

EMPOWERING EDUCATORS: INTEGRATING CLIMATE CHANGE EDUCATION INTO TEACHER TRAINING PROGRAMS

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ABSTRACT

Climate change poses a severe threat to the planet, and addressing it requires immediate attention. This study examines the causes and impacts of climate change while emphasizing the crucial role of teacher preparation in addressing this global challenge. Education is a powerful tool that can either contribute to positive change or perpetuate the status quo, depending on the quality of education provided and the effectiveness of teachers. The paper contends that mitigating the climate change crisis, along with environmental pollution, can be achieved by producing highly motivated, conscientious, and competent teachers across all levels of education.

Keywords: Climate change, environmental pollution, teacher preparation, education, global warming.

INTRODUCTION

The fragile nature of our earth today as a result of climate change is a serious threat to human lives. Global warming, pollution, environmental degradation emanating from climate change, are most dangerous issues that deserve urgent attention. The study focuses on climate change, its causes, the dangers or impact of the change and appropriate teacher preparation. Education is a most powerful weapon for change and direction. Ukeje (2000) cited in Anekwe and Okoli (2011) noted, It is so powerful that it can heal/ kill; it can build up or tear down. But it depends on the type of education provided and particularly the teacher who is the pillar of the education process. The paper argues that the present crisis of climate change and environmental pollution could be cushioned according to NPE (2004) by raising highly motivated, conscientious and efficient classroom teachers for all levels of our educational system. The study focuses on the university where trained teachers with curriculum in climate change through constant research and update could bring awareness and means of ameliorating and eliminating causes and problems attendant to climate change.

Understanding Climate Change

Climate Change has to do with a change of climate which is attributed directly or indirectly to natural and human activities that alter the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. It refers to changes and challenges that have adversely affected human race generally. Oxford Dictionary sees climate change as change in global or regional climate pattern, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased level of the atmospheric carbon-dioxide(CO₂) produced by the use of fuel fossils. In this definition, climate change is a threat to human lives because of excess CO₂ release into the atmosphere. The IPCC Report (2007) refers to climate change as a change in the state of the climate that can be identified (e.g.

using statistical tests) by changes in the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time whether due to natural variability or as a result of human activity. Mkpa (2013) noted that UN Framework Convention (UNFCCC) refers to climate change as a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time period. Wikipedia (2010) pointed out that climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be change in average weather conditions that is extreme weather events. UNESCO (2009) noted that it could be conceived as a change in the statistical properties of the climate system when considered over a long period of time regardless of cause. It is noted that climate change is the biggest environmental and humanitarian threat in the world today. The change makes the earth's atmosphere overloaded with heat-trapping CO₂ which threatens large scale disruptions in climate giving rise to global warming which is a most serious threat to life. Climate change may occur in a specific region or across the globe. This anthropogenic climate change is called anthropogenic global warming. The causes of climate change are varied. Greenhouse gases - CO₂ and other pollutants - methane, nitrous oxide are colliding in the atmosphere like a thickening blanket trapping the sun's heat and causing the planet to warm up (www.ntdc.org/global_warming). These gases absorb infrared radiation of heat and cause the warming up of the planet.

Why Climate Change?

Climate change, otherwise global warming, is caused by human activities. International government Panel on Climate change (2007) reported that in the past 100 years, global surface temperature has increased on the average of 0.6 °C. Central to climate change is pollution which involves the emission of harmful substances into the air, land and water. Although pollutions have been occurring throughout history, the rate at which human beings have contributed to the amount of pollution that has entered our environment over the past 100 years far exceeds the earth's inherent ability to heal itself. Some of the activities of humans that lend breath to global warming are as follows:

Greenhouse Gases

There are several greenhouse gases that are responsible for global warming and human beings emit them in variety of ways. Most come from combustion of fossils fuels in cars, factories, and electricity products. The gas responsible for most warming is carbon dioxide (CO₂), others are methane, released from landfills and agriculture especially from digestive systems of grazing animals and nitrous oxide, from fertilizers, gases used for refrigerators and industrial processes. Categories of greenhouses have heat-trapping abilities. Some of them can trap more heat than CO₂. USA Environmental Protection Agency (EPA 2014) pointed out that the heat absorbed by the planet is sometimes released as infrared radiation greenhouse gases (GH4) like water vapour (H₂O), carbon dioxide (CO₂) and methane (CH₄) absorbed energy, slowing or preventing the loss of heat to space. GHGs act like blanket making earth warmer than it should be.

