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Original Article

Greening the Curriculum: An Exploration of How the Curriculum Can Be Tailored Towards Tackling Climate Change in East Africa

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ABSTRACT

Climate change remains one of the greatest global threats to sustainable development, with East Africa increasingly experiencing severe consequences such as droughts, floods, food insecurity, biodiversity loss, and socio-economic instability. Education systems have a critical role in preparing learners with the knowledge, skills, values, and attitudes necessary to address these challenges through sustainable practices and climate action. This paper explored how the curriculum in East African countries can be tailored to strengthen climate change education and promote environmental sustainability. The study employed a systematic literature review and document analysis approach, examining curriculum frameworks, policy documents, ministry reports, and higher education guidelines from Kenya, Uganda, Tanzania, and Rwanda. Findings revealed that although climate change education has not yet been comprehensively institutionalised in the region, significant progress has been made. The ongoing curriculum reforms, particularly the adoption of Competency-Based Curriculum (CBC), provide a strong opportunity in which climate change content can increasingly be integrated through cross-cutting themes, interdisciplinary teaching, learner-centred pedagogies, and practical experiential learning activities. The study further established that East African universities possess substantial opportunities to incorporate advanced climate change education through curriculum reviews, standalone courses, interdisciplinary programs, research, and innovation initiatives. The paper argues that effective greening of the curriculum requires stronger policy implementation, teacher training, development of climate learning materials, integration of climate issues across all disciplines, and promotion of experiential and community-based learning approaches. The study concludes that curriculum transformation can serve as a powerful strategy for building climate resilience, environmental responsibility, and sustainable development competencies among learners in East Africa.

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INTRODUCTION

Climate change is a major threat to humanity globally (Intergovernmental Panel on Climate Change, 2023). Its consequences destabilise the very survival of human beings, as it affects all aspects of sustainable development. It causes food insecurity, retarded economic growth, a threat to human health and general biodiversity. East Africa is not spared from the catastrophes occasioned by this crisis. At the moment, there is already grave risks and overwhelming effects of climate change in the region (UNICEF, 2024). This calls for immediate and practical efforts from societies and institutions, including learning institutions.

According to UNESCO (2024), facing the perturbing challenge of climate change requires behavioural changes and adopting more sustainable practices to reduce greenhouse gas emissions in the longer term. It is a crisis that calls for urgent global collective responsibility at all levels, including in schools and institutions of higher learning (UNESCO, 2020). There is an increasing demand for all learning institutions to empower learners as agents of change by equipping them with knowledge, skills, values and attitudes required to advance the green transition and pursue sustainable career pathways (Tshabalala et al., 2025; Chawla & Cushing, 2021; Wambugu & Okere, 2020).

Climate change awareness is still very low among young people. A survey carried out by UNESCO showed that despite the severe effects of climate change, 70% of youths could not describe what climate change is about and how it can be mitigated (UNESCO, 2024). Equally, the survey also showed that almost half (47%) of national curriculum frameworks do not address issues of climate change. The curriculum is one key tool that can be used to address climate change (Tshabalala et al., 2025). The Paris Agreement in the United Nations Framework Convention on Climate Change (2015) encourages countries to develop extensive education programs to promote climate change sensitisation and increased participation in actions that mitigate climate change effects across the world.

Today, institutions including schools and universities are recognising that they have a role to play through their curriculum to mitigate the effects of climate change (Mtitu & Mneney, 2022; Cramer, 2020). UNESCO's Greening Education Partnership, launched in 2022, is an initiative that aims to have 90% of all countries globally include climate change education in their curricula by 2030. The purpose of the initiative is to support countries in integrating green education into their systems and promote a lifelong learning approach to climate action.

East Africa is yet to fully integrate climate change education into their curriculum in schools and higher education (Fitzpatrick & Amenya, 2023; Mwageni & Nkwera, 2018). As stated earlier, the school curriculum can be a powerful tool for producing a highly informed population on issues of climate change. Learners in schools and higher

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institutions interact with the curriculum on a daily basis (Ndyanabo & Katabazi, 2022). This, therefore, means that including climate change education in the curriculum is engaging the learners with issues of climate change in their daily life. The curriculum thus provides an opportunity to inculcate into the learners the very essential values, attitudes and skills needed to tackle climate change.

Given the current overwhelming effects of climate change in East Africa, there is a need for the region to be part of the 90% countries globally expected to have integrated climate change education in their curricula by 2030. This paper, therefore, explored the available opportunities for strengthening the integration of climate change education in the curriculum in East African countries to tackle the effects of the crisis in the region.

