

Literature Study: Integration of Climate Change Education in School Curriculum of Various Countries

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Abstract. In recent decades, climate change has become a pressing global issue, demanding effective educational approaches to increase awareness and mitigation actions. Facing the increasingly impactful issue of climate change, it is necessary to integrate climate change in education. So far, from searches on Google Scholar, many articles from overseas research have been published on the integration of climate change education in the school curriculum. This literature study aims to explore climate change models that are integrated into foreign curricula. The keywords used in the database search were developments in climate change education published in the last 5 years, namely the period 2020 to 2024. The method used in the literature study used PRISMA guidelines with four stages, namely identification, screening, feasibility and inclusion. Conclusions are drawn qualitatively. The database from Google Scholar was systematically analyzed to search for relevant climate change education development studies. There are seven articles that describe the integration of climate change education abroad. The research results show that there are significant variations in approaches to climate change education, ranging from the integration of climate change material into the curriculum to the development of special programs that focus on adaptation and mitigation. Therefore, it is necessary to carry out development research to create a more effective and sustainable climate change education model for the curriculum in Indonesia.

Key words: Climate Change, Curriculum, Education

INTRODUCTION

Climate change is a big issue that is widely discussed because it has a big impact on life. Climate” is defined as the average weather conditions in a region over at least one thirty years and includes seasonal variations and extreme weather events. Climate change, according to the United Nations Framework Convention on Climate Change, is a change that occurs as a result of human activity, either directly or indirectly, that alters the composition of the global atmosphere and adds to the natural climate variability that occurs over an equal period of time (United Nations, 1992).

Climate change is a global problem that has an impact on various fields. Climate change directly affects the education sector. The significant impact of climate change on education arises from extreme weather events, such as heavy rains that cause flash floods, strong winds and hail storms that last for a short time but have long-term consequences. Droughts and rising temperatures result in crop damage and food scarcity, which negatively affects educational attainment (UNDP, 2017).

Mitigation and adaptation to its increasing impact are very important for human life. The formation of beliefs, attitudes and values in this case is very important. This formation process occurs mainly during childhood, so that basic education becomes the main focus. Based on this, the first thing to pay attention to is the information that will be conveyed to students by their teachers. The beliefs held by primary school teachers regarding climate change are an important aspect for effective performance in their work (Moshou & Drinia, 2023).

Various countries focus on mitigating climate change, one of which is through education. Climate change education can help people understand and address the impacts of the climate crisis, empowering them with the knowledge, skills, values and attitudes necessary to act as agents of change (UNESCO, 2020). Although most countries are progressively working towards integrating climate change education in school curricula, teachers face difficulties in planning and implementing climate change education in schools (Mavuso et al., 2022). So further studies

are needed regarding effective climate change education to be implemented.

Developing countries are increasingly vulnerable to the impacts of climate change and have lower adaptive capacity. Consideration can be given to their indigenous knowledge systems for an integrated approach to education, which is more holistic and applicable to the context (M. Mbah et al., 2021). People in the developing world have been adapting to climate change using their indigenous knowledge systems (IKSs), which refer to cultural, traditional, and local knowledge that is unique to a specific society or culture (Ubisi et al., 2020) and encompasses skills and technology derived from systems of production and consumption (Kanchebe Derbile & Laube, 2014).

