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Introducing Climate Change in Non Formal Education Sector in Nigeria: Instructors' Perspective

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Abstract: The non-formal educational sector in Nigeria encompasses a variety of citizenry, across the rural and urban settings. Evidently, this educational sector can be a key contributor to the dissemination of information on climate change, which is necessary for its mitigation and adaptation. As Nigeria government is incrementally enabling the introduction of a climate change education to the school curriculum, the non-formal education sector engagement is vital. The study herein described is aimed at determining the extent of climate change awareness by the instructors of non-formal education as it is expected to streamline perspectives and understanding of how the individuals and government can contribute to its mitigation and adaptation. A descriptive survey design was used to sample ninety non formal education instructors which were selected through purposive sampling from eighteen non-formal education institutions in Akwa Ibom State, Southern Nigeria. The applied data were gathered by means of the "Non-Formal Education Instructors Climate Change Questionnaire" (NEICCCQ). The study results revealed an overall moderate awareness of climate change issues; awareness of mitigation and adaptation measures; with the instructors indicating a need to be more informed on the subject before they can teach it. Thus, our findings led to the conclusion that non-formal education instructors were not sufficiently informed to provide instruction on climate change that can make the required impact on the students and communities. Special training programs on climate change education are needed to be put in place for instructors of the non-formal education sector in order to establish a robust climate change education in this educational sector.

Keywords: Non-formal education instructors; Climate change awareness; Climate change mitigation; Climate change adaptation.

1. Introduction

1.1 Overview

Climate change has become one of the important environmental challenges of our time. Initially it had seemed like a myth and merely existed in the minds of some scientists. But today the reality of climate change is becoming a widely acknowledged fact internationally. Climate change refers to the alteration in the composition of the global atmosphere through varied levels of human activities leading to the observed pattern of natural climate variability over comparable time periods (United Nation Framework Convention on Climate Change (UNFCCC), 2004). A known fact is that climate change has rocked the foundation of human existence. According to the UN Secretary General, Ban Ki Moon it is the "defining challenge of our time" (UNESCO, 2010). The ensuing climatic ravages have been recorded as intense rainfall, drought, hurricanes, floods, landslides. The global community is wary of the impact of the climate change and its ramifications as it has brought about concerted efforts and strategies that attempt to address, to mitigate it. Poor economic development underscores the Nigerian literacy decline and sparse infrastructure which has been linked to its notable susceptibility to this grim reality (when compared to other African countries) (Mbakwem, 2014; Salami, 2011). Nigeria has started experiencing the effects of climate change with increasing rainfall in the South and a similar increasing trend of drought in the North.

Intuitively and historically, education has been fundamental to engendering awareness and refining the public perspectives on these issues, thus, introduction of climate change education into the school curriculum would elicit the prevention, mitigation or cessation of the effects of climate change in the world today. Research findings (Anderson, 2010; Wisner, 2006) reveal that investment in climate change education including disaster risk reduction can change human perceptions and patterns of behavior that reduce risks and cost of disaster. Educating the populace on climate change would require satisfactory pedagogical standards to be established and adept educators of this field of knowledge for efficient instructional delivery. These variables must all work together in order to achieve the desired objectives.

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Climate change has touched the foundation of human existence. According to the UN Secretary General, Ban Ki Moon it is the “defining challenge of our time” (UNESCO, 2010). Global concerns about the bugging issue has brought about concerted efforts and strategies not only to address the issue but also create awareness among the world populace so that together we can address its effects and prevent it from increasing in magnitude and devastation. It has started to devastate various countries of the world with marked climatic variations: increased rainfall, drought, hurricanes, floods, landslides .Nigeria, with its low literacy level, poor technological development and poverty is one of the most vulnerable countries in Africa (Mbakwem, 2014; Salami, 2011). It has started experiencing the effects of climate change with increased rainfall in the South and increased drought in the North.

Education plays the vital role in creating and engendering awareness and also changing the way people view issues. Thus, including climate change in the educational curriculum can contribute immensely to getting the desired awareness and positive action against menace of climate change. Research findings (Anderson, 2010; Wisner, 2006) reveal that investment in climate change education including disaster risk reduction can change human perceptions and patterns of behavior that reduce risks and cost of disaster. Educating the populace on climate change involves, the content, appropriate pedagogical practice relevant to learners need and of course, the teacher’s preparedness in terms of knowledge and skills for instructional delivery. These variables must all work together in order achieve the desired objectives.

