

Teachers Awareness of Climate Change: Implications for innovative Teaching

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Abstract

Teachers' awareness of climate change and its implication to teaching in Secondary School was investigated. The study was carried out in Port Harcourt city and Emohua Local Government Area. 200 Science Teachers were sampled out of 450 teachers using a stratified sampling technique from 10 schools in each target area. Three research questions and three hypotheses were formulated. A survey design was adopted and the instrument was a 30-item questionnaire structured in a 4-point modified Likert scale, which was validated by experts and considered reliable at a coefficient of 0.75 using product moment correlation coefficient. The data administered and analyzed using Mean, Standard deviation, population t-test and t-test statistic. Findings showed that the awareness of teachers on climate change and the sources of information are significantly low, while a significant difference was found between male and female teachers on the level of awareness on climate change. Based on the findings, it was concluded that teachers have scanty source of information and adequate awareness on the menace of climate change for pedagogical application in the classroom. The study recommends that climate change educators should provide opportunities for climate change awareness education to the teachers. It further recommends that an arrangement be made ahead of time to cope with the effects of climate change, probably through a workshop for classroom teachers.

Introduction

Education is a core strategy to achieve a meaningful and sustainable development in our changing society. At the present era, education for sustainable development is gaining ground across the shores of Africa and beyond. The sustainable development is increasing its profile even more within the Higher Education circle that its potential role contributes immensely to the society through the skills that graduates acquire. These skills are knowledge driven through the exchange of business and public engagement.

Haigh (2005) appreciates that sustainable education should span the whole range of subjects discipline, traditionally viewed within the Geography, Earth and Environmental Science (GEES) issues. One of the environmental issues is the climate change harassing the planet earth in recent

time. Evidence of climate change is however shown in campaigns and researches carried out for quite about 10 years past.

For instance, Intergovernmental Panel on Climate Change (IPCC, 2001) and Copenhagen (2009), without much doubt, obviously observed that climate change impact is quite around us. The climate change is described as any kind of change in climate that may be natural or human induce, resulting to deviation in normal adopted weather condition (Union of Concerned Scientist, 2012).

Climate change as defined by Ekpoh (2009), is any long-term change in the patterns of average weather of a specific region or as a whole. This abnormal weather condition may occur over a period of years. Report of (IPCC, 2000) shows that global mean temperature is noticed to increase by 0.60 Degree Celsius. During the past century, having the hottest years occurring between 1999 and 2007, this is being informed through the global warming cushioned by the high concentration of Carbon (IV) oxide and other fossil fuel combustion and deforestation. These by extension have consequences on the earth in the form of significant variations in the regional climate, excessive heat waves, windstorms and so on.

Climate change appears as a threat to the living now and as well to environmental factors (economic development, industrialization, urbanization, consumption and lifestyle pattern). Somehow, linking the threats in terms of its actual and anticipated effects (increased scarcity of resources). At this level of unawareness, the United Nations Education Scientific and Cultural Organization (UNESCO) tends to promote Education for Sustainable Development (ESD) as the best frame work for addressing climate change issue through education (UNESCO, 2010).

The perception of human threat resulting from climate change on sustainable development could sufficiently be understood through education and raising awareness and its effect right from secondary school level.

The priorities of UNESCO in establishing Climate Change Education for Sustainable Development (CCESD) programmes are to:

1. Strengthen the capacity of countries to provide quality change education for sustainable development at secondary school level.
2. Encourage and enhance innovative teaching approaches to integrate quality of climate change education for sustainable development in school.
3. Raise awareness about climate change and enhance non-formal education programme through media, networking and partnership (UNESCO, 2010.P.5)

The need for teachers' awareness of the curriculum framework in climate change, with the view of assisting the learners, becomes imperative. Awareness of climate change calls for what curriculum pattern is likely suitable for imparting the knowledge to the learners. Of course, the issue of climate change does not limit itself to a specific area of subject. It is interdisciplinary at the various components of social life.

