Education in Nigeria: LOOKING BEYOND THE 21ST CENTURY

A BOOK OF READING

Edited by

Kolawole C.O.O., Bagudo A.A., Moronkola O.A.,
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Ojedokun I.M. & Meroyi S.I

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In Honour of

Professor Oluremi - Ayodele Bamisaiye

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Assessing Teachers' Understanding of Green Economy for Effective Teaching of Climate Change Education

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Introduction

The growing concerns about environmental unsustainability of past economic growth designs and the increased awareness of a potential future climate crisis have made it clear that the environment, economy and education can no longer be considered in isolation. The understanding of the concepts of the climate change and green economy are two closely related constructs that have emerged in recent years to protect and enhance biodiversity and the ecosystem service.

Climate Change: Meaning, Causes and Impacts

The Intergovernmental Panel on Climate Change (IPCC) (2007) defined climate change as a change of climate which is attributed directly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (IPCC, 2007). In other words, IPCC (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 mean and/or the variability of its properties, and that

persists for an extended period, typically decades or longer. It refers to any change in the climate over time, whether due to natural variability or as a result of human activity (IPCC, 2007).

IPCC's (2007) definition confirmed the primacy of human responsibility over natural factors in global warming through the combined effect of greenhouse gases, aerosols and the albedo. Greenhouse gases which lead to warming are mainly the result of the combustion of fossil energies (carbon (IV) oxide) and the development of agriculture (methane and nitrous oxide). Aerosols and albedo, however lead to global cooling. As for natural factors, the effect of solar radiation is to a limited extent an added factor to other global warming dynamics.

However, developed and developing countries have begun to feel the impact and effect of climate change as the frequency and intensity of the events are on daily basis. For instance, reports on Nigeria by the Climate Systems Analysis Group at the University of Cape Town, using statistical downscaling method to extrapolate the empirical data of about 40 meteorological stations in the country, suggest trends towards a warmer climate in the future (BNRCC, 2011). The Federal Republic of Nigeria (FRN, 2012) in her Country Report to the Rio+20 Summit indicated that Nigeria is strongly predisposed to severe negative impacts of climate change due to its fragile economy, weak resilience and low adaptive capacity. Much of the economy is dependent on climate-sensitive resources. For example, the agriculture, forestry and fishing sectors employ up to 70% of the workforce. Its fossil fuel-dependent economy will be particularly vulnerable to climate change-induced frequent and severe extreme events, such as floods and droughts. The heavy concentration of Gross Domestic Product (GDP) generating industries in locations that are highly vulnerable to climate change-induced sea level rise, e.g. Lagos and the Niger Delta make the country extremely vulnerable.

Moreover, the 2011 Climate Change Vulnerability Index (CCVI) published by the UK-based risk company, Maplecroft, classifies Nigeria as being of high risk. Climate change could result in a loss in GDP of between 6% and 30% by 2050, worth an estimated US$ 100 to 460 billion dollars. According to the Department for International Development (DFID) 2009 study, if no adaptation is implemented, between 2-11% of Nigeria's GDP could potentially be lost by 2020, thereby hampering the national development goal of becoming one of the top 20 economies in the world (National Population Commission and RTI International (NPC, 2011). In another vein, Asthana and Asthana (2012) affirm that the impacts of climate change include unhealthy environment that reduces agricultural productivity, such as crop, animals and fishes.

The results are evident in the overview of basic services in Nigeria such as piped water, electricity, roads, improved sanitation and health care are acknowledged to be still insufficient to meet the needs of these densely populated settlements. Access to safe water and improved sanitation is one of the key social challenges facing the country. A baseline survey on National Water Supply and Sanitation conducted by Nigerian government between July 2005 and July 2008 revealed that, access to safe water varied between 54 per cent and 58.9 per cent in the six geo-political zones (FRN, 2012). Expectedly, urban areas are more likely to have access to improved sources of water than those in the rural area (75 per cent compared with 45 per cent). In 2006, only 35 per cent of urban Nigeria had access to improved sanitation, less than the average for Sub-Saharan African figure of 42 per cent (World Bank, 2010).

Furthermore, these areas are in a state of urban squalor and over-crowdedness characterised by decrepit structures, poor sanitary conditions, over-crowding, and under-provision of amenities and general deterioration of the urban environment. The functionality of most urban areas is thus reduced in addition to exerting adverse impacts on households, macro-economic

performance and social well-being (FRN, 2012). The government acknowledges that the current situation poses a major challenge to economic growth and sustainable development.

