Teaching Basic Science for probable Global Challenges and Sustainable Development in Junior Secondary School in Ekiti State, Nigeria

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ABSTRACT: *The study investigated teaching Basic Science for probable global challenges and sustainable development in junior secondary school in Ekiti, Nigeria. This was a descriptive survey research which was questionnaire based. The population of the study was Junior Secondary School III (JSS III) Basic Science students of public secondary schools in Ekiti State, Nigeria. The sample consisted of 150 students drawn from two public secondary schools in Ikere Local Government of Ekiti State. Stratified random sampling was used to select the sample. The instrument used for data collection was structured questionnaire. The instrument was subjected to validity and reliability mechanisms. The reliability of the instruments was determined using Test-Retest method on a sample similar to the study population but not the exact same participants. Three research questions were generated and tested using chi-square statistical analysis at 0.05 level of significance. The findings of the study revealed students' lacked the required awareness about global challenges and need to build a positive behavior for sustainable development, while teachers should engage the students with more effective teaching method and need for curriculum improvement among others; it was concluded that effective teaching and curriculum enhancement are key to preparing students' for global challenges through Basic Science education. Based on the findings, conclusion and appropriate recommendations were made.*

Key Words: *Basic Science, Global Challenges, Sustainable Development, Student, Teaching*

Introduction

Basic Sciences is seen as a basis of major technological advances that stimulate innovations, essential for the training of future professionals and indispensable for the development of population capable of participating in the decisions that affect their future. The basic sciences is based on curiosity, have an essential contribution to make to make to the implementation of 2030 agenda. Basic sciences are instrumental in all areas of our lives, even the World Wide Web, which you are using right now, was invented at CERN out of the need for global collaboration on fundamental physics experiment, and it was developed using powerful algorithms (UNESCO, 2022).

Global problems are not just important problems, or problems that affect many people. Rather they are those problems that affect the whole of the planet, and potentially all of the people who live on it. Climate change is one clear example that springs to mind quickly. This is because the consequences of humanly-generated changes in the atmosphere will, albeit in different ways according to region, affect everyone on the planet. In other words, the consequences are universal. Moreover, unless we profoundly change our collective behaviour, climate change may well result in irreversible changes in the climatic conditions of life, a measure of the deep vulnerability of human society in the face of this issue.

In an interconnected world where the pursuit of sustainable development is paramount, the acquisition of scientific and technological knowledge and skills is imperative for those striving to obtain the best that the environment can give. Thus, the major goal of basic science education is to equip the learners with essential scientific literacy and process skills and apply them in a problem context (Oginni, Saibu, Awobodu, and Olusegun, 2024).

Global challenges is really hard to define as a term because of the multifarious definitions. There is no exact definition of this term. Global challenges are bad results of globalization, (Karaduman, 2013), which have to be overcome by international actors including citizens, states, NGO's etc. for a better understanding of this term, it is important to know the difference between global issues and global challenges. According to Cambridge Dictionary *global* means relating to the whole world, *challenge* means something needing great mental or physical effort in order to be done successfully, or the situation of facing this kind of effort, *issue* means a subject or problem that people are thinking and talking about. Therefore, trying to deal with *global challenges* means handling more coercive problems than *global issues*. Also dealing with global challenges needs a mental or physical effort and it means it is not enough to think about them.

On the other hand, according to Kirsten Gelsdorf *global challenges* are defined as any major trend, shock, or development that has the potential for serious global impacts. There are many kinds of definition on sustainable development but widely acclaimed definition is that development that meets the needs of the present without compromising the ability of future generations to meet their own needs, (Karaduman, 2013).

The importance for formal educational settings to reflect on global issues as part of teaching and learning approaches is also noted in the most recent agenda of the United Nations (2015) and more specifically in the Sustainable Development Goal 4.7. This goal explicitly refers to the necessity for learners to develop knowledge and skills aiming to create a more sustainable, just, and equitable society (United Nations, 2015). Despite the increased theoretical development within the field, only recently there is emerging research that highlights how teachers incorporate global issues as part of their teaching and learning (Goodwin, 2020).

The contents of the concept of sustainable development lie in necessity of conserving of available potential of our planet for future generations with the help of radical decrease of anthropogenic pressure on environment, which can be obtained with the help of drastic changes in society's life, its values and development targets. Education for sustainable development shows all the necessary from sustainable development concept in unity of ecologic, social-cultural, and economic spheres. The reduction of education for sustainable development to the issue of environmental education poses a threat to the values associated with the humanistic interpretation of education, (Galtseva et al, 2020).

Sustainable development in Nigeria can be actualized through science education. For any nation including Nigeria to attain sustainable development, there is need to recognize science education as a priority area of education for her citizens (Ogunmade, 2006).