The climate change curriculum according to United Nations Educational, Scientific and Cultural Organization UNESCO/UNEP (2011) is aimed at assisting the broad audience (with particular focus on youths) to:

- i. Understand, address, mitigate and adapt to the climate change effects
- ii. Encourage the change in attitude and behavior needed to put our world on a sustainable development path
- iii. Build a new generation of climate change sensitive citizens.

These objectives can only be achieved with a well-designed curriculum and also the required competent educators. The vital role of the educators as the curriculum implementers cannot be overemphasized, they can contribute immensely in the awakening of the youths and all citizens to the realities of climate change; its mitigation, adaptation and attitudinal change for sustainable development, should be the focus.

The non-formal educational sector according to Mbakwem (2014) is any form of organized educational activity, outside the formal school system, which is designed for any identifiable learning client in a nation’s population such as adults, youth, and children due to some imposed economic, social and political conditions. According to the United Nations Organization in Imhabekhai (1998) non-formal education ...”is the product of change and development in any society and it covers a wide range of activities depending on the prevailing social, economic and political circumstances”. In Nigeria, non-formal education could include literacy education, remedial education, continuing education, extra-mural education among others. The teachers/instructors in this educational sector are drawn from the government agencies and communities and which include adult education instructors, youth leaders, members of civil society organizations, women leaders, (Arop *et al.*, 2014). These educators are expected to be knowledgeable in the climate change discipline with sufficient pedagogical skills and enthusiasm for adequate transfer of knowledge and to engender attitudinal changes. Over the decades the Nigerian government has been mounting awareness campaigns through the mass media, its Ministry of Environment and other government agencies for the spread of knowledge and increase in awareness for the need for sustainable adjustment and necessary life style changes to this effect. It is also important for the non-formal education instructors who also are a part of the nation’s citizenry to be adequately sensitized and well intellectually fortified to impart the change.

1.2. Climate Change Awareness in Nigeria

The Federal and State Environmental Protection Agencies (NESRA and SEPA), and the the Ministry of Environment has been mobilized by the Federal government of Nigeria to disseminate the climate change awareness campaign for over two decades and it is rational to assume that at the present time, this knowledge must have pervaded the territory. Studies have shown (Esiobu *et al.*, 2014; Nwankwo and Unachukwu, 2012) that there is a low level of awareness of climate change issue among teachers in Nigeria. According to Nwankwo and Unachukwu (2012) most teachers in secondary schools are not aware of climate change and its effect. In agreement, Nwagu and Nzewi (2009) also found that although teacher education students had moderate awareness of climate change, they had a fairly high understanding of the needed adaptation measures. Isiwu *et al.* (2014) also found that lecturers of Agricultural Science had some knowledge of climate change, its effects and consequences but require more knowledge of the crucial areas that are supposed to be taught to students.

1.3. Mitigation and Adaptation of Climate Change in Nigeria

Increasing threat of the climate change to the economic sector and the vulnerability of the communities has awakened the global community, as there has been increasing question of what mitigation and adaptation measures could effectively address this challenge. Mitigation involves finding ways to attenuate the emissions of greenhouse gases (or other carbons), their storage or absorption by any means possible. A prime need is creating environmental friendly public transportation or other sustainable modes of transport which would require vehicle emission monitoring;(creating forests where none exist) to improve the global carbon balance such that land use change would mobilize their effectiveness as carbon sinks) thus, promoting the health of the country’s ecosystems and encouraging development of renewable energy. Adaptation on the other hand, involves controlling the extent of

climate change through combating the undesirable or unfriendly sources with climatic impacts while enhancing the sources of favorable climate impacts with the relevant appropriate measures. Salami (2011). However, (Salami, 2011) points out that the adaptive capacity of a nation relates closely to its level of economic development and overall availability of educational, technological and other material resources. Thus, Nigeria as developing nation may have to rely heavily on its traditional educational streams to enhance its adaptive capacity.

Both mitigation and adaptation are important and climatically compliant mitigation and adaptation campaign could be disseminated to the public through:

- Establishing sound Environmental education programs in schools
- Zero tolerance to environmentally unfriendly life style.

