

ASSESSMENT OF THE PERCEIVED IMPACT OF CLIMATE CHANGE ON STUDENT-TEACHERS IN NIGERIAN TERTIARY INSTITUTIONS

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Abstract

The study assesses the perceived impact of climate change on student teachers in Nigerian tertiary institutions. The study adopted descriptive survey research design. Two research questions guided the study while two hypotheses were formulated and tested at 0.05 level of significance. The population of the study comprised of all the students of 2020/2021 final year Degree students of Alex Ekwueme Federal University and NCE students of Enugu State College of Education (Technical). Purposive sampling technique was used to select one hundred and eighty (180) students from both institutions. The instrument for data collection was a structured questionnaire titled Questionnaire on Perceived Impact of Climate Change Teacher (QPICC). The questionnaire was structured by the researchers and validated by two experts in Science Education and Measurement and Evaluation respectively. Data collected were analyzed using mean and standard deviation to answer the research questions while t-test statistics was used to test the null hypotheses. The findings revealed that student-teachers have adequate knowledge of cause, impacts and solution of climate change respectively. The researchers recommended that climate change education be introduced into the teacher training institutions and regular training and workshops be organized to update teachers' knowledge on the causes, impacts and mitigation strategies on climate change.

Key words: Assessment, Climate change, Perception, Student-Teacher, Mitigation

Introduction

Climate change today represents one of the worst and greatest environmental, social and economic threats of the 21st century facing the planet Earth. Climate change is the statistical changes that occur in the climate over a long period of time. Climate change which is the average pattern of weather over the long term is one of the most devastating environmental threats facing mankind. The earth's climate has warmed and cooled for millions of years long before the existence of science, and this has a lot of implications for the survival of man on earth. This is because man needs a conducive and suitable environment to survive. Climate change is part of the earth's natural variability, which is related to interactions among the atmosphere, ocean, and land, as well as changes in the amount of solar radiation reaching the earth. The changes in climate are now observable as any change overtime, whether due to natural variability or as a result of intense man's activities (IPCC, 2007). According to Henson (2006), it describes the past, present and future shifts in climate on global, regional and local scales. Houghton (2001) opines that climate change can also be considered as a change in the statistical properties of the climate system when

considered over periods of decades or longer regardless of cause. There have been records of evidenced significant changes of the earth's climate, ranging from drought, flood, extreme temperature leading to different atmospheric phenomena some of which are natural occurrence and some are induced by man leading to a long-term alteration in global weather patterns, especially in stormy activity.

Climate change is one of the greatest threats facing mankind today, has a lot of implications for the survival of man and organ living organism and its impacts are being experienced in all regions of the world. Climate change has been defined by different researchers as a stable and durable change in the distribution of climate patterns over a period of time ranging from decades to millions of years Moreno & Perdomo (2018). According to Offorma (2010), climate change is a continuous, rapid and prolonged alteration of climate in one direction; it is the variation in global or regional climate over time-ranging from decades to millions of years. Climate change is significant and lasting change in statistical distribution of weather patterns over a period (Wikipedia, 2012) it includes patterns of temperature, humidity, wind and seasons. Climate change is a global phenomenon which is evident in Nigeria. It is an international issue which requires both national and international approach and indigenous knowledge. Mitchell, Williams, Hudson & Johnson, (2017) define climate change as any change in climate, whether is due to natural variability or as a result of human activity. Climate change is with us now, the earth is warming, seasons are shifting, and species are either migrating to various geographical ranges or getting extinct, while water scarcity is a reality.

The two major causes of climate change are the natural and anthropogenic/man-made/human activities according to Odujogo, (2010). Natural activities are the eccentricity of the orbit, solar radiation and ultraviolet radiation; these cause the warming of the environment thereby increasing the average temperature. The increase in temperature is referred to as global warming. Anthropogenic/man-made/human activities include urbanization, deforestation, population explosion, and industrialization. Other industrial process and mining that releases green house gasses (GHG), refuse disposal in the stream, sewage and septic systems. Others include; burning of fossil fuel from automobile and power plant, burning of oils, gasoline and coals. IPPC (2007) stated that fossil formed by long-dead plants and animals, coal burning, oil and natural gas release billions of tons of carbon every year that would otherwise remain hidden in the earth crust as well as methane and nitrous oxide. More carbons are released when trees are cut down and not replaced. Moreover, the use of fertilizer produces nitrogenous oxide. Such agricultural practices such as application of fertilizer, manure management and deforestation are contributors of climate change.