At present, the need to know the cause of climate change as accumulation of CO₂(carbon iv oxide) and other heat trapping gases in the atmosphere, as well as the effect of greenhouse gas emissions becomes imperative. It may not also be limited to other predominant economic paradigm and the view about nature exploit for the interest of human consumption. The rapid impacts of climate change as a threat to health of people, animals and plants should be made known to the present generation. Also, threat to cultural heritage and lifestyles, increasing hunger and malnutrition as land becomes arid is expected to create awareness of climate change in the classroom. Students need to be aware, according to Utang (2012), that illness could result due to

high temperature which has its own hazards of heat exhaustion and heat stroke that may lead to death. He equally pointed out the commonest of these illnesses come from greenhouse effect resulting from high consumption of fossil fuel that releases carbon dioxide, water vapour, and methane into the atmosphere.

In Nigeria, nobody loses sight of the consequences of climate change in the form of thunder storm and flooding on a yearly basis. Odey (2009) in Ekpoh (2011) has pointed out that the climate change impacts pose great dangers with consequences such as desertification, sea level rise, flooding, water salinity, among others. Climate changes no doubt will result to attendant health challenges like stroke, malaria, fever and other related diseases due to excessive rise in temperature and water level. It will by extension, affect every aspect of our lives, economy and developmental patterns (Ekpoh,2009). Umenduji (2012) observed that climate change has huge impact on humans, growth of crops, and make some regions inhabitable.

It is on this basis that alarm is being raised at the global perspective regarding the devastating nature of climate change and the need to raise awareness to address its various effects. As noted in common saying “A stitch in time, saves nine” the need to make people aware of this menace becomes necessary through campaign. This should be prompt, since a lot of misconception is bound to misdirect people from the actual phenomenon of climate change.

Researches are replete concerning the understanding of climate change and recent environmental problems. The obvious ones stem from the misconception that people hold about climate change issues in terms of consequences, and remedies (Rye, Rubba and Wisenmajer(2009) in Ekpoh and Ekpoh(2011) are probably due to complexity of the science involved, the uncertainties and controversies surrounding them. Invariably, climate change awareness has to do with knowledge, understanding, attitude, skills and abilities towards a better sustainable environment. The preparation of teachers in achieving this role in the classroom becomes a strong weapon to guide our future generation to equip them to handle the issue of climate change

To effectively understand climate change, there is need to construct a new knowledge and understanding within learners’ existing and already established beliefs. As noted by Dripigony-Gironx (2008), students are unaware that their understanding is naive compared to scientific representations. Such prior knowledge on misconception of climate change can pose a significant barrier to deeper learning and conceptual change. This implies that teachers must work to deconstruct the existing partial knowledge as part of the educational process in order to achieve effective climate change education.

The need for this study is necessitated by the ever increasing or often represented by the media concerning climate change and sustainability issues. This has several effects:

- Learners feelings of knowledgeable and well informed notion about climate change
- Learners strong emotive view points on the subject of climate change and sustainability
- Learners influence on the media representation about climate change controversy than reflect on the scientific basis
- Learners boredomness on the repeated coverage of climate change misconception(Antilla, 2005).

Therefore the relationship between the teacher and students is very important as the teacher’s role model can easily influence their views. It is noted that the capacity within the secondary schools system to provide robust climate change education for learners during the earlier stage of their education is limited (Bardsley and Bardsley, 2007). This may exacerbate the misconceptions generated by media coverage of the subject, leading to poorly prepared learners

at tertiary level. Study has shown that in secondary education, many teachers feel unprepared to teach climate change (Johnson, 2008). They may probably lose sight of the prevailing information and continue to depend on the obsolete text books. Umenduji (2012:3) stressed the need for experts to research and to break more grounds into the relevant knowledge in the needs, trends and patterns of changes in the weather. In order to ensure actual preparedness to teach climate change in schools, it is necessary to know the level of awareness of those that will handle the instruction. The paper therefore looks at the level of secondary school teachers' awareness of climate change in Rivers State. This is informed by the fact that education plays a vital role in helping to give correct information about changes in phenomena so as to correct the misconception of students at secondary school level.

The research questions that guided this study are:

1. What is the level of awareness of secondary school teachers on climate change?
2. Do teachers have enough access to information on the phenomenon of climate change?
3. How does the level of awareness of climate change discriminate among gender (male/female) teachers in secondary school?

The research hypotheses formulated for this study are:

1. The level of secondary school teachers' awareness of climate change is not significant.
2. There is no significance in teachers' awareness on the source of information on climate change.
3. There is no significant difference between male and female teachers in their level of awareness on climate change.