Problem Statement

Climate change continues to pose serious environmental, social, and economic challenges in East Africa, manifesting through recurrent droughts, floods, food insecurity, biodiversity loss, and declining livelihoods. Despite the region's high vulnerability to these impacts and growing international calls for climate action through education, climate change education remains inadequately integrated within school and university curricula. Existing curriculum reforms, particularly Competency-Based Curriculum (CBC) initiatives, have created opportunities for embedding climate-related knowledge, skills, values, and attitudes; however, implementation remains fragmented, with limited teacher preparedness, insufficient learning resources, and weak institutionalisation across disciplines and levels of education. Consequently, many learners leave educational institutions without the competencies required to understand, mitigate, and adapt to climate change challenges. This gap undermines efforts to build climate-resilient communities and achieve sustainable development. The aim of this study, therefore, was to explore how the curriculum in East Africa can be effectively tailored to strengthen climate change education and equip learners with the competencies necessary for environmental stewardship and climate action.

Research Objective

The main objective of this study was to explore how the curriculum can be tailored towards tackling climate change in East Africa. This was broken into two sub-objectives. First, it was to evaluate the nature of climate change education and integration in the curriculum in East African Countries. Secondly, it was to explore the available opportunities for strengthening the integration of climate change education in the curriculum in schools and higher education in the region.

METHODOLOGY

This study employed a systematic literature review and document analysis design to examine how the curriculum can be tailored to address climate change in East Africa. This involved a systematic review and interpretation of policy documents, curriculum frameworks, ministry reports, higher education guidelines, conference papers, and peer-reviewed publications related to climate change education and curriculum development in Kenya, Uganda, Tanzania, and Rwanda. Documents published between 2015 and 2025 were purposively selected based on their relevance to climate change education, environmental sustainability, competency-based curriculum, and curriculum reforms.

The literature search was conducted through Google Scholar, ERIC, Scopus, UNESCO databases, Ministry of Education websites, and curriculum and higher education regulatory bodies using keywords such as climate change education, curriculum greening, environmental education, competency-based curriculum, sustainable development education, and East Africa. Data were analysed using thematic content analysis, where documents were systematically coded and grouped into themes relating to climate

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change education integration, curriculum practices, and opportunities for strengthening climate action through education.

THE NATURE OF CLIMATE CHANGE EDUCATION AND INTEGRATION IN THE CURRICULUM IN EAST AFRICAN COUNTRIES

Climate change education is not fully integrated into the school curriculum in East Africa. However, several countries have made tremendous steps in using different strategies to integrate curriculum education into the curriculum, as discussed in this section.

In Kenya, climate change education is integrated in the Competency-Based Curriculum (CBC), even though this is yet to be fully practised, it is expected to be implemented through cross-curricular themes like environmental stewardship and sustainable consumption (Fitzpatrick & Amenya, 2023). It is also entrenched in practical, student-centred activities that foster critical thinking and problem-solving skills (Kenya Institute of Curriculum Development (KICD), 2021). The purpose of this approach is to equip students with knowledge and skills to live sustainably, understand climate change and advocate for climate action (Tshabalala et al., 2025)

Uganda has made great efforts to integrate climate change education into its school curriculum. The country has a national strategy to mainstream climate change education, which involves incorporating climate change education and environmental concerns into all educational programs and sports programs across all levels (Tusiime & Tumwine, 2023). They aim to integrate the concepts of climate change education in different subjects from primary to secondary schools (United Nations Children's Fund (UNICEF), 2022). There are also climate change readers for primary schools, which have been approved by the National Curriculum Development centre (NCDC) (Uganda National Commission for UNESCO, 2021). Even though these materials are not enough and are not available in all schools, it is already playing a big role in promoting climate change education in schools.

In Tanzania, climate change education has been integrated into the school curriculum by incorporating it into subjects like geography and science, rather than as a standalone subject (Mwageni & Nkwera, 2018). In a study carried out in Tanzania, the findings revealed that teachers in schools are aware of the importance of climate change education (Mtitu & Mneney, 2022). Nevertheless, there is a need for more training of teachers and integration of climate change education across all subjects (Mwageni & Nkwera, 2018). The Tanzania Institute of Education (2020) has also provided guidelines for integrating climate change education in Secondary schools in an effort to promote education for sustainable development in the country

Rwanda has also put in place several strategies to integrate climate change education into the school curriculum. The competency-based curriculum has been tailored in a cross-cutting approach where climate change education is embedded across various subjects like languages, humanities and sciences (Mukama & Uwamahoro, 2022). This is more unique compared to the form of integration in other East African countries, where climate change education is mainly incorporated in science subjects only. The main focus of the integration is to develop students' attitudes to climate issues, their knowledge and skills on climate change (Rwanda Education Board, 2020). Students are also engaged in practical activities that promote awareness of climate issues and environmental sustainability (UNESCO, 2021).

