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Decolonizing Climate Change Education: Evidence from an Empirical Study in Ghana

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Abstract
Climate change education plays a significant role in the fight against climate change. Yet the knowledges of Indigenous Peoples who have been disproportionately impacted and are at the frontlines of climate change have not been given enough attention in climate change education. To enhance the capacity of communities to adapt to climate change, calls are increasing for climate change education to be decolonized. Contributing to this call, the researcher partnered with a rural community, Boania, in Northern Ghana to integrate Indigenous Ecological Knowledge into environmental and climate change education in a rural primary school. A community-based research approach and an Indigenous research methodology in the form of two-eyed seeing were adopted to guide the project. The purpose of the study was to decolonize environmental and climate change education by integrating Indigenous Ecological Knowledge into programs. It emerged that the consideration of holistic Indigenous epistemologies in climate change education re-emphasized our inseparability from non-humans and improved the children's knowledge about the community's local environment. Additionally, decolonizing the concept of climate change created the space for acknowledging community-led climate adaptation efforts. Broadly, the study provided a model for decolonizing climate change education in Ghana.
Keywords:community-based research; climate change education; decolonization; Indigenous Ecological Knowledge; Indigenous epistemologies
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1.0 Introduction

Decolonizing climate change education means giving multiple forms of knowledge equal representation in the climate change narrative (Chao & Enari, 2021; Mbah, Ajaps & Molthan-Hill, 2021; Whyte, 2017). That is in either mitigating or adapting to climate change. As Blasingame, (2020) observed, "When the climate conversation is dominated by limited perspectives, we end up with a limited conversation about what we can actually do about it" (para. 3). Similarly, the United Nations Educational, Scientific, and Cultural Organization [UNESCO] (2018) argued that the combination of two or more epistemologies produces better knowledge and improves climate-related decision-making. The call for multiple epistemologies in climate change has further been emphasized by the United Nations Framework Convention on Climate Change (2022) and the Intergovernmental Panel on Climate Change [IPCC] (2022).

Particularly on Indigenous Knowledges, the Intergovernmental Panel on Climate Change (2014, 2022) concluded that given its holistic nature, Indigenous Knowledge provides an in-depth understanding of climate risk that enhances the climate adaptation process by informing policy and practice. The IPCC (2022) further argued that Indigenous People's lands contain about 80% of the world's remaining biodiversity. Yet one wonders why Indigenous Knowledges are not given equal attention in the climate narrative. In other words, why does there continue to be a hegemony of western science over Indigenous epistemologies in climate change education? Hansen and Antsanen (2018), for example, have shown the role Indigenous Knowledges can play in the climate change narrative. The scholars observed among other things that by enhancing environmental stewardship, Indigenous Knowledges can help reduce the severity of climate change. Based on this, the paper highlights the need to integrate Indigenous Knowledges into climate change education in the Ghanaian context.

In terms of structure, the paper starts with the self-location detailing the researcher's positionality and the benefit of the research to the community. Next, it addresses western knowledge domination over climate change education in Ghana. Further, the results from the study are presented after which the discussion and conclusion sections follow.

1.1 Self-location

I am a community-based researcher with longstanding respectful and reciprocal relationships with Indigenous

communities both in Canada and Ghana. All the research I conduct is community-led. Particularly, this research exploring the decolonization of climate change education emerged out of this relationship. The community expressed interest through their Community Research Advisory Committee (CRAC) in exploring how their Indigenous Knowledges could be integrated into environmental and climate change education. To enhance the community's capacity to adapt to climate-related challenges. Boania relies heavily on its Indigenous Knowledges to adapt to climate change. But the community observed their Indigenous Ecological Knowledges (IEKs), which are needed for their survival were not taught to their children in schools. Particularly, during recent times when the community is witnessing severe environmental changes. It was, therefore, necessary that this knowledge is passed down to the younger generations to enhance their capacity to adapt to the changing environment.

Additionally, community-based research and Indigenous research mean a lot to me as a researcher, and all my research is aimed at enhancing the general well-being of communities. Therefore, a research project with the goal to enhance the capacity of a rural community to adapt to climate change fell in line with my research interest. As a result, I partnered with the community of Boania to integrate IEK into a Kindergarten two environmental and climate change education.