Government Initiatives on Climate Change

It is evident that developed countries contribute more to the problem but both the developed and developing are mutually bearing the brunt of environmental degradation. Several efforts were put in place to mitigate and adapt to change in the environment. At international level, in 1992, United Nations Conference on Environment and Development endorses the concept of sustainable development through Rio Declaration on Sustainable Development. After 20 years of first Rio summit, the United Nations Convention on Climate Changes put in place in 2012 had a significant showcase of the "Green Economy" to address climate change problems and to reduce human activities that produce greenhouse gases (FRN, 2012; UNEP, 2011). Consequently, at the national level, Nigerian government put specific policies and action plans such as National Policy on Drought and Desertification, National Environmental Sanitation Policy, Nigeria Climate Change Policy Response and Strategy and integration of environmental related issues into the school curricula among others (Gbadamosi, 2012; FRN, 2012).

Adaptation and Mitigating Climate Change through Green Economy

A new approach to economic growth which is necessary is called green economy. According to the United Nations Environment Programme Sustainable Energy Finance Initiative (UNEP, 2011), green economy is an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. At the operational level, the green economy is seen as one whose growth in income and employment is

driven by investments that reduce carbon emissions and pollution; enhance energy and resource efficiency; and prevent the loss of biodiversity and ecosystem services (UNEPSEFI, 2011). It involves integrating environmental sustainability with economic growth and welfare by decoupling growth from environmental over-exploitation and inequalities (Dahlin, 2010). "Environmental sustainability", "sustainable consumption and production", "green growth", "climate resilient", "low emission strategies", "inclusive growth" and "decent jobs" can be seen as ways to reconcile the demands for economic growth with the increasing scarcity of natural resources, and the challenges of poverty (Gbadgesin, 2012; FRN, 2012; UNEP, 2011; Oladipo, 2008).

Within this context, green economy can be seen as a way to pursue economic growth and development, while preventing environmental degradation, biodiversity loss and unsustainable natural resource use. It aims at maximising the chances of exploiting cleaner sources of growth, thereby leading to a more environmentally sustainable growth model. This will involve seizing the opportunities for development of new green industries, jobs, and technologies, as well as managing the transition for greening the more traditional sectors and the associated employment and distributional effects. It will require adopting new technologies, developing new products and supporting new patterns of demand from households, companies as well as governments (United Nations, 2011).

Meanwhile, Gbadegesin (2012) stated the various ways of promoting green growth by everybody both in the urban and rural areas as well as government and institutions at all levels. He suggested (i) replacing fossil fuels with sustainably managed biofuels; (ii) reducing the need to travel by automobiles by providing local recreation areas and green travel routes; (iii) managing water supply; (iv) reducing soil erosion; (v) replacing material such as concrete and steel with sustainably managed wood; (vi) micro

gardens; (vii) urban agriculture and community gardens among others.

Problems of Effective Teaching of Climate Change

Throughout the world, total impacts of climate changes are bound to come to a lead in the next 10-30 years, and whereas developed countries of the world have the knowledge and means to tackle the impacts of climate change, West African countries (including Nigeria) are still unprepared and groping in the dark on ways to face the inevitable (Osumanu, 2010). Several studies revealed that environmental problems stem from inability to develop a system of social values, life styles and institutions which enable us to live in harmony with the environment (World Bank, 2010; Odingo, 2008). The quality of a people's environment, on which sustainable development is predicated, depends critically on their level of environmental literacy (Gbadamosi, 2012).

Meanwhile, studies have revealed that education is the most proven mechanism to create awareness and capacity building for sustainability and achieving Sustainable Development Goals (SDGs). Promoting green economy through education therefore is a right step in a right direction as indicated by Nigerian government that one of the strategic approaches that will be adopted to operationalise sustainable development in Nigeria will centre on critical mechanisms of education, public awareness and capacity building (FRN, 2012). It is through participatory education that children and youth obtain the awareness, the skills and acquire the attitudes necessary to pursue successful action for sustainable environment.

However, it is important to recognise that students as well as teachers often have misconceptions about climatic changes and environmental management in schools that can negatively impact the construction of new knowledge (Amao, Ambali and Amoo, 2014; Chinyere and Ohia, 2010). Also, climate change and environmental

management is a great theme for students to study because it integrates so many subjects: energy, Environment, geography, politics, chemistry, biology, economics and more. It requires students to use analytical tools and mathematical skills to exercise their abilities to research, think, and understand complex issues (Amao, Ambali and Amao, 2014). Effective climate change therefore requires the learners to construct new knowledge and understanding within existing incomplete knowledge and conceptions as indicated earlier.