Methods

The study was carried out in Port Harcourt City and Emohua Local Government areas of Rivers State. A survey design was adopted for the study. The population comprised of 450 Senior Secondary School teachers in the study areas. 200 teachers were sampled using stratified random sampling technique to obtain 20 schools of 10 schools in each target areas. On the basis of gender equality, for this study, 100 male and 100 female teachers were used. A self developed questionnaire tagged "Questionnaire of Climate Change Awareness "(QCCA) consisting of a 30-item instrument was constructed for the study. The instrument had 3 sections -Section A contained the demographic profiles of the sample. Section B contained 15 items patterned in a 4-point modified likert scale, {Strongly Agreed(SA), Agreed(A), Disagree(D) Strongly Disagree (SD)} and section C contained measures of teachers' source of information on climate change.

The face and content validity were ensured by two lecturers in the department of Guidance and Counseling, Faculty of Education, University of Port Harcourt. Also a lecturer in the Geography and Environmental Management, University of Port Harcourt determined the content coverage of the questionnaire. A test retest method was used to establish the reliability index of 0.75. using Pearson Product Moment Correlation Coefficient (PPMCC). This figure confirmed the suitability of the instrument for the study.

The data for the study were realised through the personal administration of the instrument to the target schools in May 2013. The teachers were personally met and details of responses to the contents were explained. This method yielded dividend as 100 percent of the questionnaires were returned and collated. The Data realised were subjected statistically to population t-test and independent t-test.

Results

Research Question 1 and Hypothesis 1

What is the level of awareness of secondary school teachers on climate change? Level of Secondary school teachers' awareness of climate change is not significant. The variable in this, is level of secondary school teachers' awareness of climate change. Since only one variable is involved, a population t-test or single mean was used to analyze the data obtained. The result is presented in Table 1

Table 1: Population t-test analysis of the level of climate change awareness among Secondary School teachers.

N=20		Expected Mean	Observed Mean		
Variable	μ	\bar{X}	SD	t	
Teachers level of climate change awareness	47.93	43.33	6.20	-0.74	

df=199; t cri=1.960; Not significant @ 0.05 confidence level

The result in Table 1 shows that the calculated t-value of -0.74 was obtained, which is less than the t critical value of 1.960 at 0.05 alpha level with the degree of freedom df (199). This result accepted the null hypothesis while the alternate is rejected. This implies that the level of climate change awareness by secondary school teachers is not significantly high enough to sensitize students awareness in the classroom in Port Harcourt City and Emohua Local Government Area. The result, no doubt indicates that the observed mean is less than the expected Mean ($\bar{X} = 43.33 < \mu = 47.93$). The negative t-calculated (-0.74) is to say that the level of teachers awareness of climate change is quite low to sensitise students awareness on climate change.

Research Question 2 and Hypothesis 2.

Do Teachers have access to sources of information on climate change?

Teachers access to sources of information on climate change is not significant.

The variable involved is teachers' access to sources of information on climate change. Population t-test (t-test of one sample mean) was used to analyze the data. The result obtained is presented in Table 2.

Table 2. Population t-test analysis of Teachers' access to sources of information on Climate Change.

N=200		Expected mean	Observed Mean		
Variables	μ	\bar{X}	SD	t	
Teachers' access to sources of information on climate change	47.93	43.63	6.80	-0.63	

Df=199, tcri -1.960, not significant at 0.05 confidence level.

The result in Table 2 equally shows that the calculated t-value of -0.63 was obtained and found to be less than the t-critical value of 1.960 at 0.05 level of significance and degree of freedom of Df=199. The null hypothesis was accepted and the alternate hypothesis rejected. This means that the teachers' awareness of sources of information concerning the climate change is low.

On further comparing the Observed mean ($\bar{X} = 43.63$) and the Expected mean ($\mu = 47.93$), it could clearly be seen that there is a difference of ($x = 4.30$) skewed to the expected. This is

further informed by the negative value of t-cal (-0.63), which is an indication of a low level of information on the prevailing circumstances of climate change.

Research Question 3 and Hypothesis 3

How does the level of awareness of climate change discriminate among the Male and Female teachers in secondary schools?

There is no significant difference between male and female in their level of awareness on climate change.

The independent variable is male and female teachers, and the dependent variable is level of climate change awareness. Independent t-test statistic analysis was used to compare the mean scores of male and female teachers. The result is presented in Table 3.