This paper focuses on decolonizing climate change education in Ghana. I draw on a doctoral study that collectively investigated environmental and climate change education in a rural school in Northern Ghana (Acharibasam, 2021). Specifically, I tie the observations from this study into the larger discussions surrounding decolonizing climate change in the developing world context, and what this means for practice. The paper highlights what it means to decolonize climate change education through the incorporation of Indigenous epistemologies into programs within a rural community in Ghana.

Three main arguments are advanced in support of this exercise. First, allowing multiple perspectives, especially Indigenous epistemologies, in climate change discussions leads to decolonization. As Ndlovu-Gatsheni (2020) suggested, the next stage of Africa's decolonization struggle must focus on knowledge. Second, decolonizing climate change improves children's knowledge of their local environment. Third, decolonizing climate change creates space for highlighting community-initiated climate solutions. The highlighting of community climate efforts has the potential to enhance self-determination as it relates to climate disaster risk among rural and Indigenous communities by creating the space for acknowledging community-led climate adaptation efforts. The paper adopts a decolonial thought to engage in the discussions surrounding climate change.

1.2 Context-Climate Change education in Ghana

Climate change is exacerbating poverty and derailing most of the successes that African countries have made so far in meeting the United Nations Sustainable development goals (Oguntuase, 2020; World Meteorological Organization, 2020). According to the United Nations Climate Change (2021), "Increasing temperatures and sea levels, changing precipitation patterns and more extreme weather are threatening human health and safety, food and water security, and socio-economic development in Africa" (para. 1). Further, Lawson (2016) observed Sub-Saharan Africa is among the most vulnerable regions to future and current climate variability. Ghana is not immune from the threat of climate change. As studies show, the country is experiencing rising temperatures, floods, declining rainfall totals, increased variability, rising sea levels, and a high incidence of weather extremes and disasters (Government of Ghana, 2012, 2021).

The problem however is that the narrative surrounding climate change has been dominated by western worldviews to the neglect of Indigenous Knowledges. Even where the two worldviews are adopted or a synergy of western worldviews and Indigenous knowledge is struck, Indigenous Knowledges are often not given equal value and are seen as secondary (Chao & Enari,2021). According to Nyong, Adesina, and Elasha (2007), Indigenous Knowledges are "rarely taken into consideration in the design and implementation of modern mitigation and adaptation strategies" (n.p). As efforts are being made and resources provided for governments and individuals to adopt science-based knowledge (see World Meteorological Organization, 2020) equal efforts and resources are not being pushed into governments and individuals adopting Indigenous Knowledges to guide climate change adaptation.

Given that some of the most successful climate change adaptation strategies in Africa have come from community-led Indigenous Knowledges (Hertsgaad, 2012; Nyong, Adesina, and Elasha, 2007), one would have thought equal efforts and resources would be pushed toward the adoption of Indigenous Knowledges. But unfortunately, this is not the case. As UNESCO (2018) confirmed in the African context, Indigenous Knowledge has largely been ignored and is not informing schools and curriculum development on climate change. This is particularly true with climate change education in the Ghanaian context where climate change has been limited to only natural science courses (Boakye, 2015).

Evidence suggests schools present a great opportunity for engaging children in climate change education (Fortner, 2001; Ginsburg & Audley,2020; Molthan-Hill et al., 2022). But environmental and climate change

education (which happen to be offered together) in the Ghanaian context is dominated by western worldviews in basic schools (Boakye, 2015; Ministry of Education, 2019). The nonavailability of Indigenous worldviews is particularly, evident in the kindergarten two curricula (Ministry of Education, 2019). Most of the environmental and climate change education topics in Thematic Unit 6 of the curriculum do not include Indigenous content. Some of these topics include living and non-living things (living things: animals, domestic and wild), water, air, plants, gardening (types of soil and gardening, making the soil fertile for gardening), light - day and night (natural and technological sources of light), and changing weather conditions (positive and negative effects of weather conditions).

One reason for this domination is that there is a continuous influence of colonialism on the Ghanaian educational system. Colonialism has disrupted Ghana's Indigenous Knowledge systems and imposed western worldviews on the county's educational system (Dei & Simmons, 2011). This has therefore limited the role that Indigenous Knowledge plays in helping rural communities which are at the frontline of climate change either mitigate or adapt to climate change. As climate change research within Indigenous communities has shown, the erosion of Indigenous knowledge and land-based skills can intensify vulnerability within communities (Ford et al., 2007). Based on this the study investigated how the Indigenous Ecological knowledge of the Kasena ethnic group from Northern Ghana could be integrated into environmental and climate change education in a rural school, Boania Primary School. Chao & Enari, (2021) observed, "In the context of climate change, transdisciplinarity can help challenge the assumed supremacy of secular science over other ways of knowing" (p.44).

