' everyday life. In secondary school books, climate change happens mostly 'somewhere else'; far away from our daily life. Although a global view of climate change is important, I argue that a local perspective on climate change impacts, mitigation strategies and adaptation initiatives is crucial to achieve positive learning outcomes and behavior change. This project aims to answer the following key scientific question: Do locally relevant examples used in CCE lead to students being more concerned with CC and, subsequently, result in higher willingness to review and change their behaviors as well as to support governmental actions to tackle CC?

2. 研究の目的 (Purpose of Research)

Purpose of the project: identify "best-practice examples" of CCE in Japan, Germany and Australia to explore the impact of local climate change information and initiatives on students' attitudes, perceptions and behaviors and to develop an effective place-based CCE teaching strategy. CCE needs to teach climate change at a scale that students can understand and relate to in order to have a positive effect on their environmental behaviors (Bofferding & Kloser, 2015; Cone et al., 2012; Lee et al., 2013). Thus, it is important to make the distant, global and unclear threat of CC personally relevant to students (Dilling & Moser, 2007; Wibeck, 2014).

While recognizing that the impacts of CC can be more obvious elsewhere in the world (such as the polar regions), this project investigates the effects of local examples on student learning and behavior change. Personal relevance is a prerequisite for effective education (Kaplan & Kaplan, 1982). Some aspects of CC, such as lack of direct and visible culprits, globally diverse effects, and time lags between emissions and impacts to the climate system, challenge educators to make CC lessons personally relevant (Dilling & Moser, 2007). However, I argue that connecting CCE with Place-Based Education framed by everyday experiences is necessary and effective for pro-environmental behavior change. Therefore, CCE programs need to include a local perspective on climate change impacts, mitigation strategies and adaptation initiatives.

3 . 研究の方法 (Research Methods)

The project focuses on formal (secondary school) education in Japan, Germany and Australia. In all three countries, significant efforts have been made to develop effective CCE materials and strategies. However, CCE is framed somewhat differently in each country - with inherent strengths but also shortcomings. Through the synthesis of 'what works best' in each country, a more robust and effective 'best-practice' strategy could be developed to improve CCE across all three case studies. The combined examples of Japan's long history of environmental education and awareness campaigns, Germany's advances in environmental education pedagogy and Australia's leading role in ESD, offer valuable insights into developing a 'best practice' strategy for CCE.

[FY 2019] The research project is organized into three phases. During the first phase, a qualitative review (discourse analysis) of CCE teaching materials and curricula is conducted in Japan, Germany and Australia. Objectives for this phase are: (1) Identify relevant school subjects of CCE and spatial (locality) contexts of CC in teaching materials. (2) Synthesize main discourses of climate change included in teaching materials and illustrate how these are framed spatially (local/global).

[FY 2020] The second phase focusses on the analysis of how CC teaching materials are being used by teachers. Multiple focus-groups (Japan, Germany and Australia) are held to investigate how CC is taught in the three countries and to understand the challenges teachers are facing in the classroom. Objectives for this phase are: (1) Elaborate the different ways of teaching CC in Japan, Germany and Australia. (2) Identify gaps and shortcomings of teaching materials and approaches.

[FY 2021] The third phase evaluates the learning effects of CCE among students through applied behavior analysis (ABA). Three surveys with two student cohorts (pre-CCE and post-CCE) are administered in secondary schools in Japan, Germany and Australia. Subsequently, three workshops with students and teachers are organized (one in each country). Objectives for this phase are: (1) Gain deeper insights into CC interests and engagement levels of students. (2) Evaluate the effectiveness of CCE programs. (3) Understand what resources are required to introduce locally situated CCE.

4 . 研究成果 (Results)

All research objectives for FY2019 have been met. 1) A qualitative review (discourse analysis) of climate change teaching materials and curricula has been conducted (Japan, Germany and Australia). Teaching materials included over 30 textbooks and curricula. 2) Relevant school subjects of climate change education have been identified in all three case studies. These differ from country to country but are often related to civics, geography or social studies. 3) The spatial (locality) contexts of climate change have been analyzed in all teaching materials. The main discourses of climate change included in these teaching materials have been synthesized and their spatially framing categorized (local/global). 4) Results have been presented at an international conference.

