ASSESSMENT OF SCIENCE TEACHERS' PERCEPTION OF CLIMATE CHANGE: IMPLICATION FOR CLIMATE CHANGE EDUCATION IN SCHOOLS IN NIGERIA

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ABSTRACT

Globally, countries all over the world are being faced with the challenges of preparing their citizens for climate change in the 21st century. The changes that have accompanied climatic changes have rapidly increased demanding for adaptation and mitigation on such changes. However, in a new global economy driven by knowledge, these changes have implications on the nature and purpose of science teaching in schools to determine a framework and pedagogy for climate change education. In the light of this, this study is carried out to assess the perception of science teachers about climate change and to form a base line for climate change education in schools in Nigeria. The sample comprised of 300 purposively selected science and environmental related subjects teachers from the Three (3) senatorial districts of Ekiti state, Nigeria. Data were collected directly from the selected science teachers with the use of 4 point likert scale questionnaire designed and validated by the researcher. In-depth interviews were also conducted using selected participants to shed more light on response patterns obtained from the questionnaires. Climate change issues examined include; Determining a frame work and pedagogy for climate change education, climate change adaptation measures, as well as knowledge transfer of science process skills as related to climate change adaptation and mitigation. The results of the data collected were analysed and discussed. Recommendations were made to foster climate change education in Nigerian schools.

Keywords: Adaptation, Mitigation, Perception, Climate change, Science teaching.

Introduction

The nature and significance of environmental education

Environmental Education is an aspect of science teaching that focuses on contemporary environmental problems that demand prompt attention and solution. All over the world, people are manifesting their concern for the environment and the need for Environmental Education. Although, Environmental Education has been in existence long time ago; but its recent re-appearance with the submission of Norton and Leaman (2004) also Olatumile (2013) is as a result of widespread public concern about environmental problems such as over population, pollution, and environmental degradation.

The Climate Change

Climate can be described as the average temperature and precipitation expected throughout a typical year in a given region. The different temperature and moisture regimes in different parts of the world have given rise to different types of ecosystems called biomes. These biomes according to Hudson (2005) reflect adaptations of plants, animals and microbes to the prevailing weather pattern or climate of a region. The temperature and precipitation patterns themselves are actually caused by the determinants of weather. It is however possible for humans to adjust to any climate but, this is not true of other inhabitants of the particular regions we occupy. If other living organisms in a region are adapted to a particular climate, then a major change in the climate represents a serious threat to the structure and function of existing ecosystems. The subject of climate change is such a burning issue today because we depend on these other organisms for a host of vital goods and services without which we could not survive.

Scientific evidence in Banuri, Weyant, and Akamu, (2001); Behrens, (2009) and Bouwer, (2006) indicates that human activities have contributed significantly to the climate change through the use of energy and emission pollutants in our quest to provide the basic necessities i.e. food and shelter and other products for world's overgrowing population. Although, man has since affected the environment but it is only in the twentieth century that the consequences of this action have expanded to a global scale.

Today, cumulative effect of human activities is a significant force driving the changes in the global environment. These changes brought by human activities tend to make life more and more difficult for organisms and even human. There is need for proper education i.e. Climate change education to stop this damaging trend. We have to device the right code of conduct to regulate our behaviour towards the environment and the natural resources so that the quality of life we live is not compromised and the ability of our future generations to meet their needs is not affected. As an appeal to human conscience, his ethical convictions and perception about good and bad, the right or wrong is often an effective way to control an unimaginable problems.

Response to Climate Change

It is a reality that climate change is a clear and present challenge to our society. How exactly we should respond to climate change is a difficult question one will likely be wrestling with for decades. One possible response to this situation is "adaptation". That is, we must anticipate some harm to natural and human systems and should plan adaptive responses to lessen the vulnerability of people, their property and the biosphere to coming changes.

Another way is to reduce the rate at which emissions are added to the atmosphere and eventually bring about a sustainable balance .This is the 'mitigation' response.