The impact of climate change has no border and it directly affects global sustainable development, livelihood and man's ability to coexist on earth (Sambo, 2010). The impacts of climate change are far more reaching in developing countries. It is an environmental, social and economic challenge on a global scale Scholze, Knorr, Arnel & Prentice (2006). It can be caused by human induced actions such as: the widespread use of land, deforestation, infusion of anthropogenic compounds into the atmosphere. Human activities always result in the emissions of greenhouse gases into the atmosphere, such gases consist of carbon dioxide, nitrous oxide, methane and the halogenated compounds. The accumulation of these compounds in the atmosphere cause the concentrations of these gases to increase, some of which have adverse effect on the atmosphere and results in other atmospheric hazards that are dangerous to human's health. All of these causes a lot of challenges for mans' survival on the surface of the earth.

The most devastating adverse impacts of climate change in subtropical countries especially Nigeria include frequent drought, increased environmental damage, increased infestation of crop by pests and diseases, depletion of household assets, increased rural urban migration, increased biodiversity loss, depletion of wildlife and other natural resource base. Others are changes in the vegetation type, decline in forest resources, and decline in soil moisture and nutrients, increased health risks and the spread of infectious diseases, changing livelihood systems (Abaje & Giwa, 2007). According to Igbokwe, Azubuike & igbokwe (2015), the impacts of climate change can be summarized as follows: deforestation, drought, uncertain rainfall, climate sensitive diseases, reduction in availability of water,

impact on food production, reduction in livestock production, effect on fishes and migration as a result of conflicts, flooding, drought, etc. Asthana and Asthana (2012) affirm that the impacts of climate change includes unhealthy environment that reduces agricultural productivity, such as crop, animals, fishes and affects man. This the researchers added that it will result in food scarcity, poverty and consequently malnutrition, leading to ill health, morbidity and outbreak of infectious diseases, increase in cases of cataract of the eyes, skin diseases and cancers, increase in the growth of insects and pest that is a threat to human health, increase in waterborne disease (typhoid and cholera), airborne diseases such as pneumonia, poliomyelitis, tuberculosis, measles and diphtheria, neonatal tetanus and pertussis. Litus (2012) also adds that climate change causes rising temperature, droughts and desertification, heavy precipitations, flooding, rising sea level, extreme weather events such as cyclones, floods and droughts leading to malnutrition, waterborne diseases as diarrhea and vector-borne diseases as malaria, drowning, severe mental and physical trauma.

Responding to climate change involves a two-pronged approach: Reducing emissions of and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere through mitigation and adapting to the climate change already in the pipeline through adaptation. Climate change adaptation is the process of adjusting to current or expected climate change and its impacts (Grüneis, Heidelinde; Penker, Marianne; Höferl, Karl-Michael, 2016). It is one of the ways to respond to climate change, along with climate change mitigation. For humans, adaptation aims to moderate or avoid harm, and exploit opportunities; for natural systems, humans may intervene to help adjustment (IPCC, 2014). Without mitigation, adaptation alone cannot avert the risk of severe, widespread and irreversible impacts. Mitigating involves reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing sources of these gases (for example, the burning of fossil fuels for electricity, heat or transport or enhancing the “sinks” that accumulate and store these gases (such as the oceans, forests and soil). The goal of mitigation is to avoid significant human interference with the climate system. Climate change mitigation consists of actions to limit global warming and its related effects. This involves reductions in human emissions of greenhouse gases (GHGs) as well as activities that reduce their concentration in the atmosphere (IPPC, 2014). Mitigation of climate change may also be achieved by changes in agriculture, reforestation and forest preservation and improved waste management (IPPC, 2007). Methane emissions, which have a high short-term impact, can be targeted by reductions in cattle and more generally by reducing meat consumption. Spread of the awareness of the impacts of climate change and the challenges facing man because of the environment and the roles each one can play to reduce its adverse impact is crucial and effective in schools.