Mbakwem (2014) enumerated among others that the adaptive strategies to be included in a non-formal education curriculum for Nigerians should be:

- Education on increased use of alternative energy mechanisms
- Health education and awareness of the health implications of impacted climate and health management knowledge on increased use of alternative energy mechanisms
- Knowledge of alternative domestic water supplies to prevent water borne diseases that may result from toxic run off from increased rainfall and flooding.

He also reiterated that as an adaptive strategy, non-formal education teachers should attend to seminars and conferences on climate change and more importantly, there should be a continuous curriculum restructuring to incorporate new developments in climate change approaches.

Interestingly, there have been recorded improvements in the Nigerian environmental literacy levels. However, formally, there had been moderate levels of environmental responsibility and environmentally friendly behaviours (Nwosu and Nwosu, 2010). Similarly, Esiobu *et al.* (2014) using in-service science teachers found that although the teachers had a high awareness of climate change causes and mitigation, their awareness of its effects and adaptation was low.

1.4. Importance of the Non-formal Educational Sector in Climatic Change Adaptation

Education has been the principal vehicle of change in our society, as it has been utilized as the conduit of information spread, knowledge and awareness globally. Thus, the educated population (formal and non-formal) has been used as a platform to propagate the climatic change agenda towards the overall objective of sustainable economic growth and quality of life (Olubademo, 2006). Oghave (2007) defined non-formal education as activity carried on outside the framework of the formal education system, to provide different types of learning to people. It is the series of learning activities directed to certain individuals who had been deprived of the age-appropriate mainstream, traditional education opportunity. Every kind of learning that happens outside the traditional school setting such as continuing education centre, skill acquisition centre, and adult learning centre can be called non-formal (Brown and Okedara, 1981). It inculcates all the relevant knowledge, skills, attitude and values needed to satisfy the required literacy status appropriate for stated period of the life of the individual. Learning is a lifelong exercise and as the society continues to evolve there is also an accompanying rapid technological change and growth in information that also requires knowledge growth for its utilization (Smith, 2001). Lifelong education prepares the individual for change to continuously keep pace with the information landscape. Federal Republic of Nigeria (2004) outlines the goals of adult and non-formal education to include: providing functional literacy and continuing education for adults and the youths; providing education for different categories of completers of the formal education system to improve their basic knowledge and skills; providing in-service, on-the-job, vocational and professional training for different categories of workers and give adult citizens of the country necessary aesthetics, cultural and civic education for public enlightenment. These objectives equip the adult learners with everything he needs for life in order to be relevant to his society and solve some of its problems which includes the challenge of climate change.

Nigeria has been characterized as highly populated, with low literacy level, high vulnerability and low adaptive capacity due to poverty (Mbakwem, 2014) low wealth and technological development (Salami, 2011) which culminate into it being among the hardest hit nations of which climate change challenge had become almost insurmountable. There is a continuous search of streams of knowledge that could lend hand in combating the climatic change challenge. The non-formal educational sector is a channel through which training is provided to communities both rural and urban, the young and old, the educated and non-educated. The Nigerian non-formal education instructor plays a key role in creating awareness and making altitudinal changes among the citizenry. Arop *et al.* (2014) has suggested that non formal instructors and programmes need to be adopted at the non-formal levels for sustainability and to tackle attitudinal changes and nuisance groups to include: staff of government agencies, mass media, community leaders and chiefs; and law enforcement agencies. Climate change has broad impacts not only on the environment but also on economic and social development. It brings with it increasing incidence of disease, declining agricultural productivity. The effect of Climate change is quite evident in Nigeria. There is decline in rainfall in desert-prone Northern Nigeria causing desertification and increasing rain fall and South and rising waters in the coastal areas. By taking sustainable learning out of the classroom and into the community, students can collaborate with members of the community in brain storming for creative ideas needed for implementing local initiatives for climate change mitigation, adaptation, and disaster risk reduction. This can be

carried out in the non-formal sector through instructors who are aware of climate change and its impact and are committed to its mitigation and adaptation efforts.