The study took place in the community of Boania, in the Upper East Region of Ghana. It was a community-based project requested by the community and led by two traditional Elders. According to Ermine et al. (2005), Elders play a significant "role in maintaining cultural continuity, and in particular, the ability to communicate the importance of maintaining respectful and ongoing relationships with the land to the youth" (p.65). Based on this, the Elder-youth relationship has the potential to enhance climate change education. Specifically, the Elders can help redefine the children's relationship with the land. As Ermine et al. (2005) have shown, just like the scientific community, Indigenous Elders have also been observing the environmental changes that are emerging from climate change. Such observations and insights can play an important role in climate change education. That is in preparing the younger ones for climate change. A kindergarten two classroom was selected for the study. These Elders guided the research and took the children out on land-based learning activities. The study combined the school, Elder-youth relationship, and community to help achieve a decolonized climate change education. The study received ethical approval from the University of Saskatchewan ethics office and the Ghana Education Service.

2.0 Methods

The research project adopted a community-based participatory (CBPR) design and an Indigenous methodology in the form of a two-eyed seeing to guide the research. In line with this, a CRAC was formed to guide the research process. Comprising of community members, Elders and Knowledge Keepers, and education experts from the community of Boania. Data were collected using in-depth interviews with 12 co-researchers. The co-researchers consisted of two Elders (a man and a woman), one teacher, and nine pupils. I used the term co-researchers instead of research participants because they played active roles in the research beyond research participants (Pope, 2020). The interview questions were co-developed, reviewed, and approved by the CRAC representing the community.

Again, the CRAC was involved in deciding the methods to be used in collecting data. In-depth interviews were adopted because they aligned with the CBPR and the Indigenous methodology adopted. Particularly, they allowed for deeper and open discussions on the issue under investigation (Bessarab & Ng'andu, 2010) being the community's IEK in this case. Two rounds of interviews were held with the Elders and teacher whilst one set of interviews was held with the pupils. The first set of interviews occurred at the beginning of the research to find out what IEK was and how it could be integrated into classroom lessons. These were open-ended questions specific to each co-researcher. After this, we decided on the methodology to use in integrating this knowledge into classroom lessons.

Collaboratively, we (the researcher, teacher, Elders, and the CRAC members) adopted a two-eyed seeing methodology to integrate the community's IEK into classroom environmental and climate change lessons. The Elders took turns visiting the school every week to engage the children on the community's IEKs. By taking them on outdoor land-based learning whilst the teacher taught what existed in the children's curriculum. The study went from January to March 2020.

2.1 Data Analysis

Again, this was done collaboratively with overarching guidance from the CRAC. A qualitative data analysis approach in the form of thematic analysis was adopted to analyze data. According to Braun & Clarke (2006), it

"is a method for identifying, analyzing, and reporting patterns (themes) within data" (p.6). Fereday & Muir-Cochrane (2006) also concluded thematic analysis is "a form of pattern recognition within the data, where emerging themes become the categories for analysis" (p.82). The process began with transcribing interviews, coding, and categorizing codes into themes. Themes were deductively selected based on how they helped answer the research questions of the study (Braun & Clarke, 2006). For example, there were questions about the IEKs the Kasena employed to adapt to environmental problems including climate change, and the roles IEK could play in environmental and climate change education. Specifically, the Elders and teacher were asked, what roles can IEK play in environmental and climate change education? This led to the emergence of themes around multiple perspectives and the highlighting of community-based initiatives to adapt to climate change. This was done by using NVivo 12 Plus, computer software that facilitated the coding of data and organizing it into themes. The transcripts were sent back to the co-researchers to be verified. Also, identified themes were discussed with the co-researchers to ensure the themes truly represented their views. After this, they were presented to the CRAC for their review and overall approval.

3.0 Results

The study led to the emergence of different themes as they relate to decolonizing climate change. In other words, the integration of IEK into environmental and climate change education had broader implications for decolonizing climate change. Among the themes that emerged was the significance of multiple perspectives on climate change, the highlighting of community climate efforts, improvement in the children's knowledge of the environment, and enhancement in their capacity to adapt to climate change.