Schools has been an effective vehicle for information transfer and the teacher is the most effective means of transferring knowledge to the younger generation and families. Climate education having been introduced in schools need to be effectively implemented by teachers and would be teachers - student-teachers. Teachers are the implementer of the curriculum and the vehicle to drive the content of the curriculum into the heart of the students. Hence, student-teachers need adequate knowledge of climate change for effective teaching and learning. The student-teachers being the most effective tool for transferring climate change knowledge to the young generation must be aware of what climate change is all about. Teachers represent an indispensable human resource and the most important element in the school system, more important than the quality of equipment and materials or level of financing. Quality education depends on quality of teachers. In recognition of the pivotal role of quality teachers in the provision of quality education at all levels, students are trained in Universities and Colleges of Education to become teachers. These students trained from tertiary institutions to become professional teachers are referred to as student-teachers. During the training period of these student-teachers, teacher education programmes, teaching practice goes side by side, while they are getting knowledge about theory papers. Student-teachers are trained to plan their lessons and core courses that will make them professional sound. Brittin (2005) opined that teachers are required to set up a school learning environment in which students can learn effectively, and this involves planning materials, strategies and timing. Student-teachers’ knowledge on the causes of climate change and its impacts will help them plan, present and impact this contemporary issue effectively to the students. Hence, the need to assess the perceived impact of climate changes on student-teachers in tertiary institutions in Nigeria.

Education has a major role to play in enhancing individual understanding about climate change and its impact. Emeh, (1999), contented that the classroom is the most important unit of the educational system because it is where all the policies of education are finally implemented. Therefore, schools have a vital role in advancing students' understanding and responsibility in relation to climate change mitigation, and helping them develop actions to deal with the problem associated with climate change. Furthermore, the society and appropriate government organ need to be sensitized so as to be able to make informed decisions in relation to activities that need to be engaged in to have safe and healthy environment. Teaching about climate change is vital for developing students' awareness in the concept, and knowledge of it is essential to increase public's awareness (Hallar, McCubbin & Wright, 2011). There has been increasing concern about climate change in Nigeria and the world at large. Many researchers had made tremendous effort research on climate change, nevertheless, there appears to be very few research on student-teachers' awareness of climate change in Nigerian tertiary institutions. The researchers deemed it necessary to ascertain the student-teachers' knowledge level of climate change and its impact. This situation justifies and makes it imperative to carry out an investigation on the perceived impact of climate change on student-teachers in Nigerian tertiary institutions.

The study aimed at assessing the perceived impact of climate change on the student-teachers in Nigerian tertiary institutions as well as the causes of climate change and the students' awareness of climate change based on institution.

Research Questions

The following research questions were raised to guide the study:

1. What are the impacts of climate change on student-teachers in the tertiary institutions?
2. What is the student-teachers perception about the causes of climate change?

Hypotheses

Ho₁: There is no significant difference between the mean impact of climate change between Universities and College of Education student-teachers.

Ho₂: There is no significant difference between the mean rating of Universities and College of Education student-teachers perception about the causes of climate change.

METHODOLOGY

The study adopted the descriptive survey research design. Descriptive research design is a type of design in which a group of people are studied by collecting and analyzing data from only a few of people considered being representative of the entire group over a period of time (Nworgu, 2015). The population of the study comprised of all the 2020/2021 final year Degree students and NCE students from the Faculty of Education, Alex Ekwueme Federal University Ndufu Alike, Ikwo and Enugu State College of Education (Technical) respectively. Purposive sampling technique was used to select one hundred and fifty (150) students from both institutions. Seventy five (75) students were selected from each institution making a total of 150 final year students as respondents. A 10-item structured questionnaire developed by the researchers titled "Questionnaire on Perceived Impact of Climate Change Teacher (QPICC) was used for data collection. It consisted of two sections. Section 'A' sought for demographic variables of the respondents while section 'B' is seeking information from the student-teachers, on the causes of climate change and awareness about climate change. The instrument was validated by experts in Science Education and Measurement and Evaluation from the Faculty of Education University of Nigeria Nsukka. The questionnaire was trial tested using 30 student-teachers that were not part of the sampled population. The data collected was analyzed using Cronbach Alpha Correlation Co-efficient which yielded 0.86. The Co-efficient indicated high internal consistency which proved that the questionnaire instrument was reliable to be used for the study. 180 copies of the questionnaire distributed to the respondents were dully filled and returned. Data collected were analyzed using mean and standard deviation to answer the research questions while t-test statistics was used to test the null

hypotheses at 0.05 level of significance.

Results

Research Question One: What are the impacts of climate change on student-teachers in the tertiary institutions?