1.5. Climate Change Teaching Approach in the Non Formal Educational Sector

As discussed above, instructors in non formal education are expected to demonstrate a capacity to educate the masses on climate change as needed for sustainable development. Afangideh (2009) and Duru (2010) identified teachers as the key facilitators of curriculum implementation. Non formal education instructors take learning out of the classroom into the community thereby supporting learners towards acclimatization with the climate change issues. Thus, Nwagu and Nzewi (2009) stated that different approaches should be employed in teaching climate change that takes into consideration different types of learners. Instructors in non-formal education should have command of a range of pedagogical /andragogical skills (individualised, cooperative, integrated approaches, expository, and discovery) as needed. UNESCO (2013) has established the Climate Change Education for Sustainable Development (CCESD) programme, recognizing the crucial contribution of education and awareness in combating the climate change challenge that are hindering sustainable development. The priorities of the CCESD programme are to encourage and enhance innovative teaching approaches; to integrate quality climate change education for sustainable development in schools and raise awareness about climate change and enhance non-formal education (UNESCO, 2013). However, this cannot be achieved if the teachers are ignorant of climate change and the classroom instructional strategies needed (Nwankwo and Unachukwu, 2012). Isiwu *et al.* (2014) showed that there were performance gaps in the ability of Agricultural Science lecturers to teach climate change content, indicating that the lecturers needed skill improvement in the teaching of climate change content. Non- formal education teachers will likely require similar skill development.

1.6. Purpose of the Study

The aim of the study was to determine the extent of awareness of non formal education instructors of climate change, its causes and effects; mitigation and adaptation measures. Specifically, the study was intended to:

1. Identify the level of awareness of climate change issues among non -formal education instructors.
2. Identify the level of awareness of climate change mitigation and adaptation measures among non-formal education instructors.
3. Identify the perception of the non-formal education instructors on their ability to teach climate change to their students.

1.7 Research Questions

The following research questions were formulated to guide the study.

1. To what extent are non-formal education instructors aware of climate change causes and effects?
2. To what extent are non-formal education instructors aware of climate change mitigation and adaptation measures?
3. How do non- formal education instructors perceive themselves as being able to teach climate change?

2. Methodology

2.1. Design and Sample for the Study

2.1.1 Design of the Study

The study used a descriptive survey design to determine the extent of non formal education instructors' awareness of climate change issues (its causes and effects) and mitigation and adaptation strategies. It also identified the non-formal education instructors' approaches to climate change instruction and climate change awareness between genders.

2.1.2. The Sample

Ninety non-formal education instructors (56 male and 34 female) were used as the sample for the study. These instructors consist of full time or part time staff; trained or untrained teachers ; retired or in-service teachers and even young and middle aged individuals providing instruction at non formal education institutions such as ,adult education centres and special skill training centres in the sampling area.

2.1.3 Sampling Technique

Akwa Ibom State, Nigeria is divided into three major districts Uyo, Ikot Ekpene and Eket senatorial districts. The sample for the study was drawn through purposive and simple random sampling techniques from all non-formal education institutions in the nine educational zones in Uyo senatorial district. First of all two non-formal education institutions each were selected purposively from each of the nine educational zones that make-up Uyo senatorial district. Purposive sampling was used to select functioning non formal educational institutions. These eighteen institutions thus selected included adult education centers and special skill training centers. Five instructors were selected by simple random sampling (using balloting) from each institution, making up ninety instructors, ten from each educational zone.

2.2. Instrumentation

2.2.1. Structure of the Instrument

The instrument used to collect data for the study was a “Non-Formal Education Instructors Climate Change Questionnaire” (NEICCQ). The questionnaire is a 24 item Likert-type rating scale designed to elicit responses from non-formal education instructors on their awareness of climate change issues such as what climate change means; causes of climate change; effects of climate change (8items); mitigation and adaptation of climate change (10 items). The questionnaire also elicited responses on the instructors perception of their ability to teach climate change in their class (4 items).The questionnaire items elicited responses on a 4 point scale of strongly agree 4 points, agree 3, disagree 2, and strongly disagree 1 point.

2.2.2. Reliability and Validity of the Instrument

The content and face validity of NEICCQ was established through faculty experts who vetted the draft and made contributions to the final version. The reliability of the scored questionnaire was established using data from 30 instructors selected from other senatorial districts. The data was subjected to the Cronbach’s Alpha test of internal consistency. The reliability index of .78 obtained from the analysis was sufficiently high to ascribe the instrument as being reliable (Gliem and R., 2003).