Table 3- Independent t-test analysis of the difference between male and female teachers in their level of climate change awareness.

Variables	N	\bar{X}	SD	Df	t-cal	t-crit	Decision P>0.05
Male	100	52.36	8.44	198	6.76	1.960	0.05
Female	100	43.50	10.04				

*significant at 0.05; df=198, critical t-value=1.960

Table 3 shows the result of analysis with respect to the Mean and Standard Deviation for Male as ($X=52.36$, $SD=8.44$) and Female as ($X=43.50$, $SD=10.04$). A mean difference of 8.86. The independent t-test statistic calculated has the value of $t\text{ cal}=6.76$ and this is greater than the Critical value ($t\text{ cri}=1.960$). This is an indication that a significant difference exists between male and female teachers in their level of awareness of climate change. This result rejects the hypothesis.

Summary of Results

1. The level of awareness of climate change by secondary school teachers is not significantly high but low.
2. Teachers Knowledge of the sources of information on climate change is significantly low
3. There is a significant difference between Male and Female in their perception or awareness of climate change.
4. Male teachers are better informed than female teachers since the $X = 52.36$ for Male is higher than the $X=43.50$ for Female teachers.

Discussion of the Result

The study centered on the issue of climate change awareness by secondary school teachers in Port Harcourt city and Emohua local Government Area of Rivers State. Teachers were chosen as target sample because they are the facilitators in the school system. It therefore beholds on them to be properly informed on the present weather situation, to enable them manage possible the misconception on any issue in the classroom. The issue of climate change is at present the talk of every person; particularly the meteorologists appear to loose fate in their scientific method. Lots of misconceptions are abound among teachers and students that they do not seem to have any clue on the way forward. The manifestation of the climate change appears in different threatening situations that affect human and environment alike.

Consequently, the study was carried out to ascertain the level of awareness of teachers on climate change.

On the analysis of the data obtained, being guided by the Research Questions and Hypotheses, it was revealed that in research question one and hypothesis one, the mean observed ($X=43.33$) is less than the expected ($\mu=47.93$) with the standard deviation of 6.20 which was subjected to a population t-test statistic analysis. The result obtained indicated that the t-calculated (-0.74) was less than t-critical (1.960) at 199 degree of freedom. This implies that teachers' awareness of climate change is quite low. This result is in consonance with the results obtained by Johnson, 2008 and Ekpoh and Ekpoh, 2011 at Calabar city of Nigeria who in their various findings found a misconception or lack of awareness of climate change by teachers.

The study further investigated the sources of information on climate change. The question and hypothesis raised and data collected were analyzed. The result showed that the teachers have shallow information as shown in Table 2. The mean expected ($X=47.93$) is higher than the observed mean ($X=43.63$) with a standard deviation of 6.80. These parameters were subjected to population t-test statistic, the result obtained indicated a low and limited knowledge of the sources of information by teachers on climate change. The t-calculated (-0.63) is less than t-critical value (1.960) at 0.05 level of significant. This result is equally similar to the result obtained by Ekpoh and Ekpoh (2011)

In a bid to showcase what may likely be the outcome of male and female, Table 3 showed that a significant difference was found. The t-calculated (6.76) was greater than t-critical value (1.960) at 0.05 level of significance. This further showed that males have a better awareness of the effect of climate change than females. This result agrees with the findings of Ekpoh and Ekpoh (2011).

Conclusion

Climate change is a phenomenon that has become a threat globally. A lot of monitoring on the likely outcome is being put in perspective. One major way of disseminating information on the menace of climate change is in the classroom. The need for teachers' awareness necessitated the study. Consequently, the revelation became obvious that there is scanty awareness by the teachers. Meanwhile, the male teachers appear to have the misconception than their female counterpart.

Implication

The study is timely since the teachers who are closer to students as facilitator of knowledge should be better informed on the circumstances of climate change. A clear cut knowledge in the classroom will reposition the students and the general public on the consequences of climate change.

It will also border on the curriculum planners and stakeholders in the education sector to adjust the curriculum with better funding to address the menace of climate change.

Recommendation

The study recommends as follow:

1. A workshop should be organized for teachers of secondary schools to enable them have a better understanding to cope with the menace of climate change. This will equip them for classroom delivery.
2. The stakeholders should make arrangement ahead of time on how to handle the effects of climate change.

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