Climate Change Adaptation

Adaptation to climate change involves adjustments in ecological, social or economic systems in response to current or expected impacts according to Intergovernmental Panel on Climate Change (2001). It has to do with the changes in human behaviour, practices or structures that are capable of moderating or offsetting potential changes in climate. It involves adjustment aimed at reducing vulnerability of communities, regions or activities to climate to variability and change. Adaptive capacity however is the potential or ability of a system, region or community to adapt to the effects or impacts of climate change. The use of adaptive capacity represents a practical means of coping with changes and uncertainties in climate including variability and extremes.

The ability to adapt and cope with climate change impact is a function of wealth, scientific and technical knowledge, information, skills as documented by Infrastructure Institution and Equity in Intergovernmental Panel on Climate Change (2001). Countries or societies that lack access to these are more vulnerable in most cases to climate change impacts. Many adaptive measures according to (Cunningham and Cunningham, 2003; Copenhagan, 2010) include public education and awareness, seasonal climate forecasting, adjustments of cropping systems, diversification of production and restoration, adaptation to water problems, building reserves and provision of relief measures, to mention a few.

Climate Change Mitigation

Climate change mitigation refers to actions that are targeted toward the reduction of the magnitude or rate of long term climate change. It involves efforts to prevent or reduce emission of greenhouse gases. Miller (2008) pointed out that climate change is essentially a consequence of the choices that are made in the generation and use of energy. He suggested that alternatives to fossil fuels have the potential to eventually halt the change caused by CO_2 emissions. Mitigation can however be achieved by increasing the capacity of carbon sinks, through reforestation, switching to low carbon energy sources, expanding forests (carbon capture storage), improving the insulation of buildings and geo-engineering.

Perceptions of science teachers on environmental education

Environmental perception and behaviour is an essential tool in understanding man-environmental problems as well as to device possible solution to it. Studies such as The Pew Research Center, 2009; Whitmassh, 2011; Leviston & Walker, 2011; Norton & Leaman, 2004) have shown the search by different scholars for relevant philosophies, theories and models for explaining the ever-growing problems of man-environment. The emergence of the behavioural approach according to Leiserowitz, Maibach, Roser-Renouf, & Smith, (2010) cannot be overestimated because human perception and reaction to the environment is the only thing which can save man from disaster.

Climate change continues to be a low priority issue in relation to other social issues such as economy, terrorism, education, HIV/AIDS and so on. Opinion on concern and perception about climate change have reduced somewhat and this is aggravated by continual increase in the number of people that are uncertain about the reality of human influence on the climate (British Broadcasting Corporation (BBC), 2010). From the study conducted by

Leviston and Walker (2011), they concluded that public awareness about climate change is low and that professional groups are likely to see climate change/global warming as the most serious global threat compared with other social classes.

All over the world, the quality of human environment has been altered and has aroused the need for an education system that ensures environmental protection and maintenance of life support system. This according to Upham, Whitmarsh, Poortinga, Purdam, Darnton, McLachlan & Devine-Wright (2009) is because the battle for environmental quality should centre on human than on the environment. Therefore the essence of human perception in environmental education should not in any way be ignored. Education according to Olatumile (2013) has a central role to play in understanding, mitigating and adapting to the changing climate which is an essential element of the global response to climate change. It also instil in people the skills of understanding and addressing the impact of global warming, encourages changes in their attitudes and behaviour as well as helping them to adapt to trends in climate change.

In the knowledge driven society according to (Obanya, 2002; Tinio, 2003) it therefore becomes imperative that basic education programme is utilized maximally if climate change problem is to be alleviated. Since climate change education as documented in UNESCO excerpts by its Director General, Koichiro Matsuura (2009) is about helping learners understand and address the impacts of global warming today, while at the same time encouraging the change in attitudes and behaviour needed to put our world on a more sustainable path in the future.

However, according to Olatumile (2013), the 21st century is confronted with a lingering crisis that links the present with the future. The United Nations Framework Convention on Climate Change model on education, training and awareness in addressing the problem of climate change, may not be workable in a developing nation like Nigeria without strong recourse to lifelong education in which the non-formal mode of education is specially emphasized.

Effective climate change education cannot be achieved without mobilizing the concerted efforts of people who are actually saddled with the responsibility of disseminating information, ideas and innovations related to the environment and environmental issues. Therefore, the role of science teachers in providing basic education on climate change cannot be over-emphasized and this informed the assessment of science teachers' perception of climate change with its implication for climate change education in schools in Nigeria.