3.1 Multiple perspectives on climate change

The first outcome of this study was that the integration of Indigenous epistemologies into climate change education allowed for multiple perspectives and helped resist western knowledge domination over climate change. For example, all subjects were taught holistically, environmental lessons also included relationships with nature and spirituality. This kind of holistic teaching was not previously observed in environmental and climate change education.

Again, it became clear from the Elders' teachings that there was no dichotomy between living and non-living things. For example, stones especially on shrines were viewed to possess spirits and to be conduits to communicate with ancestors. As one of the pupils said when asked if stones were living or non-living things, she said "that stone can talk and eat because it is a shrine stone. It always speaks to the people" (Acharibasam, 2021, p. 106). Thus, further emphasizing our in-separability from non-human forms of creation. This challenged the dominant western worldview of humans existing separately from non-humans. The Land is also considered a living thing among the Kasena. The Male Elder, for example, stated "Everything relating to Land is considered spiritual, sacred, and permission is sought from the Land through the pouring of libation before any activity takes place in Boania" (Acharibasam, 2021, p. 91). This type of understanding of holistic co-existence has been found to be effective in promoting sustainability within Indigenous communities. Indigenous teachings such as these are important to help mitigate climate change.

3.2 Improved the children's knowledge of the environment and enhanced their capacity to adapt to climate change

To improve the adaptive capacity of children to climate change, knowledge of the community's local environment is important. The Elders possess some insights into how to identify environmental changes resulting from climate change. This knowledge can enhance earlier identification of environmental changes resulting from climate change and influence action. Decolonizing climate change by integrating IEK into climate change education improved the children's knowledge of the flora and fauna within the community. The Elders engaged the children in traditional teachings about trees and other species within the community of Boania as well as their traditional gifts. This type of land-based teaching is important for improving knowledge of their immediate environment. As the male Elder commented, "through our teachings and outdoor activities, the children got to know most of the vegetation around them and its traditional uses" (Acharibasam, 2021, p.98). The interviews with the children also showed the children's knowledge of the local environment had been enhanced as one pupil said "We learned the names of trees and their uses as well as how to make herbal medicine. Like treating malaria by drinking neem bark and guava leaves" (Pupil-3, interview transcript, March 20th, 2020).

The children were also able to differentiate between Indigenous teachings and western teachings. As one of the pupils stated "with the Elders, we always go outdoors to learn the names of trees, grass, and harvest bark for medicine. But when we learn with the teacher, we always draw trees and get graded in class" (Pupil-5 interview transcript, March 20th, 2020). Inviting Elders into the school to engage children in climate change education, therefore, helped improve their knowledge of the community's local environment.

Additionally, land-based teachings like these have the potential to connect the children more to their

community and nature. Land-based and place-based teachings have been shown to be effective in connecting children to place and nature. Developing a relationship between children and nature is important to help mitigate climate change.

3.3 Highlights community's efforts

Over the years, Boania has been adapting to climate change and this is manifested in different activities including diversified livelihoods. But these adaptation strategies are not in the environmental and climate change education curriculum. Therefore, the study provided an opportunity to highlight the community's climate change adaptation efforts. In addition, engaging children in the community's climate adaptation strategies can enhance their capacity to also adapt to climate change in the future. The female Elder, for example, stated that adaptation strategies such as dry season gardening, shea butter and dawadawa processing, pottery, and basketry in climate change education enhance children's capacity to adapt to climate change. Some of these adaptation strategies are gendered as only females engage in them. Thereby enhancing girls' capacity to adapt to climate change which is very crucial in the community. As the female commented,

> What if the school does not work out for the girl child, then what next? But teaching her our ways gives her security in life. If the school does not work out, she can fall on our IEK to make a living (Acharibasam, 2021, p. 96).

4.0 Discussions

To decolonize climate change education, Indigenous epistemologies must be integrated into programs. Indigenous Knowledges help children understand how interconnected humans and non-humans are (see Acharibasam, 2022). Given its holistic nature, the Indigenous Ecological Knowledge provided a broader understanding of the relationship between humans and nature. This kind of holistic thinking has been found to promote environmentally sustainable lifestyles that can help mitigate climate change. Particularly, the inseparability between humans and non-humans is a theme that has gained attention in sustainability research (Nelson, Pacini-Ketchabaw, & Nxumalo, 2018). Berkes and Berkes (2009), for example, have shown how combining holistic thinking and relationship with non-humans (observing abnormalities in animals) has helped scientists understand the larger implication of contamination within Inuit communities in the Arctic Regions of Canada. Based on this, Ermine et al. (2005) concluded that Indigenous Knowledges provide a "considerable depth to the view of climate change and human adaptation" (p.62).