Table 1: Mean Rating and Standard Deviation of the impacts of Climate Change

Item No	Item Description	Universities			Colleges of Education		
		\bar{X}	SD	Remarks	\bar{X}	SD	Remarks
1	Scarcity of water	3.68	0.32	Accept	2.26	1.74	Accept
2	Waterborne diseases (typhoid, cholera, diarrhea)	3.48	0.52	Accept	3.24	0.76	Accept
3	Reduction of crop production	3.44	0.56	Accept	3.52	0.48	Accept
4	Reduction of fish production	3.24	0.76	Accept	2.70	1.30	Accept
5	Airborne diseases (Tetanus, tuberculosis, diphtheria, polio, measles, pneumonia etc)	3.52	0.48	Accept	3.26	0.74	Accept
6	Extinction of some animal specie	3.00	1.00	Accept	3.52	0.48	Accept
7	Increase in vector related diseases	3.62	0.33	Accept	4.00	0.01	Accept
8	Malnutrition/famine	3.38	0.72	Accept	3.73	0.27	Accept
9	Drought	3.84	0.16	Accept	3.48	0.52	Accept
10	Increased temperature and Precipitation	3.68	0.32	Accept	3.26	0.74	Accept
11	Rise in sea level	2.88	1.12	Accept	3.76	0.24	Accept
12	Desertification	3.36	0.64	Accept	2.76	1.24	Accept
13	Flooding	3.68	0.32	Accept	3.54	0.46	Accept
14	Malnutrition, leading to ill health	3.12	0.88	Accept	3.50	0.50	Accept
15	Land sliding	2.16	1.84	Reject	3.02	0.98	Accept
16	Increase in cases of cataract of the eyes, skin diseases and cancers	3.74	0.26	Accept	4.00	0.01	Accept
17	Migration which sent people in search of job	3.12	0.88	Accept	2.26	1.74	Reject
18	Morbidity and outbreak of infectious diseases	3.38	0.72	Accept	3.73	0.27	Accept
19	increase in the growth of insects and pest that is a threat to human health	3.52	0.48	Accept	3.27	0.85	Accept
20	Environmental pollution	3.62	0.32	Accept	3.33	0.67	Accept
Average Mean		3.36	2.57		3.34	2.80	

The data in Table 1 showed that, the respondents accepted all the items with the exception of items 15 and 17 in Universities and Colleges of Education respectively. The average ratings were 3.36 and 3.34 respectively with the corresponding standard deviations of 2.57 and 2.80. This indicates that both institutions have mean above the criterion mean of 2.50 showing that climate change have high impact on man as well as student-teachers in tertiary institutions.

Research Question Two: What is the student-teachers' perception about the causes of climate change?

Table 3: Mean Ratings and Standard Deviations of the Perception of Students about Causes of Climate Change

Item No	Item Description	Universities			Colleges of Education		
		\bar{X}	SD	Remarks	\bar{X}	SD	Remarks
21	Use of automobiles cause climate change	3.46	0.58	Accept	4.00	0.01	Accept
22	Cooking gas and fire wood can cause climate change	3.48	0.52	Accept	3.24	0.76	Accept
23	Fossil fuel causes climate change	3.64	0.36	Accept	3.00	1.00	Accept
24	Pollution from heavy industries and human activities causes climate change	3.76	0.24	Accept	4.00	0.01	Accept
25	Overgrazing can cause climate change	3.52	0.48	Accept	3.27	0.73	Accept
26	Industrial emission are the major cause of climate change	3.46	0.54	Accept	3.27	0.73	Accept
27	Deforestation can cause climate change	3.62	0.33	Accept	4.00	0.01	Accept
28	The eccentricity of the orbit, solar radiation and ultraviolet radiation cause the warming of the environment and increased the average temperature	2.84	1.16	Accept	3.28	0.72	Accept
19	Burning of oils, gasoline and coal cause climate change	3.49	0.51	Accept	3.40	0.60	Accept
30	Dumping of refuse in gutter and river side cause climate change.	3.68	0.32	Accept	3.26	0.74	Accept
Average Mean		3.33	2.32		3.38	2.37	

Data on Table 2 showed that, the respondents rated all the items 21-30 above the cut-off point of 2.50. The universities have average mean of 3.33 while the Colleges of Education have average mean of 3.38 with standard deviations of 2.32 and 2.37 respectively. The result from the table revealed that, the mean value of the student-teachers' responses from both tertiary institutions on the causes of climate change were all accepted. This shows that an average number of the respondents identify the listed factors as causes of climate change.

Hypotheses

H₀₁: There is no significant difference between the mean impact of climate change between Universities and College of Education student-teachers.

Table 3: t-test Analysis of the Impact climate change between Universities and College of Education student-teachers.