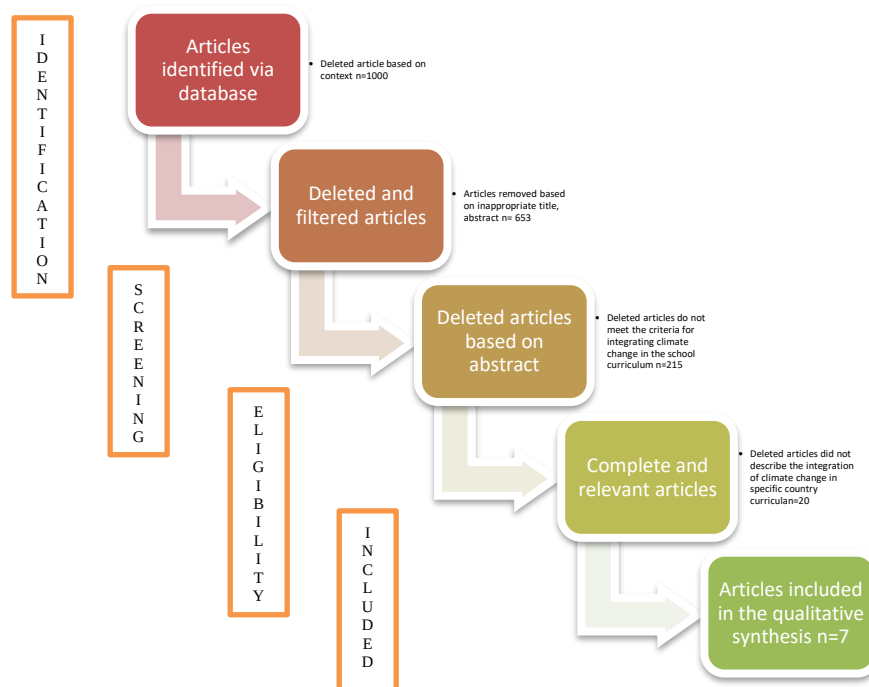
Knowledge about the causes and impacts of climate change is still weak. Climate change education integrated in schools must include social norms and personal efficacy (Busch et al., 2019). Including Indonesia, according to the Minister of Education, Culture, Research and Technology, climate change has not been fully implemented in the Indonesian curriculum (CNN, 2021). This literature study aims to explore the integration of climate change in curricula in various countries in order to obtain an overview

of the processes carried out. The integration of climate change in various countries can be used as inspiration for further development research in Indonesia. Climate change education is important to implement in Indonesia considering the large impact of climate change on people's lives.

METHODS

This research uses a literature review method using Preferred Reporting Items for Systematic Reviews and Meta-Analyses or referred to as PRISMA (Moher et al., 2009). Articles related to the integration of climate change in curricula from various countries were searched via Google Scholar. Articles are limited to the last 5 years from 2020 to 2004. The stages of this method begin with identification, screening, eligibility and inclusion. The articles obtained are entered into the database, then filtered according to the title, abstract and content of the article that are relevant to the theme to be studied. After that, filtering is carried out based on country of origin. The keywords used in searching for articles were "integration of climate change in the school curriculum" via the Google Scholar search engine.

The research method steps are depicted in the following chart:



Picture 1. PRISMA Flow Chart

An article search via Google Scholar was carried out by selecting only articles displayed with the keywords climate change integration in

RESULTS AND DISCUSSION

the school curriculum. The search was limited to 2020 – 2024 and returned 1,000 articles. Of the articles that appeared, 653 articles were deleted because they did not fit the context expected by the research theme. The remaining 347 articles were filtered through identification of abstracts that were not suitable for integrating climate change in the school curriculum. To ensure the suitability of the articles, relevant articles were selected that describe the expected integration of

climate change in the school curriculum. Finally, filtering was carried out by selecting articles originating from various countries. There are 7 (seven) articles that will be used as literature study material. The article to be studied describes the integration of climate change in Greece, Spain, Australia, Japan, China, Africa and East Africa. The following is a summary of each article:

Table 1. Literature Review

No	Country	Title	Authors	Summary
1.	Greece	Climate Change Education and Preparedness of Future Teachers—A Review: The Case of Greece (2023)	Hara Moshou and Hara Drinia	Climate change is not a special subject, but is integrated into each subject through environmental principles and values.
2	Africa	The Decolonisation of Climate Change and Environmental Education in Africa (2024)	Marcellus Forh Mbah and Chidi Ezegwu	A multidimensional approach to decolonization is needed to promote climate and environmental change.
3.	China	Disaster Risk Reduction Education in School Geography Curriculum: Review and Outlook from a Perspective of China (2021)	Qian Gong, Yushan Duan and Fengtao Guo	Climate change is integrated into geography subjects. Geography as a carrier subject had been an integration approach of Disaster Risk Reduction in the national curriculum in China.
4	Türkiye	Historical Background of Secondary School “Environmental Education and Climate Change Lesson” in Türkiye (2022)	Elif Bakar & Mehmet Akcaalan	The Climate Change Curriculum was investigated taught to secondary school students on a selective basis course in Turkey. Duration of teaching at school, content, learning areas, distribution of subjects and a number of environmental education curriculum outcomes are examined progressively.
5	Australia	Teaching about climate change: Possibilities and challenges in Australian adult literacy programs (2022)	Keiko Yasukawa	Shows how teachers carry out resistance, total surrender to the demands of the curriculum so that they can provide the education they believe students need and deserve, while remaining compliant with institutional and curricular requirements.
6	Spanish	Climate Change and Sustainability in Spanish Classrooms: State of the Art and Didactic Proposal (2023)	Jordan Correa-González, Abel López-Díez, Jaime Díaz-Pacheco and	A learning situation on sustainability and climate change that can be implemented in the Spanish and European contexts,

			Nerea Martín-Raya	responding to Rosenshine's principles of instruction, a circumstance that gives it enormous flexibility and makes it an interesting resource focused on helping geography teachers to face current challenges from an innovative, scientific, and inclusive perspective.
7	East Africa	Challenges and Opportunities for Climate Change Education (CCE) in East Africa: A Critical Review (2021)	Abigael Apollo and Marcellus Forh Mbah	The existence of research institutions in the East African region is an opportunity for educators to apply participatory learning to offer holistic and transformative answers to climate change management.

The development of climate change integration in school curricula in various countries varies. One of the studies in Greece stated that The Greek State, adapting to the global requirements for climate change and environmental protection, apparently recognizes the necessity of enriching the present compulsory educational curriculum in this direction. The “Environment and Education for Sustainable Development” curriculum was established in the Greek school system with the recent no. 66152/4 (2820/B/2022) Decision of the Greek Ministry of Education and Religious Affairs for kindergarten, grades 1–6 of primary school, and grades 1, 2, and 3 of secondary school. This decision describes the nature of the “course”, but it is subsequently pointed out that it is not a course, as it is not exactly included as a subject in the school curriculum. It is signaled in the aforementioned decision that there is an impregnation of cognitive concepts and value principles relating to the environment in all subjects of the present curriculum. It is a guideline and tool for teachers in primary and secondary education, providing a didactic, step-by-step curriculum cycle for dissemination in the present curriculum of the objectives oriented towards the achievement of sustainable development (Moshou & Drinia, 2023). Greece already has regulations and guidelines for implementing climate change education, making it easier for teachers to develop implementation steps.

Through a systematic review conducted in Africa, it was stated that multidimensional approaches to decolonisation are required to promote African-centred climate change and environment education. This includes the

interrogation of existing theories and depictions of subjugation of Indigenous and local knowledge, as well as seeking ways to halt or mitigate the prevalence of ongoing epistemic exclusion in different educational contexts and locations (M. F. Mbah & Ezegwu, 2024). Africa emphasizes the involvement of indigenous communities in the climate change mitigation process, so that their local wisdom can be used as a learning resource in climate change education.

Research in China states the Disaster Risk Reduction (DRR)-relevant content in the geography curriculum standards that used for analysis in this research had undergone constant changes and finally reached a relatively stable state; the changes of DRR-relevant contents in primary school, middle school, and high school curriculum presented different characteristics. In the future geography curriculum reform, it is necessary to realize that the term disaster does not describe the natural event per se, but instead its impact on/consequences for infrastructure and society. It is bound to add more DRR-relevant content that belongs to the “action” dimension and the ‘participation’ dimension, especially at the primary and middle school stages, and to systematically incorporate the DRR-relevant content of the “integration” dimension into the school geography curriculum (Gong et al., 2021). The curriculum in China integrates climate change according to the characteristics of each level of education, so that its application is more meaningful.