Natural Causes

Global warming occurs through natural phenomena like solar variations, volcanic eruptions, glacier melting, and ocean currents orbital variations, etc. Variations in solar intensity affect global climate, and accumulation of the intensity gives rise to overheat that is detrimental to life and health. Volcanic eruptions cause the release of large quantities of sulphur dioxide (SO₂), water vapour, ash or dust. The reflection of solar energy on the space brings cooling effect that produces green house gas, CO₂

Oceanic Currents

Hays *et al.* (2005) noted that ocean currents are major drivers of global climate. Through environmental forcing mechanism redistributes heat around the planet. The huge amount of currents derived from ocean movement constitutes climate system. These produce topography affecting climate, atmospheric and ocean circulation. Changes in ocean circulation give rise to CO₂ movement into the atmosphere. Increased and unrelenting hurricanes, tornadoes, earth tremors, flooding and general increase in water levels, heavy rain falls, drought, promote climate change.

Human Activities

The contribution of human beings to climate change has been enormous. Mkpa (2013) noted that various types of combustion-gas flaring by oil companies, burning of household waste, industrial pollution of smoke and gases, bonfires etc produce carbon compounds that destroy the ozone layer. Electric power plants emit billion tons of CO₂, this constitutes 40% emission. Agricultural activities of bush burning, use of insecticides, deforestation, fishermen's use of chemicals for fishing, explosives, all kinds of cigarettes, weeds, pipe-smoking, smokes from exhaust pipes, produce carbon compounds and other green house gases. Breeding of cattle and cutting down forests, lend weight to climate change. Industrialised nations have also been breeding vast number of methane-producing livestock and cutting down forests that naturally absorb CO₂ from the air. Compassion in World Farmageddon (2014) noted that Agricultural activity like factory farming is a dangerous, unfair activity with impacts ranging from climate change to biodiversity loss and disease to food insecurity. Beyond these, the researcher observed that in Nigeria, long hours of hold up cause release of CO₂ fumes from vehicles' exhaust pipes. The terrible bad roads make driving difficult and long lasting than usual. Thus there is an unending pollution of the environment. Many deaths are witnessed in Nigeria and all these pollutions contribute to it. Cattle graze along the high ways with their droppings everywhere. Their purification constitutes pollution because CO₂ is released in large quantities.

Oil pollution is a common feature in Nigeria as witnessed in the Oil producing Areas. The damaging effect on plant life and environment are terrible.

Trapped CO₂

Discharge of wastes into streams and rivers affects the water bodies and shifts in the ecosystem balance. Salinisation of fresh water causes acidity concentration in waters as more CO₂ dissolve in them.

Impact of Climate Change

The impact of climate change is enormous. Dunnell *et al.* (2011) noted that regional temperature increases over the past 100 years are caused by increasing concentrations of green house gases in the temperature which trap reflected radiation. IPCC (2007) noted that the rate of global warming from 1976 onwards has been greater than in the past 100 years. Continuous increase in concentrated atmospheric CO₂ has been recorded.

It is changing our economy, health, communities in diverse ways. The earth heats up and there are drought, storms and fire. 2012 Weather Report showed that waves, wildfires, floods, drought hit hard in the year. Global warming has given rise to shortage of water supply for communities. It is a threat to the elderly, children and those living in poverty and want. www.nrdc.org/global_warming.