Both Elders further emphasized our inseparability from the other forms of creation. Thus, encouraging respect, reciprocity, and our responsibility towards other non-human forms of creation. All teachings were done in Kasem, the children's mother tongue and there was no dichotomy between animate and inanimate objects. Confirming Aikenhead and Ogawa (2007) observation that some Indigenous languages do not dichotomize animate and inanimate objects. It is also observed that Indigenous languages allow for talking to trees and rocks, an allowance that is not possible in English (Little Bear, 2000). From the Elders, trees and even rocks had spirits and could communicate. For example, they poured libation on rocks to communicate with their ancestors. To the Elders, everything is animate and if everything is animate, then everything has spirit and knowledge (Little Bear, 2000). This worldview is important currently in climate change education given the scale of environmental degradation that is occurring.

These kinds of holistic land-based teachings were what created bonds between the community and nature including non-human relatives. Sadly, colonialism has disrupted some of the stronger bonds that Indigenous communities in Ghana once had with nature. Formal educational curricula are dominated by western knowledge whilst marginalizing Indigenous Knowledges (Acharibasam & McVittie, 2021). Traditional land-based teachings such as these are, therefore, important to rekindle these relationships with nature. Based on this, scholars (Mbah, Ajaps, & Molthan-Hill, 2021) have called for Indigenous Knowledges to be integrated into climate change education. To build stronger relationships, enhance capacity, and achieve climate action within the community, these ancestral knowledges must be considered in climate change education. Additionally, Chao and Enari (2021) urged a reimagination of well-being, care, and dignity as it extends to forests, animals, and waterbodies. This shift in thinking is what is needed to help decolonize climate change (Chao & Enari, 2021).

Based on this, it can be concluded that the integration of Indigenous Knowledge into climate change education decolonized climate change education by helping the children unlearn dominant western worldviews and relearnt Indigenous Knowledges that are critical to the survival of their community. According to Gruenewald (2003), decolonization "means unlearning much of what dominant culture and schooling teach and learning more socially just and ecologically sustainable ways of being in the world" (p.9). The language used, and topics taught by the Elders also challenged western knowledge. Teaching children to take care of non-humans because they are family and possess spirits is not available in the climate change curriculum. Thus, reemphasizing the human and non-human connections. These teachings helped challenge the supremacy of western knowledge over the climate change narrative in Ghana.

Again, knowledge of the local environment is vital for enhancing the capacity of children to adapt to climate change. In other words, having IEK taught in classroom lessons enhances the children's capacity to adapt to climate change by improving their knowledge and understanding of their local environment. Education is effective in enhancing the capacity of children to adapt to climate change by promoting awareness (Monroe, 2017). Particularly in this study, the Elders' teachings improved the children's understanding of climate change and knowledge of the community's local environment. At the end of the study which went from January 2020 to March 2020, the children knew what climate change was and how it caused lower crop yields and famines. Additionally, the children knew the causes of climate change, traditional adaptation strategies, and how to prevent climate change from getting worse in Boania. For example, IEK can enhance the earlier identification of environmental changes resulting from climate change and influence action. Currently, the Elders realized that due to climate change, some trees are taking longer to recover from bark harvesting for medicinal purposes than usual. Based on this, they taught the children how to harvest traditional medicine sustainably without killing the trees by using IEK. This knowledge contains insights into how to adapt to climate change. It is dynamic, relational, and holistic. Unfortunately, all the traditional teachings taught by the two Elders were not found in the school curriculum on environmental and climate change education. As a result, these traditional teachings further provided a more balanced understanding of climate change in the community.