3. Results

3.1. Statistics and Analysis

The questionnaire was distributed to non-formal education instructors in various locations in the educational zone. The data collected using NEICCQ was collated and subjected to descriptive analysis. The questionnaire items were Likert –type items ,each standing alone as single questions (Clason and Dormody, 1994).Thus, frequencies and percentages were used to describe the instructors’ responses to the items on the four point scale (Boone and Boone, n.d.). The response were then summarized into two categories for easier interpretation, ‘Agree’ (comprising of Strongly Agree and Agree responses) and ‘Disagree’ (comprising of Disagree and Strongly Disagree responses).

3.2. Non-formal Education Instructors Awareness of Climate Change

3.2.1 Research Question1: To what extent are non-formal education instructors aware of climate change causes and effects?

Table-1. Frequencies and percentages of non-formal education instructor’s responses to awareness of climate change causes and effects.

SN	ITEM	AGREE		DISAGREE	
		F	%	F	%
1	Climate change is change in the climate atmospheric conditions	59	69.4	26	30.6
2	It is caused by increased emission greenhouse gases	65	76.5	20	23.5
3	It is caused by burning of fossil fuel.	40	47.1	45	52.9
4	It is caused by increased persistent deforestation	71	83.5	14	16.5
5	Climate change affects my health and wellbeing.	55	64.7	30	35.3
6	It causes Global warming	62	72.9	23	27.1
7	It causes extreme weather conditions	67	78.8	18	21.2
8	Climate change affects Agricultural productivity	70	82.4	15	17.6

Table 1 reveals that most of the respondents, over 50% of them in almost all the items showed some awareness of the various causes and effects of climate change with the exception of “ burning of fossil fuel” in which (47.1%) less than 50% of the respondents agreed that it causes of climate change .

3.3. Non-Formal Education Instructors Awareness of Climate Change Mitigation and Adaptation Strategies

3.3.1. Research Question2: To what extent are non-formal education instructors aware of climate change mitigation and adaptation measures?

Table-2. Mean and standard deviation of non-formal Education instructor’s response to awareness of climate change mitigation and adaptation measures.

SN	ITEM	AGREE		DISAGREE	
		F	%	F	%
	Climate change can be mitigated and adapted by;				
1	Using fuel efficient vehicles	41	48.2	44	51.8
2	Using energy efficient appliances and lighting	31	36.4	54	63.6
3	Use solar equipment.	52	61.2	33	38.8
4	Sending items for recycling	62	72.9	23	27.1
5	Planting more trees	79	92.9	6	7.1
6	Organizing public awareness campaigns	82	96.5	3	3.5
7	Environmental education programs in schools	83	97.6	2	2.4
8	Reducing transportation by providing effective communication	65	76.5	20	23.5
9	Encouraging development and use of renewable energy	40	47.1	45	52.9
10	Zero tolerance to unsustainable life style	39	45.9	46	54.1

Table 2 above show that a majority of the non –formal education instructors are aware of some of the mitigation and adaptation measures especially environmental education programs in schools (97.7%); public awareness campaigns (96.5%); planting trees (92.9%) and recycling (72.9%). However many of them were not quite aware of use of measures such as: use of fuel efficient (51.8%) ; use of energy efficient appliances (63.6%);encouraging development and use of renewable energy (52.9%) and zero tolerance to unsustainable life style.

3.4. Non-formal Education Instructor’s Approach to Climate Change Delivery

3.4.1. Research Question3: How do non formal education instructors perceive themselves as being able to teach climate change?

Table-3. Mean scores of non-formal education instructors responses to their perception of their ability to teach climate change to their students

SN	ITEM	AGREE		DISAGREE	
		F	%	F	%
1	I can discuss with my students about climate change when the topic at hand is related to it.	26	30.6	60	69.4
2	I can discuss do climate change mitigation and adaptation measures with my students in class.	20	23.5	65	76.5
3	I can make out time to discuss climate change issue during lessons	14	16.5	71	83.5
4	I will teach climate change when there are designated topics on climate change in the students’ curriculum	56	65.9	29	34.1
5	I not be able discuss climate change in my class	30	35.3	55	64.7
6	I need more information about climate change before I can teach it to my Students .	70	82.4	15	17.6

Table 3 reveals that the respondents indicate that they will teach climate change when there are designated topics on climate change in the students’ curriculum (65.9%).However; they need more information about climate change before they can teach it to their students (82.3%). Most of the instructors also indicate that they neither make out time to discuss climate change issues during lessons (83.5%) nor do they discuss do climate change mitigation and adaptation measures with their students (76.5%) or discuss about climate change when the topic at hand is related to it (69.4%) and are not able to discuss climate change in their class (64.7%).