Statement of the Problem

Globally, the quality of human environment has been altered and has aroused the need for an education system that ensures environmental protection and maintenance of life support system now and for the future. Therefore the essence of human perception in environmental education should not in any way be ignored and this has implication for the teachers who have a central role to play in this knowledge driven society. However, the pedagogical framework on climate change model on education, training and awareness in addressing the problem of climate change may not be workable in a developing nation like Nigeria without strong recourse to lifelong education in which the non-formal mode of education is specially emphasized. Therefore, the role of science teachers in providing basic education on climate change cannot be over-emphasized and this informed the problem of this study.

Research Questions

1. What is the extent of science teachers' awareness of climate change?
2. What is the perception of science teachers on climate change education?
3. What is the quality control level of science teachers in environmental topics in basic education?

Selection of Participants

Participants of this study were drawn from Three (3) senatorial districts of Ekiti State, Nigeria. The sample comprised of 300 purposively selected science and environmental related subjects teachers from the basic education level among primary and post primary schools of Ekiti State, Nigeria.

Research Instruments and Administration

The instruments used to collect data for this study was Science Teachers Climate Change Awareness Questionnaire (STCCAQ) designed by the researchers and validated by experts in environmental studies, while the reliability of the questionnaire was determined using Cronbach coefficient alpha in which r = 0.88 having administered it in a try out study to a set of teachers in a neighbouring state. This consists of three sections: Section A identifies the purpose of the questionnaire and seeks some demographic information from the respondents. Section B seeks information about the practice of environmental education in schools; Section C seeks information about climate change.

Also the researchers conducted an in-depth interview for selected participants about the practice of environmental education in schools. The questionnaire was administered to the selected participants in the three senatorial districts of Ekiti state within a period of three weeks and the interview conducted concurrently by the researchers.

Data Analysis

Frequency and mean score for each item on the questionnaire were calculated. Chi-square statistics was used to compare the responses of the participants.

Results of the Study

Table 1-3 presented the results of the data collected and analysed to answer the questions raised to guide this study.

Research question1: What is the extent of science teachers' awareness of climate change?

Table1
Contingency table comparing science teachers' awareness of climate change

GROUP	FREQUENCY DISTRIBUTION		RESULTS	
	POSITIVE (Strongly agree and agree)	NEGATIVE (Disagree and Strongly disagree)	X^2C	X^2T
HIGH	50	60		
LOW	85	90	0.26	3.84

* Significant at 0.05 levels.

Research question 2: What is the perception of science teachers on climate change education?

Table 2
Contingency table comparing the perception of science teachers on climate change education

GROUP	FREQUENCY DISTRIBUTION		RESULTS	
	POSITIVE (Strongly agree and Agree)	NEGATIVE (Disagree and Strongly disagree)	X^2C	X^2T
HIGH	58	64	0.10	3.84
LOW	86	88		

* Significant at 0.05 levels.

Research question 3: What is the quality control level of science teachers in environmental topics in basic education?

Table 3
Contingency table comparing quality control of science teachers on environmental topics in basic education

GROUP	FREQUENCY DISTRIBUTION		RESULTS	
	POSITIVE (Strongly agree and Agree)	NEGATIVE (Disagree and Strongly disagree)	X^2C	X^2T
HIGH	48	57	0.0004	3.84
LOW	77	91		

* Significant at 0.05 levels.

Summary and Conclusion

The following could be inferred from the results:

1. Science teachers awareness of climate change is very low consequent upon the non-significant result of X^2 Calculated (0.26) less than the table value of X^2 table (3.84) at 0.05 level of significance.

2. Science teachers perception of climate change is very low consequent upon the non-significant result of X^2 Calculated (0.10) less than the table value of X^2 table (3.84) at 0.05 level of significance.

3. Science teachers quality control of basic education environmental topics is very low consequent upon the non-significant result of X^2 Calculated (0.0004) less than the table value of X^2 table (3.84) at 0.05 level of significance.

4. The results are just a reflection of the in-depth interviews conducted for the participants on the subject of climate change in environmental education.