Other studies also reported that one of the major constraints to the effective implementation of school curriculum in developing countries is the lack of adequately trained personnel (Kolawole, 2014; Obanya, 2013). Specifically, Ojedokun and Gbadamosi (2014) and Ajiboye, Ajitoni and Gbadamosi (2013) reported that one of the major constraints to the implementation of environmental education in the school curriculum in Nigeria is the lack of adequately trained personnel and that teachers who are usually called upon to handle environmental education topics lack the requisites training to do so. As climate change research rapidly advances and educationists try to create awareness and integrate climatic issues into the school curricula, it is expedient for teachers to have up-to-date, relevant content and pedagogical knowledge that presents basic concepts in ways that stimulate the interests of the students and facilitate learning. Hence, using education which is handled by a more knowledgeable individual cannot be toyed with. Therefore, teachers who are saddled with the responsibility of educating the students must be effective and efficient in order to be able to fulfil and successfully carry out their aims and objectives of professional responsibilities.

Against this background therefore, the study investigated the level of preparedness of secondary school teachers to promote green economy through their various areas of specialisation. This is pertinent because teachers are identified as agents of knowledge

transfer to the younger generation and there is the need to catch the students at their formative age. Specifically, the study sought to obtain information on;

1. teachers sources of information on environmental sustainability and green economy;
2. teachers' understanding of environmental sustainability and green economy;
3. the difference if any, that exists in the teachers' understanding of environmental sustainability and green economy of three subjects grouping- Science, Social sciences and Arts; and
4. the effects of teachers educational qualification on teachers' understanding of environmental sustainability and green economy.

Research Question

What are the sources of information on environmental sustainability and green economy for the teachers in secondary schools?

Hypotheses

1. There is no significant effect of area of specialisation on teachers' understanding of environmental sustainability and green economy.
2. There is no significant effect of educational qualification on teachers' understanding of environmental sustainability and green economy.

Methodology

The study was a descriptive survey research. A total of 100 teachers were selected by purposive and stratified random sampling techniques from Oyo Metropolitan Area. They were drawn from four local government areas of Oyo Metropolitan Area (Atiba, Oyo East,

Oyo West, and Afijio). Teachers of three subjects grouping were sampled:

1. Social sciences comprising Social Studies, Government, Civic Education and Economics.
2. Sciences comprising Chemistry, Biology, Geography and Basic Science.
3. Arts comprising Christian Religious Knowledge, English, French and Yoruba.

Based on subject groupings, 41 participants were social sciences teachers, 26 were teachers of science subjects and 31 were teachers of Arts-related subjects. They were selected by purposive sampling technique from 12 secondary schools.

A self-developed Test on Teachers' Understanding of Environmental Sustainability and Green Economy (TUEGE) was designed and used to obtain relevant information on the study. Section A sought for demographic data of the participants. These included the number of years of teaching experience, highest educational qualifications, areas of specialisation, subject taught, class taught and gender. Section B was concerned with sources of information on environmental sustainability and green economy. Section C was a 30 item multiple choice to measure knowledge of teachers on environmental sustainability and green economy. The instrument was given to two experts in educational evaluation and environmental studies for face and content validity. As a result of the inputs of the experts, some items were added while a few others were restructured. The approved version was trial-tested on a group of 25 secondary school teachers in Ibadan in a school that was not part of the sample. The data collected were used to calculate the reliability coefficient using Kuder Richardson 20 (KR 20) which yielded a reliability value of 0.79. The instrument was administered to the respondents through four research assistants and collected back after.

Method of Data Analysis

The responses of the participants were analysed using descriptive statistics of frequency counts and inferential statistics of Analysis of Variance (ANOVA). The data arising from the study were analysed according to the research questions and hypotheses that were posed to guide the study. All hypotheses were tested at 0.05 level of significance.

Results

The gender distribution of the participants shows that 32% of them are male and 68% female teachers. The study revealed that average year of teaching experience of participants is 13 years. It shows that majority of sampled teachers are experienced teachers and might have acquired more skills to perform better in teaching-learning process.

Table 1: Distribution of the participants by Highest Educational Qualification

Highest Educational Qualification	Frequency	Frequency (%)
M.Ed, M.Sc., M.A.	12	12.3
B.Ed, B.Sc., B.A.	35	35.7
HND with PGDE	06	6.1
HND only	-	-
NCE	45	45.9
OND	-	-
TOTAL	**98**	**100.0**

Table 1 shows that 47% of the teachers have university education, 6% have HND while PGDE and NCE graduates totalled 45%. On the whole, most of the sampled teachers possessed the necessary qualifications that could help them to teach.

What are the sources of information on green economy for the teacher?

Table 2: Sources of Information on Green Economy

Sources of Information	Frequency Yes (%)	Frequency (%) No (%)
i. Friends/Colleagues	10 (10.1)	89 (89.9)
ii. Official of Ministry of Education/ Publication	02 (2.1)	92 (97.9)
iii. Books, Journals and other periodicals	12 (12.5)	84 (87.5)
iv. Seminar/workshops	05 (5.2)	94 (94.8)
v. Internet	28 (28.6)	70 (71.4)
vi. Radio/Television	11 (18.3)	81(91.2)
vii. Others	10 (10.4)	76 (89.6)
viii. No source/ Never heard	71(72.9)	38(26)

Table 2 shows that 72.9% of the teachers have never heard about green economy while 38.6% have heard about green economy.