4. Discussion

4.1. Non-formal Education Instructors Awareness of Climate Change Causes and Effects

The results have shown that the non- formal education instructors are aware that there is climate change and are also aware of its causes and effects. These findings contradict Nwankwo and Unachukwu (2012) stipulation that

there is lack of awareness about climate change which has impacted the secondary school teachers. This may not have been the case with non –formal education instructors. However, the results are consistent with [Nwagu and Nzewi \(2009\)](#) report that there is a modest level of awareness about climate change among teacher education students. The Nigerian government has over the past two decades made efforts to sensitize the nation to the impending climate change threat and ramifications. These sensitization campaigns may have increased awareness among the non- formal education teachers who are important fraction of the climatic change knowledge streams. According to this result, it is plausible to assume that these teachers have a considerable level of awareness needed to effectively transfer knowledge to the learner and with enough ardour to elicit interest among the learners.

4.2. Non-Formal Education Instructors Awareness of Climate Change Mitigation and Adaptation

The results also highlight the non- formal education instructors awareness of the mitigation and adaptation of climate change, an indication of increasing environmental literacy amongst the Nigerian populace. This is in agreement with [Nwosu and Nwosu \(2010\)](#) who found that the Nigeria people show moderate levels of environmental responsibility and environmentally friendly behaviours .However, ([Esiobu et al., 2014](#)) using in-service science teachers found out that the teachers were substantially informed about climate change and mitigation but not on its effects and adaptation. Most of the teachers in this study, were biased over certain mitigation and adaptation strategies of which only a minority accept the utilization of fuel efficient appliances and vehicles; production of renewable energy and furthermore, had zero tolerance to unsustainable life style. Intuitively, we speculate that this low compliance might translate into inadequate knowledge transfer to the learners.

4.3. Non-Formal Education Instructors Perception of Their Ability to Teach Climate Change Content.

The results have revealed that the non-formal education instructors have eluded Climate Change as a subject matter in their classroom discussions. However, those that have considered this subject also have discussed it trivially. [Nwagu and Nzewi \(2009\)](#) have suggested certain approaches that need to be employed in teaching climate change to different types of learners. And [Nwankwo and Unachukwu \(2012\)](#) pointed out the fact that most teachers do not use classroom management strategies that are required in this era of climate change. These findings relates the waning interest among these teachers who would require proper sensitization prior to their engaging in climate change curriculum instruction. Moreover, the instructors have indicated that they require more information on climate change in order to teach their students.

5. Recommendation

Non -formal education instructors play a unique role in creating awareness and knowledge for action on climate change, mitigation and adaptation as they are in contact with the various population groups especially those at the grass roots. Thus, extra attention must be paid not only in the curriculum for students of this sector but also in the training curriculum for instructors/teachers of this sector. This study has shown that the population of instructors that are reasonably aware of the causes and effects of climate change and its mitigation and adaptations measures, and are willing to teach it but have lost the confidence with the notion that they have not met the standards and thus need adequate preparation. This study therefore recommends that given the unique role of non-formal education sectors in providing knowledge and sensitizing the masses on climate change. There should be a Climate Change curriculum relevant to the needs of the learners in the non – formal education sector. The Government should also consider organising special training programmes for non-formal education instructors. These training programmes should include knowledge of climate change and the pedagogical skills required to impart the necessary knowledge and awareness to sensitive the learners for action towards engendering sustainable life styles.

6. Conclusion

This study has shown that the instructors in the non-formal education sector, though they are reasonably aware of the existence of climate change, its causes and effects, have minimal knowledge of the strategic approach to combat it ,nor do they exhibit the unction to participate in the combating of this prevailing environmental burden that has infiltrated the global community. This has been bypassed in the school curricula and needs to be address appropriately, using a top-bottom approach in such a way that there is a smooth collaboration among all the aspects of the society. A working agenda on climate change mitigation and adaptation needs to include curricular reform at the various educational sectors and should be spearheaded by the government and governmental organizations whose initiating input is essential to unleash the drawbacks while providing lasting solution to this dire concern.

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