The children's knowledge of the local environment and ecosystem including the biotic and abiotic components of the ecosystem also improved. The integration of Indigenous Knowledge into climate change education contextualized the climate change discussion. The knowledge taught was relational and connected to the land, culture, and language of the community. Thus, making climate change lessons more relatable to children and easier to grasp. Activities such as diversification of livelihoods including shea butter and dawadawa processing, basketry, and pottery which most women from the community engaged in to supplement household incomes due to poorer crop yields emerging from droughts were things the children saw on daily basis. Particularly, the female Elder engaged children in some of these activities as ways of adapting to climate change. She used this opportunity to stress the need to avoid bushfires and illegal logging. Further, the Elder also encouraged the planting of more trees and other vegetation as a means of tackling recent droughts in the community. She reiterated the traditional importance of the flora and fauna to women in the community. Likewise, the male Elder also engaged the children in traditional teachings about spiritual connections to land, trees, and other non-human forms of nature in the community.

Besides the importance of multiple perspectives in climate change discussions, another significant outcome that emerged was that the study highlighted community-led strategies for adapting to climate change. Decolonizing climate change helps highlight community climate efforts and empowers communities. The Elders showed that for a long-time the community has been adapting to climate change on its own. According to the Elders, activities such as dry season gardening, shea-butter processing, dawadawa processing, basketry and pottery, farming, and livestock rearing are as old as the community of Boania itself. Thus, confirming earlier studies that climate change is not new to Indigenous communities as they have regularly adapted to changing environments (Whyte, 2017). It is argued that Indigenous Peoples have successfully faced threats linked to climate change (Mortimore & Adams, 2001). This further backs the assertion that for a long time Indigenous communities have been adapting to climate change (Whyte, 2017). Hence, highlighting community-led climate adaptation strategies is important because most rural communities especially in Africa are often portrayed as helpless and only waiting for outsiders including government agencies and non-governmental organizations to come to their rescue (Adekoya, 2013; Randolph & DeMulder, 2008). The study showed several strategies that the community has already been adapting on its own over the years to cope with climate risks. Due to climate change, droughts and floods have reduced crop yields in the community. Thus, alternative livelihood activities such as dry season gardening, shea-butter processing, dawadawa processing, basketry and pottery, farming, and livestock rearing are undertaken by community members to supplement household incomes. The Elders indicated these are community-led initiatives that the community members have been engaging in for a long time.

Again, for people whose Indigenous Knowledges have often been marginalized, studies highlighting community-led climate change adaptation strategies are important to encourage self-determination in the fight against climate change. Self-determination, the ability to manage one's own life, is a fundamental human right (United Nations Declaration on the Rights of Indigenous Peoples [UNDRIP], 2007). Failure to do this will only continue to portray communities as helpless people waiting for outsiders to come to their rescue. Thus, further perpetuating the dispossession and disempowerment of communities (Whyte, 2017).

Again, highlighting community efforts can also serve as baseline information for organizations engaging in rural research to meet communities where they are. This shows where organizations can meet communities in further enhancing their ability to adapt to climate change. Taalas (2020) concluded, "Although climate change is a global phenomenon, its impacts are felt at the regional and local levels, and it is at these levels where actions to adapt to it and mitigate its effects are required" (p.2). Based on this, we must begin the discussion around climate change adaptation from the community level where the burden is most felt. In other words, we must adopt a

narrative that is guided by community-based approaches and Indigenous worldviews.

5.0 Conclusion

The purpose of the study was to decolonize climate change education by integrating a rural community' Indigenous Ecological Knowledge into classroom lessons. As a result, I examined the decolonization of climate change in the Ghanaian context through the integration of Indigenous epistemologies into climate change education. My findings show that Indigenous epistemologies provide a broader understanding of climate change. From this study, I draw the following conclusions as they relate to decolonizing climate change education.

First, multiple perspectives in climate change education help broaden and challenge the dominant western narrative surrounding climate change. Children need to relearn Indigenous ways of coexisting with nature. Our connection to nature must be strongly highlighted in climate change education to influence sustainable lifestyles. I found holistic land-based teachings, grounded in Indigenous worldviews, strongly highlight our inseparability from the rest of the environment. Hence, decolonizing climate change education means reminding children of our interconnectedness to the environment and allowing this interconnectedness to inform every action of ours we take.

Second, decolonizing climate change education helped improve the children's knowledge of their local environment. To address climate change, knowledge of the local environment is important for observing and managing environmental changes. Therefore, education is vital to preparing children for future environmental challenges. This study showed how the community of Boania is coping with changing environments. The transfer of the community's adaptation strategies, Indigenous Ecological Knowledge, to younger generations has the potential to enhance their capacity to adapt to climate change in the future.