However, there were two unforeseen developments that have resulted in a conceptual shift of the project: 1) Consultations with researchers, schools, and NGOs in the three field study sites have shown that the study would benefit from a research shift towards teachers. These are deemed to be the gatekeepers of possible improvements in climate change education. This includes teachers in training but also in-service teachers. 2) The second aspect causing a delay was the corona crisis, which has made research visits and fieldwork almost impossible. Workshops and focus-groups that were scheduled had to be postponed. Hence a further delay of the overall project was expected.

The target group of the research had shifted towards teachers and teachers-in-training. It was discovered, that a revised teacher education, combined with improved and extended teaching materials and tools, would be the first essential step towards a more effective climate change education strategy. Only then, can we expect positive effects on student learning and behavior. However, the corona virus has resulted in further delays and further adjustments of the project. Overall, the project was still viable and delivers significant results that inform best practices in climate change education.

The FY2020 has been extremely challenging and problematic. This research project is heavily dependent upon direct engagement with key stakeholders, such as teachers, students and educational experts. During the FY2020 most research activities that require such personal contacts have been put on hold due to Corona. It was not possible to meet the first research objective for the second phase. However, research objective (2) Identify shortcomings in teaching materials and approaches has been partially met. Results have been presented at an international conference. As mentioned above, the conceptualization of the research project required direct and personal engagement with key-stakeholders. Unfortunately, the Corona pandemic has made this impossible and severely impacted the progress of this work. Despite the best efforts to further the project, only small progress has been made.

FY2021 was again significantly influenced by the ongoing Corona pandemic. Face-to-face research was not possible. The project PI made the decision to completely shift the research focus from students to teachers. This includes teaching practices in class as well as teacher preparation and development. Despite all challenges, research objective (2) has now been completed and results were presented at two international conferences. Initial focus groups with teachers have been conducted in Japan, but due to the significant shift in research focus from secondary students to teachers, the overall progress has been very limited. Nevertheless, first data gathering has been completed and results presented internationally. It is expected to complete the remaining research activities during the coming academic year (FY2022). The research shift from students to teachers allows for the remaining research activities to run smoothly. The research project (new focus) has uncovered some important research gaps in regard to teacher competencies, support, preparation and education. These will be addressed in a subsequent project.

In the final phase of the project (FY2022), multiple surveys with teachers in training (university students to become teachers) have been conducted. Areas of inquiry included climate change knowledge, teaching skills, emotional framing of climate change, and pedagogical approaches to climate change education. Data analysis has not been completed yet, but preliminary results from this research phase have been presented at several international conferences. Two journal articles are currently under review (phase 1 and phase 2) and a third manuscript is in development, summarizing the main findings of phase 3. It is expected that all tasks related to this project will be completed shortly.

5. 主な発表論文等

〔雑誌論文〕 計0件

〔学会発表〕 計5件（うち招待講演 1件 / うち国際学会 4件）

1. 発表者名 Roger Baars
2. 発表標題 Climate Change: It's happening right now and right here!
3. 学会等名 Comparative and International Education Society Conference 2021 (国際学会)
4. 発表年 2021年

1. 発表者名 Roger Baars
2. 発表標題 A Changing Climate for Geography Education? Insights from Japan
3. 学会等名 Institute of Australian Geographers Conference 2021 (国際学会)
4. 発表年 2021年

1. 発表者名 Junko Kondo and Roger Baars
2. 発表標題 Connecting with Nature Through Local Narratives: A Japanese Case Study
3. 学会等名 North American Association for Environmental Education Conference 2021 (国際学会)
4. 発表年 2021年

1. 発表者名 Roger Baars
2. 発表標題 Bottom-up Approaches to Climate Action and Sustainability
3. 学会等名 Looking Ahead Seminar Series (招待講演)
4. 発表年 2020年

1. 発表者名 Roger Baars
2. 発表標題 Climate Change Education in Japan
3. 学会等名 World Environmental Education Congress (国際学会)
4. 発表年 2019年

〔図書〕 計0件

〔産業財産権〕

〔その他〕

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6. 研究組織

氏名 (ローマ字氏名) (研究者番号)	所属研究機関・部局・職 (機関番号)	備考
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7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8. 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関
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