OPPORTUNITIES TO STRENGTHEN INTEGRATION OF CLIMATE CHANGE EDUCATION IN THE CURRICULUM IN EAST AFRICA

The curriculum in East African countries can be tailored in schools and higher education to

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promote climate change education and tackle the climate change crisis in the region. This section discusses the available opportunities and strategies that can be used to incorporate climate change education in the curriculum.

Strengthening Integration of Climate Change Education in the Competency-Based Curriculum (CBC)

In primary and secondary schools, the competency-based curriculum (CBC) is one new curriculum that has recently been introduced in many East African countries, including Kenya, Uganda, Tanzania, Rwanda and Southern Sudan. Even though climate change education has been outlined as one of the key cross-cutting issues in the CBC in most of these East African countries, the practical aspect is yet to be done (Mukama & Uwamahoro, 2022; Wambugu & Okere, 2020). There is a need to entrench the key issues of climate change in the four elements of the curriculum. It needs to be translated into content across all subjects and standalone subjects, practical learning activities and assessments in the daily learning experiences of learners across all levels of schooling (Ndyanabo & Katabazi, 2022). This is a curriculum that aims to transform teaching and learning in schools in Africa (KICD, 2020). It emphasises the development of competencies and social skills in learners. It is based on apprentices learning important cross-cutting issues in society and demonstrating the ability to apply the knowledge, skills, values and attitudes acquired throughout their education (Wambugu & Okere, 2020). It is therefore one of the best curriculum that can be tailored to promote issues of climate change education from early learning.

Developing Self-Efficacy and Agency in Learners

There is a need to use hands-on teaching methods and application of learner-centred and experiential learning approaches (Chawla & Cushing, 2021). Students should be allowed to actively participate in learning processes in their natural environment (Olsson & Gericke, 2016). Project methods and the flipped classroom can be used in higher institutions, while in schools, practical activities, such as school gardens, can be used as open laboratories (Chawla & Cushing, 2021). This enables students to learn about local climate change impacts and construct their own tangible solutions. Young people ought to understand climate change in their own environment and learn how to address the impacts of the crisis in their own way (Olsson & Gericke, 2016). Practical student-centred learning that emphasises hands-on student-led activities to promote real-world problem-solving skills (Wamsler et al., 2020). It allows students to practice important life skills like critical thinking and decision-making.

Use of Practical Learner-Centred Approaches

Use of practical learner-centred approaches like project-based learning, inquiry-based learning and problem-solving activities can promote learning and understanding of climate change education (UNESCO, 2019). It empowers the learners with values, attitudes, skills and knowledge needed to act as agents of change. When climate education is enshrined in the curriculum, and such practical ways are used in teaching, it easily enables young people to understand the phenomenon and develop important skills such as engaging in community action and climate advocacy (Wamsler et al., 2020). This is the ultimate goal where climate change education in the curriculum is meant to equip learners with the abilities needed for sustainable living. It empowers learners to take action and adapt to climate challenges, as well as address the challenges creatively and sustainably in their daily life (UNESCO, 2019).

Incorporating Advanced Climate Change Education Issues in Higher Education Curriculum

In higher institutions, universities in East Africa operate a flexible curriculum that is regularly reviewed (Commission for University Education

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(CUE), 2018; Nkurunziza & Nkurikiyimana, 2017). This offers an opportunity for inclusion of climate change education in any program at any given time. The system borrows from the American education model, renowned for its flexibility and academic freedom. There is no common curriculum for a specific discipline that all undergraduate and graduate programs must follow. Each university develops their own curricula (Tanzania Commission for Universities, 2019; National Council for Higher Education, 2023). Programs are developed and reviewed with the provided guidelines in relation to the market needs by each University. This creates a perfect opportunity for universities to bring in climate change education into their program while developing a new curriculum or reviewing an existing curriculum. Given the flexibility of programs in universities, it is easier to tailor the curriculum to accommodate climate change education in every program (Monroe et al., 2019).

Developing More Standalone Courses Related to Climate Change Education

There is a need to develop more standalone courses related to climate change, environmental education and education for sustainable development in higher institutions (Cramer, 2020). This will promote extensive research in climate and environmental issues in the context of East Africa, thus providing local solutions to the climate crisis in the region (Anderson, 2019). However, apart from developing standalone courses, climate change education should also be integrated across different courses in higher education institutions like economics, sociology, law, ethics and other courses in different fields (Monroe et al., 2019). The aim is to ensure that students studying every course also interact with the content of climate change education.

Using the Interdisciplinary Approach, Tailoring

Climate change education should not only be limited to some subjects like science or geography, but also be integrated across all subjects in schools (Alkaher & Avargil, 2018). It should be integrated in subjects at all levels of the school curriculum, starting with pre-primary, primary and secondary schools (Wibeck & Ohman, 2021). Subjects like science and Geography can carry topics on the science of climate change locally and globally, as well as the causes and effects of climate change. Topics like sustainable farming practices can be taught in agriculture, while the social and economic impacts of climate change can be taught in social studies (Alkaher & Avargil, 2018). Equally, several other topics on climate change and environmental education can be integrated across all subjects in the curriculum (Bofferding & Kloser, 2015). The aim is to use a holistic approach to ensure that climate change education is part of the daily learning in schools at all levels.