Mkpa (2013) enumerated the impact of climate change. It has devastating effect on homes. Communities had been flooded out leading to displacement, loss of lives and property and washing off of coastlines. Natural resource has been reduced introducing famine and hunger. It has led to insecurity and exposure to danger. Increase in extreme weather and sunshine give rise to heat scourge on humans and animals. The Impact of pollution, dirty surrounding has given rise to all kinds of respiratory infectious diseases. The impact is overwhelming. It therefore calls for awareness and serious dissemination of knowledge.

Climate Change Curriculum

The need for education and integration of climate change into school curriculum is most urgent. Curriculum is the focus of all school activities and it speaks volumes in terms of assessing a nation's educational system. Curriculum in a formal school setting is a set of learning experiences organised through the teaching of patterned and integrated courses and their contents offered at a school or university. Padsham *et al.* (2009) noted that a wellinformed citizenry, responsive institution and problem - focused knowledge generation are key elements for effectively addressing challenges emerging from climate change. The university has a vital role to play in strengthening knowledge systems. Chakeredza *et al.*, (2009) noted that issues of climate change should be infused into curricular of universities as a matter of urgency. The growing need for evidence based scientific data on African experiences to be infused into the curricula to serve the African specific problems is overdue. Africa and Nigeria in particular has to make significant and well-targeted investment in education and training, curriculum development, research and effective practices for communication of research findings. Such investments would yield dividends when carried out around climate change. The Dar-esSalaam (2010) forum on Education, Capacity Building and Climate Change Curriculum and Strategy for Collective Action in Africa met to articulate a vision and to develop a strategy for developing appropriate curricula on climate change, to reinvigorate teaching in order to better address climate change issues, to cultivate demand for climate change course and to bring existing courses to include issues of climate change and to put in place certain professional training modules. Thus curriculum for climate change will lead students to a progression of understanding of how humans cause climate change, the impact of greenhouses and the action necessary. School (teacher) plays a major role in the education of future consumers and demands made. Getting students understand climate change, its impact and solution prepares them to play active role in making good choice for both society and environment. Okey and Ndum (2013) pointed out that the curricula could be handled as a separate subject or infused and integrated into the existing courses. The methodology for teaching and learning should be lectures, seminars, group discussions, visits to sites demonstrating the impact of climate change and adaptation and mitigation work in progress, on-farm discussions and surveys. E-learning enhanced with research repositories can also be pursued where practicable.

Suggested Topics for Climate Change Curriculum

In keeping with Mkpa 2013, Osaat 2013, and Compassion in World Farmaggeddon 2014, three distinct areas are here proposed - Environmental Education, Ecosystem Education, and Environmental Science Education. The areas could be split into sub-sections as follows:

1. Under Environmental Education will be considered Natural Environment Function, Human Management, Settlements Development and Urbanisation.
- 2) Under Eco-system Education will be considered Bio diversity, Conservation Biology and all aspects of the Eco-system
- 3) Environmental Science Education will cover Physical, Biological & information science and Solution to Environmental Problems.

Other areas could be included with time.

University Education and Teacher Preparation

University education is the highest level of education in Nigeria. With the establishment of over one hundred and twenty nine universities, there is no gainsaying that the nation needs to take up the challenge of training qualified teachers, at this highest level, who would be equipped to put into action, climate change curriculum at the other levels of education.

Goals of University Education

Universities have the special responsibility for generating and diffusing knowledge into the economy and creating opportunities for innovation. A university trained teacher should therefore be able to perform in line with the laid down policies in education. The NPE (FGN 2004:25) noted that university should intensify and diversity its programmes for the development of high level manpower within the context of the needs of the nation. Obanya (2004) noted that education should equip people with the knowledge and skills needed to live in a high tech world. University should be able to produce highly talented teachers that would alert people of the dangers inherent in the methods of interaction with the environment and how to take preventive measures. Universities are centres of excellence, transdisciplinary, and shared thinking and intellectual domain. They are custodians of knowledge; they provide avenues for transdisciplinary, multidisciplinary and shared thought that could sustain the socioeconomic and environmental growth and development of any nation. Universities are best positioned to accommodate climate change which requires knowledge across disciplines to provide strategies for mitigation and adaptation. The university offers the most appropriate opportunity for capacity building, that is for the training of teachers and and empowering the youth, the future leaders of tomorrow who with their training will be environmentally responsible. Mohanan (2010) noted that the goals of a university education have four interlocking goals, as follows:

- a) Dissemination of knowledge (knowledge of older generation preserved for new generation)
- b) Training people aimed at the production of man power needed for the preservation and progress of the nation and society (teachers, engineers, architects, bankers, farmers etc)
- c) Training of researchers needed for the preservation and expansion of human knowledge
- d) Development and enhancement of the inner potential of individual (intellectual, moral physical, spiritual, social etc. and in addition community service.

Necessity for Teacher Preparation for Climate Change Curriculum

Teacher preparation at the university level is most appropriate for teaching functions. The teacher through various functions is equipped to effectively handle climate change curriculum. The university trained teacher, teaches, disseminates knowledge, research findings to government and industries and development and enhancement of potentials.

Dissemination of Knowledge and Community Service

The trained and qualified teacher for climate change must be prepared to disseminate knowledge, information and ideas relating to climate change and environmental education. He should be able to disseminate knowledge on how to handle environmental problems as a result of man encroachment on the land through use of modern equipment and industrial activities. The trained teachers should create fora for interaction with students and community members and integrate needs into research and teaching.

Capacity Building

The teacher should be able to train and produce in turn capable manpower that would sustain the work initiated and for the sustenance, progress and preservation of the nation and society. The teacher is able to produce engineers, bankers, and architects etc who have been exposed to climate change education.

Teaching

The trained teacher should be prepared to interact with learners with the aim to help them acquire and sustain knowledge, skills, ideas etc Teaching aims at inculcating into the individual the power of acquisition, synthesis, retention, evaluation and development of habits attitudes necessary for effective learning, The teacher in this way will help learners acquire knowledge, ideas and how to tackle climate change and all the attendant problems. A teacher on climate change should be conversant with global trends, vision and occurrences in matters of university education curricula with a view of infusing generic skills that would equip the students for the world of work. Obanya (2003:139) aptly articulated necessary generic skills for the teacher some of which are pointed out here. Analytical power, that is, an advanced capacity for logical reasoning, verbal, expression and power of perceptions etc; communication, power of oral and written expressions, problem solving, that is the ability to task one's analytical power to the maximum in a wide variety of situations; team spirit, the ability to contribute meaning fully in group activity in a wide variety of forms, to relate to others, to get out of one's shell while remaining oneself; creativity, the ability to go beyond the well-trodden path, in thinking as well as action. Versatility is necessary, that is a broadened horizon in terms of domains of knowledge and competence.

Lifelong learning skills: perseverance, risk-taking and enquiring, reading as a habit, selfdirected learning efforts, and the ability to face challenges, etc.

Information Technology (IT): as a discipline in its own right, as a tool for support to other disciplines and life activities. The climate change curriculum trained teacher needs acquire the above generic skills to pass on to students and others. These skills are so relevant and necessary for our educational system today.

Research

It is a norm that the trained teacher has been equipped to understudy research into issues and challenges of climate change and all other aspects. The teacher through seminars, awareness campaigns and personal contact should interact with all groups in the society. For instance his wealth of knowledge and experience, findings

and methods should rub off on other researchers, farmers, individuals and communities. He should be prepared to be a collaborator and consultant for non government organizations, for government, individuals etc He needs to engage in continuous research exercise that must be sustained through development of learning skills. Research results that would enable the society tackle climate change challenges.

CONCLUSION

Human activities in agriculture and industries have been identified as being responsible for climate change with terrible and life-threatening consequences. The need for proper curriculum and training of teachers at the university level for awareness will go a long way in helping to cushion problems of climate change and the need for a healthier society.

RECOMMENDATIONS

High-powered awareness campaign through a strong workforce and research should be mounted at all levels of government. Universities in addition to raising strong work force should embark on research with search light on all aspects of climate change. The society as a whole through awareness should participate in tackling the challenges

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