Türkiye is also integrating climate change through Education, there was not any independent lesson named as environmental education in

Türkiye until the 1990s; the instructional statute of the lesson from the beginning of primary schools differentiated as selective or compulsory in the meanwhile; the names of independent lessons about environmental education are changed in time; the instructional levels of the grades are increased in number with the latest updates; the climate crisis and disaster trainings are highlighted as independent subjects, and the content is developed mainly for practical applications rather than transfer of academic knowledge (BAKAR & AKCAALAN, 2023). Climate change education in Türkiye is different from previous countries. Türkiye has created special subjects to anticipate climate change, namely the climate crisis and disaster trainings. This subject focuses more on students' skills in dealing with the impacts of climate change.

Research conducted in Japan found the teachers in this study saw a role as literacy teachers to teach their learners the skills and knowledge to engage with issues surrounding the changing environment. They assumed this role because of their own sense of climate emergency and because their literacy teachers' role included reducing the learners' social vulnerability and supporting them to make connections in the wider community. They devised ways of introducing the topics into their literacy teaching using strategies that were pedagogically defensible to them. This role, however, was not what is envisaged in the increasingly economic curriculum that the teachers were required to follow (Sato & Kitamura, 2023). Japan integrates climate change through literacy programs designed by teachers that emphasize students' attitudes and skills in dealing with climate change.

There are countries in East Africa contents such as climate change, sustainable development, resilience, and adaptation have been included in educational regulations as transversal elements that should permeate the daily practice of all subjects. Therefore, it is essential to provide teachers of this and other specialties with resources and didactic proposals that facilitate the teaching-learning process and increase the environmental awareness of students who, in turn, demand knowledge on these issues in order to position themselves in a society that is increasingly concerned and informed about the ecological issue. In short, education, as a tool for transformation and social change, is today a field of unquestionable interest for effectively addressing contemporary challenges that cannot be tackled with obsolete methodologies. To meet

these objectives, specific activities are required that, like the learning situation proposed in this paper, place students in a position of active and autonomous work that allows them to acquire proactive competencies and skills to contribute, from their daily lives, to the objectives set by the authorities in terms of sustainability. At the same time, this should be performed without ignoring the importance of instructing students in other elementary geographic knowledge that all students should have at the end of their time in the educational system (Apollo & Mbah, 2021). Countries in East Africa include climate change, sustainable development, social resilience and adaptation in their education regulations. Collaboration is also carried out with climate change research institutions. This really supports the process of raising awareness among students through climate change education.

In line with study findings, knowledge is the main driver of climate action, especially for the younger generation (Kolenatý et al., 2022). Apply ethnopädagogie to in the process education today at all levels education and verify its success scientifically (Nováková et al., 2021). Including in climate change education, it is necessary to integrate ethnopädagogie. pedagogy contribute to the solution internal problems practice, use environment education and generational training young, developed by people who different during centuries. We research in the field ecological education generational culture young recommend that new cultural content century society XXI (Khusainov & Galimov, 2014).

In future, us will do it using tools this is a tool system evaluation education for describe opportunities and challenge current curriculum to achieve Climate Competence, which is basic things for mobilize society to front that problem complex and urge this (Fuertes et al., 2020). By specifically, research in the future have to focus about elements student actions in climate change education, and ways most effective for build education to inside action path, because part 'action' still difficult to understand and measured in lots curriculum studies and literacy assessment climate (Siegener & Stapert, 2020).

CONCLUSION

Looking at the development of climate change integration in school curricula in various countries shows that countries are trying to carry out the same mission, namely mitigating climate change through education. Recommendations that can be

an inspiration for the curriculum in Indonesia include; (1) climate change is a theme that can be integrated into all subjects (2) involvement of local communities by including local wisdom as a learning resource (3) Teaching duration, content, learning areas, distribution of subjects and a number of environmental education curriculum outcomes are checked thoroughly sustainable (4) providing space for teachers to innovate in teaching climate change and (5) collaborating with climate change research institutions.

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