Sources of Variation	N	Mean	Standard Deviation	DF	t-cal	t-crit.	Sig level	Decision
Universities	75	3.36	2.57	148	0.045	1.96	0.05	Accepted
Colleges of Education	75	3.34	2.80					

Table 3 above presents the results of the independent-sample t-test performed on the impact of climate change on student-teachers in tertiary institutions. Although the mean score of university student-teachers (3.36) is higher than that of Colleges of Education student-teachers (3.34), but the difference is not significant (t-calculated = 0.045, t-table value = 1.96, p < 0.05 level of significance). Since the exact probability t-critical is 1.96 at 0.05 level of significance is higher than the t-calculated value of 0.045, the null hypothesis is therefore accepted. The result

therefore revealed that the impact of climate change on student-teachers on both institutions do not differ significantly.

Ho₂: There is no significant difference between the mean rating of Universities and College of Education student-teachers perception about the causes of climate change.

Table 4: t-test Analysis of the Perception Student-teachers based on Institutions

Sources of Variation	N	Mean	Standard Deviation	DF	t-cal	t-crit.	Sig level	Decision
Universities	75	3.33	2.32	148	-0.135	1.96	0.05	Accepted
Colleges of Education	75	3.38	2.37					

Table 4 above presents the results of the independent-sample t-test performed on the perception of the student-teachers on climate change based on institution. The result of the analysis indicated that, the t-calculated value of -0.135 with associated exact probability value of 1.96 from the t-table at degree of freedom of 148 at 0.05 level of significance. The result therefore revealed that there is no statistically significant difference in the perception of student-teachers in both tertiary institutions. Therefore the null hypothesis is accepted

Discussion

The study assessed the perceived impact of climate change on student-teachers in tertiary institutions in Nigeria. It was found out that the impact of climate change on student-teachers was high as shown in Table 1. This indicates that the student-teachers are aware of the impact of climate change. This finding corroborates with that of Nwankwo & Unachukwu (2012) who found that students’ awareness about the CC in Nigeria is weak and not encouraging most especially among the secondary and primary school students. Also, Olorunfemi (2010) opined that the biggest obstacle to reduction of the impact of CC in schools in Nigeria is the lack of awareness about it by people. The impact of climate change is generally conceived as global phenomenon and therefore, it is necessary to develop positive attitude towards the environment in the students from early part of their life by exposing them to the dangers of climate change so as to reduce the hazards associated with climate change. The result therefore revealed that the impact of climate change on student-teachers on both institutions do not differ significantly.

Furthermore, the result showed high mean ratings of the perceived impact of climate change on student-teachers in tertiary institutions. Also, the findings revealed that average number of the student-teachers were aware of the causes of climate change with majority of them ascribing main causes to pollution from heavy industries and human activities. This was in consonant with the scientifically proven causes of climate change which includes: industrial pollution, destruction of nature, man’s activities through combustion of fossil fuels among others. Manyatsi, Mhazo & Masarirambi (2010) further showed that the percentage of them that know the likely causes of climate change is very low which implies that they were not literate pertaining to issues on climate change. Also, the result revealed that the student-teachers’ institution does not influence their perception about the global climate change. The finding showed that University and Colleges of Education student-teachers’ perception about climate change do not differ. The findings agreed with that of Aguilar (2009) & (Ishaya & Abaje (2008) who found that the level of awareness of students about the global climate change was not influence by gender.

Conclusion

The issue of climate change is a global concern which cannot be elbowed to the background. The impacts of Climate change are real, severe and adversely affecting the people and their livelihoods in Nigeria. The students should be well informed on the causes of climate change especially the aspects that most concerns them so that positive attitude towards the environment can be inculcated into them. Combating the menace of climate change is

an enormous task that must be tackled by everybody because none of us will escape the impacts of climate change either directly or indirectly. We all have to change the way we plan, live and use the environment. We must all push the campaign for climate change starting from our local level by building relationships with local authorities and community leaders so as to encourage practical policy changes for our communities which can metamorphose to national and international levels. Businesses and industries on the other hand can develop and promote the use of sustainable technologies that reduce energy consumption and helping initiate new adaptation solutions.

Recommendation

Based on the findings the following recommendations were made:

1. Climate change education should be introduced into the teacher training institutions
2. Seminars, workshops and conference should be organized to teach and train teachers on the causes and impact of climate change.
3. Student-teachers should be given allowances and other incentives should to devote time in teaching and learning as would be teachers.
4. Advert and Media house should be used to create climate change awareness and sensitize the public on the need to reduce human activities that causes climate change and its impact on man.
5. Teachers should be trained and retrained on all the skills that will help them impact climate change education effectively to the students.

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Disclosure of Potential conflicts of interest

No potential conflict of interest was reported by the authors

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