Hypothesis 1: There is no significant effect of area of specialisation on teachers' understanding of environmental sustainability and green economy.

Table 3: ANOVA Table on Effects of Teachers' Area of Specialization on Teachers' Understanding of Environmental Sustainability and Green Economy

Sum of Squares	Df	Mean Square	F	Sig.
5493.524	23	915.587	1.379	.273
12614.514	75	663.922		
18108.038	98			

*Significant at P < .05

Table 3 shows that the F. ratio for df (23, 75). Since F. ratio of 1.378 is greater than 0.273, we reject null hypothesis at 0.05 level of significance. Therefore, there is significant effect of area of specialisation on teachers' understanding of environmental sustainability and green economy. Hence, hypothesis one was not rejected. This indicates that there are variations in the level of knowledge demonstrated by the teachers on green economy. Science teachers have higher score of $\bar{x} = 7.7$, followed by Social Science teachers with score of $\bar{x} = 5.4$ and Arts with score of $\bar{x} = 4.1$.

Hypothesis 2: There is no significant effect of educational qualification on teachers' understanding of environmental sustainability and green economy.

Table 4: ANOVA Table on Effects of Teachers' Educational Qualification on Teachers' Understanding of Environmental Sustainability Green Economy

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2836.872	23	315.208	1.827	.140
Within Groups	2760.667	75	172.542		
Total	5597.538	98			

*Significant at P < .05

Table 4 shows that the F. ratio for df (23, 75) is 0.140. Since F. ratio of 1.827 is greater than 1.40. Therefore, there is significant effect of educational qualification on teachers' understanding of environmental sustainability and green economy. Hence, hypothesis two was rejected.

Discussion

Most of the respondents claimed that they have never heard about green economy. Few of the respondents indicated that their sources of knowledge of green economy are the internet and other sources. School- oriented sources (Ministry of education/publication, seminars and workshops) were lower than internet. Secondary school teachers' low level of awareness could be attributed to the unfamiliarity, low campaign, lack of training and seminar on green economy and environmental sustainability. This implies that teachers are less familiar with environmental concepts in consonance with earlier studies that teachers' misconception of climate change negatively impact the teaching and learning of climate change (Amao, Ambali and Amoo, 2014; Ojedokun and Gbadamosi, 2014; Chinyere and Ohia, 2010).

This study also revealed secondary school teachers poor understanding of green economy with little variations in terms of subject groupings. The higher mean score recorded by science teachers could be largely attributed to the scope and nature of their subject areas which made them have rudiment knowledge of scientific aspect of climate change (Amao, Ambali and Amoo, 2014). This was followed by social science teachers which might be connected to the growing concern of the impact of the environment on social, economic and health wellness of the population which is behavioural aspect of climate change. Art group also demonstrated lowest understanding of climate change concepts (green economy). Another finding of in the study revealed that there was significant effect of educational qualifications on teachers' understanding of environmental sustainability and green economy whereby teachers demonstrated different levels of understanding of green economy based on their level of qualifications.

Conclusion

The effectiveness of a system or subsystem can best be gauged by the quality of its output. In this case, we refer to the products of secondary school. The quality of the outputs is largely determined by the quality and quantity of the inputs (e.g teachers). In this study, the sampled population of teachers in Oyo has demonstrated a poor level of understanding of environmental sustainability and green economy. Again, there are variations in teachers' understanding of green economy based on areas of specialisation and educational qualifications. If such teachers with low knowledge are called upon to incorporate green economy into their teaching, their performance would likely be below average. Successful implementation of climate change education depends on the effectiveness of teachers that are characterised by knowledge and application of prescribed pedagogy to ensure positive transformation in learners towards achieving environmental sustainability.

Recommendations

Teachers who are to teach climate change education must have the mastery of the subject matter; appropriate pedagogy, environment literate and developing environmentally friendly behaviour through the following ways:

- Workshops, in-service trainings and seminars should be organised on sustainable development by government and non-government organisations (NGOs) to expose in-service teachers to content and pedagogy knowledge of climate change education;
- Green curricula should be developed by the government and incorporated into the teacher education programme to equip individuals with the skills needed to mitigate and adapt to climate change;
- Curriculum developers should enrich traditional curriculum with sustainability by incorporating 'green curricula';

- Teacher education curriculum should be over-hauled and reviewed to include contemporary issues such as green curricula vis-a-vis climate change education.

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