Third, the integration of IEK into climate change education helped highlight, at the community level, strategies they are taking to adapt to climate change. Several communities including Boania, are making efforts to adapt to climate change on their own. The highlighting of community-invented climate solutions prevents further domination over Indigenous epistemologies. Highlighting community-invented climate solutions is important because part of the reason for western knowledge domination over climate change is denied recognition of community-invented climate solutions. Chao and Enari (2021) have shown how Indigenous Knowledges are denied recognition even when scientific discoveries reveal things that Indigenous Knowledges have already made known including the ability of plants to communicate with each other, controlled fires to nourish the soil, and destroying the environment also destroy people. Where the climate adaptation strategy, which represents communities' Indigenous knowledge, emerges from the community itself western educators and researchers must publish or report it as such and state clearly their role in only enhancing the strategy. From the Elders dry season gardening and shea butter processing, for example, have been practiced in Northern Ghana for several years even before climate change gained global attention. But government agencies and NGOs working within this area rarely make this point clear enough when they publish their reports or journal articles. These practices help reinforce the supremacy of western knowledge over Indigenous worldviews in the fight against climate change. As Chao and Enari (2021) concluded, solving the climate crisis means researchers must not further perpetuate violence on communities through the commodities consumed, the institutions we work for, and the research we conduct.

Fourth, decolonizing climate change has the potential to restore pride and self-respect to Indigenous and rural communities, especially in the African context. Given what colonialism has done to the African continent, restoring pride in peoples and their worldviews empowers communities and enhance self-determination. Throughout the study, the Elders kept emphasizing the point that most of the measures the Ghana government is now putting in place to protect the environment are things they have been saying for decades but were never listened to by the climate 'experts'. According to the Elders, their views and contributions are sometimes disregarded because they have no formal education. The process of colonialism was also a process of humiliation in Ghana and by extension Africa (Acharibasam, 2021; Maila & Loubser, 2003; Ngozi & Duruji, 2013). Indigenous Peoples and their worldviews were marginalized, devalued, and downgraded (Maila & Loubser, 2003; Ngozi & Duruji, 2013; Ntuli,1999; Onwauchi, 1972; Taiwo, 1976). People perceived African Indigenous Knowledges as backward and primitive from the western viewpoint (Onwauchi, 1972). Taiwo (1976) stated that school does not consider Africa's culture because it is seen as an obstacle to school and modernity; school is, therefore, the gateway to escape from this backwardness and anti-development attitudes. This has had devastating effects on Africans up to this day where people who cannot read and write in colonial languages, are often viewed as being less intelligent. Unfortunately, most Indigenous Elders fall within this category. As Wane (2000) observed in her study in Kenya, some female Elders still believe that their Indigenous Knowledges are not important because they have no formal education.

Fifth, another important outcome is that decolonizing climate change can empower communities to take Indigenous disaster resilience initiatives from within. Mearns and Norton, (2010) argued that the success of climate change intervention programs depends on the institutional capacities of rural people. Specifically, studies

have called for the integration of Indigenous Knowledge into climate change adaptation strategies (IPCC, 2014). Basing climate discussions on local Indigenous Knowledges can enhance capacity as this knowledge can be used to observe and manage environmental changes (McNamaraa & Westoby, 2011). As the Elders showed, by using their IEK, they have observed a delay in some tree species' recovery from bark harvesting for medicinal purposes and have taken action to address this environmental problem. Empowering communities can also help them self-evaluate some of their adaptation strategies as the environment changes (Galappaththi et al.,2021). Again, decolonizing climate change enhances continuity in climate programs since they will be initiated and led by the communities themselves. Studies show that community-led initiatives enhance continuity more than interventions introduced by outsiders using a top-down approach (McCarthy, 2014). I also found there is continuity with the community-led adaptation strategies. As the Elders noted, most of the climate adaptation strategies including shea butter processing, dawadawa processing among others have been practiced in the community of Boania for several years. Climate programs that come from outsiders may be difficult to maintain when funding ends.

Finally, by combining the school, Elder-youth relationship, and community, these findings can inform culturally appropriate climate change policy in Ghana and serve as a model for de-colonizing climate change education. This study took place in a single rural community, comprised mainly of the Kasena ethnic group. It will, therefore, be interesting to examine how the decolonization of climate change education within different communities will look in future research.

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