Tailoring Extracurricular Activities to Promote Environmental Education

Extracurricular activities like sports, clubs and debates should be utilised to promote climate change awareness in schools (McCarthy & Jones, 2019). The curriculum should be tailored to incorporate extracurricular activities and discussions related to climate change. Clubs like environmental clubs that focus on climate change awareness and environmental conservation should be strengthened in schools (Johnson & Činčera, 2021). In sports, climate change education should be integrated into sports coaching and training programs (McCarthy & Jones, 2019). Discussion like school debates should be used for students to deliberate on topics related to climate change education (Bofferding & Kloser, 2015). Several field trips should also be organised in schools for students to visit areas where they can learn aspects like effects of climate change, conservation mechanisms and sustainable practices in communities from farming to industries (Johnson & Cincera, 2021). This will further student engagement and awareness. All practical extracurricular activities that support environmental education should be encouraged in schools. The activities should be tailored according to age in order to promote meaningful

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learning outcomes and ensure effective and inclusive knowledge sharing of climate change education in different age groups, from young learners in lower primary to students in secondary schools (Dingle & Mallen, 2020).

Supplementing the Existing Curriculum with More Materials on Climate Education

There is a need to develop and supply more materials to schools on climate change education (Wambugu & Okere, 2020). This could include textbooks, documentaries and videos, climate change reader series, digital resources, literature books with environmental education and interactive tools focused on climate change (UNESCO, 2020). Such materials are engaging to learners and create an interactive learning experience and access to up-to-date and accurate climate change information (UNESCO, 2020). This is to supplement the existing curriculum and strengthen the learning of climate change education. The materials should be tailored according to different levels of education from primary to secondary (Wamsler et al., 2020).

Training of Teachers

Training of teachers who are the key implementers of the curriculum is also another way of boosting integration of climate change education in the curriculum (Anderson, 2019). Every teacher needs to understand how to integrate climate change topics into their lessons (Monroe & Oxarart, 2019). Many teachers have only been trained in their subject of specialisation and teaching methodologies in their subjects. There is therefore a need for capacity-building workshops to train teachers; first by boosting their knowledge on climate change education, and secondly, to build their confidence in teaching about climate change (Anderson, 2019). Given that climate change education is designed to equip learners with the abilities needed for sustainable living, it is necessary to train teachers on how to emphasise practical and problem-solving skills while teaching climate change education (Monroe & Oxarart, 2019).

Recommendations

This study makes the following recommendations;

Institutionalise climate change education across all levels of learning. Ministries of Education in East Africa should mainstream climate change education from pre-primary to university level by embedding it systematically within curriculum frameworks, syllabi, assessment systems, and co-curricular activities.

Strengthen implementation of Competency-Based Curriculum (CBC) approaches. East African countries should take advantage of the ongoing CBC reforms to integrate practical climate change competencies such as environmental stewardship, sustainable living, problem-solving, and climate resilience into everyday teaching and learning.

Enhance teacher training and professional development. Governments and teacher training institutions should organise continuous professional development programs to equip teachers with adequate knowledge, pedagogical skills, and confidence to effectively teach climate change education using learner-centred approaches.

Promote practical and experiential learning methods. Schools and higher education institutions should adopt project-based learning, inquiry-based learning, school gardening, field visits, debates, and community engagement activities to help learners develop practical solutions to climate-related challenges in their local contexts.

Develop interdisciplinary integration of climate change education. Climate change education should not be confined to science subjects alone; instead, it should be integrated across disciplines such as agriculture, geography, economics, social studies, literature, law, and ethics to provide learners with a holistic understanding of climate issues.

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Expand climate change courses and research in higher education. Universities in East Africa should utilise their flexible curriculum structures to introduce standalone courses, research programs, and innovation hubs focusing on climate change, environmental sustainability, and green technologies relevant to regional challenges.

Increase the provision of climate education resources and learning materials. Governments, curriculum agencies, and development partners should invest in the production and distribution of updated textbooks, digital resources, climate readers, documentaries, and interactive teaching materials to support effective climate change education in schools and universities.

CONCLUSION

Integrating climate change education into the curriculum in East Africa can be a transformative way to educate and empower students on this critical global issue, which is currently a worrying adversity. The main goal is to prepare learners to cope with the impacts of climate change by empowering them to adopt more sustainable lifestyles. It is also to create a more informed population that can participate actively in minimising the causes and mitigating the effects of climate change in East Africa.

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