The implication of this study is that policy makers, curriculum planners and more importantly government at all levels works toward sustainable education system that will require a major mobilisation of skills and training- both to equip teachers and to enable changes in practices that will positively influence our environment. Communities of the future will be based on integrated designs which incorporate education, social, ecological and economic values for sustenance. Finally, linking sciences and policy for adaptations and mitigations of climate change will not just require more and better science teaching but it will require building linkages between sciences, policy makers and resource users that share information and support for changes.

References

Banuri, T.,Weyant, J., Akamu,G. (2001). Setting the Stage: Climate Change and Sustainable Development, in *Climate Change 2001: Mitigation.* Contribution of Working group III to the Third Assessment Report of the lnter-governmental Panel on Climate Change, B. Metz, O. Davidson, R. Swart and J. Pan (eds) Cambridge: Cambridge University Press.

Behrens, A. (2009) Impacts of Climate Change Mitigation. *Climate Change Law Review* 3(2), 179-87.

Bouwer L.M. and Aerts J.C. (2006) Financial Climate Change Adaptation, *Disaster* 30(1), 49-63.

British Broadcasting Corporation (BBC) (2010). *BBC climate change poll*. Retrieved March 20, 2011, from http://news.bbc.co.uk/nol/shared/bsp/hi/pdfs/

Commission on Climate Change and Development (2009) Closing the Gaps: Report of the Commission on Climate Change and Development. Stockholm: Swedish Ministry of Foreign Affairs.

Copenhagen, A. (2010) Decision Noted by the Parties to the Fifteenth Conference of the Parties to the Climate Change Convention. FCCC/CP/2009 18th December, 2009.

Cunningham, W and Cunningham, M.A (2003) Principles of Environmental Sciences: Inquiry and Adaptations. 2nd Ed., Tata McGraw Hill Publication, New Delhi.

Hudson, P.J. (2005) Parasites, diversity and the ecosystem. Parasitism and Ecosystems. Ed Thomas, Renaud, F & Guegan, J.F. Oxford pp1-12.

Intergovernmental Panel on Climate Change (2001) Climate Change 2001: Impacts, Adaptations and Vulnerability. Contributions of working group II to the third assessment report.

Leiserowitz, A., Maibach, E., Roser-Renouf, C., & Smith, N. (2010). Climate change in the American Mind: Americans' global warming beliefs and attitudes in June 2010. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication. Retrieved from http://environment.yale.edu/climate/files/ClimateBeliefsJune2010.pdf

Leviston, Z., & Walker, I. (2011). Second Annual Survey of Australian Attitudes to Climate Change: Interim Report. CSIRO Australia. Retrieved from https://publications.csiro.au/rpr/ pub?list=BRO&pid=csiro:EP116224.

Miller, A (2008) Financing the Integration of Climate Change Mitigation into Development. *Climate Policy*. Vol. 8(2), 152-69.

Norton, A., & Leaman, J. (2004) The Day After Tomorrow: Public Opinion on Climate Change. London: MORI Social Research Institute. Retrieved from http://www.climateaccess.org/resource/day-after-tomorrow-public-opinion-climate-change.

Obanya, P.A. C (2002). Reutilization of Education in Africa. Lagos : Starling – Holding Publishers Limited

Olatumile, A. (2013) Assessment of Environmental Professional Awareness of Climate Change: Implication for Climate Change Education. *International Education Research.* Volume 1, Issue 3 (2013), 38-50

The Pew Research Center (2009). Fewer Americans See Solid Evidence of Global Warming. Retrieved November 24, 2012, from http://people-press.org/report/556/global-warming.

Tinio, V.L. (2003) ICT in Education E – primers, United Nations Development project (UNDP). Bureau for development policy, New York.

Upham, P., Whitmarsh, L., Poortinga, W., Purdam, K., Darnton, A., McLachlan, C. & Devine-Wright, P. (2009). Public Attitudes to Environmental Change: a selective review of theory and practice. A research synthesis for the Living with Environmental Change Programme, Research Councils, UK. Report for ESRC/LWEC. Manchester: ESRC

Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: dimensions, determinants and change over time. *Global Environmental Change*, *21*(2), 690–700.