Significance of the Study

This study on Teaching Basic Science for probable Global Challenges and Sustainable Development in Junior Secondary School in Ekiti State, Nigeria hinges on equipping students to understand and tackle global challenges, fostering innovative and driving sustainable development from an early stage.

Research Problems

While global challenges demand future-ready solutions, Basic Science education in Ekiti State's junior secondary schools is yet to fully integrate real-world relevance and sustainability themes. This creates a gap in nurturing students' capacity to connect classroom science with global problem-solving and sustainable goals.

Research Questions

Three Research Questions were raised to guide the study:

i. How is Basic Science education addressing global challenges in Ekiti State's junior secondary schools?
ii. To what extent do teachers integrate sustainability themes into Basic Science Instruction?
iii. What impact does Basic Science have on students' awareness of and attitudes toward global challenges?

Research Hypotheses

The following null hypotheses were formulated for the study:

i. There is no significant relationship between Basic Science education and the understanding of global challenges among junior secondary students.
ii. Teachers' integration of sustainability themes into Basic Science instruction has no significant effect on students' attitudes toward global challenges and sustainable development.
iii. There is no significant relationship between students' awareness of and attitudes toward global challenges

Methodology

Descriptive research design was used for the study while the population was Junior Secondary School III (JSSIII) Basic Science Students' and stratified sampling techniques was used to select the studied schools and students'. A sampled size of 150 students was selected from two public secondary schools while a structured questionnaire with four-point Likert scale of Strongly Agree (SA) = 4, Agree (A) =3, Disagree

(D)=2 and Strongly Disagree (SD) =1 was used to elicit responses from the respondents. The descriptive statistics was carried out using Mean and Standard deviation (M±Std.Dev.) while inferential statistics involved Chi-square statistical analysis to analyze data collected while all the hypotheses were tested at 0.05 level of significance.

Results

Research Question 1

How is Basic Science education addressing global challenges in Ekiti State's junior secondary schools?

Table 1: Basic Science education addressing global challenges

S/N	ITEMS	SA	A	D	SD	M±StdDev
1	Global challenges is adequately covered in Basic Science Curriculum in my school	14 (9.3%)	36 (24.1%)*	41 (27.3%)	59 (39.3%)	20.3±1.006
2	The Basic science Curriculum in my school includes topic on global issues	13 (8.7%)	19 (12.7%)	62 (41.3%)	56 (37.3%)	1.93±0.92
3	Global education is integrated across various science subjects in my school.	7 (4.7%)	23 (15.3%)	57 (38.0%)	63 (42.0%)	1.83±0.857
4	The Basic Science teachers in my school are well-trained to teach global education.	22 (14.7%)	35 (23.3%)	64 (42.7%)	29 (19.3%)	2.33±0.953
5	Global education is a priority in the Basic Science Curriculum in my school	19 (12.7%)	32 (21.3%)	42 (28.0%)	57 (38.0%)	2.09±1.049
Summary		15 (10.1%)*	29 (19.3%)	53 (35.3%)	53 (35.3%)	2.04±0.975

Table 1 depicts the significant relationship between global challenges into the Basic Science Curriculum and students' awareness of global-related issues. The sampled subjects vehemently disagreed that global challenges was adequately covered in Basic Science Curriculum 100(66.6%). Global education was integrated across various science subjects in my school according to the sampled respondents 120(80%). In the same vein, global issues was a priority in Basic Science Curriculum in my school as related by the students sampled 99(66%). In summary, the respondents agreed with mean score of 2.04 and standard deviation of ±0.975. The global education currently integrated into the Basic Science curriculum in secondary schools reflected in life of average secondary school students.

Research Question 2

To what extent do teachers integrate sustainability themes into Basic Science Instruction?

Table 2: Students' Exposure to Global Education And Their Environmental Actions.

S/N	ITEMS (N=150)	SA	A	D	SD	M±Std Dev
1	After learning about global challenges, I am more likely to adopt environmentally sustainable practices.	11 (7.3%)	31 (20.7%)	56 (37.3%)	52 (34.7%)	2.01±0.923
2	Global education has change my attitude towards environmental sustainability.	24 (16.0%)	19 (12.7%)	63 (42.0%)	44 (29.3%)	2.15±1.021
3	I intend to reduce my carbon footprint after learning about global change.	9 (6.0%)	11 (7.3%)	45 (30.0%)	85 (56.7%)	1.63±0.863

4	Global education has motivated me to participate in environmental sustainability.	6 (4.0%)	13 (8.7%)	39 (26.0%)	92 (61.3%)	1.55±0.665
5	I believe that global education can inspire others to take action towards environmental sustainability.	9 (6.0%)	13 (8.7%)	47 (31.3%)	81 (54.0%)	1.67±0.872
Summary		12 (8.1%)*	17 (11.3%)	50 (33.3%)	71 (47.3%)	1.80±0.934

Table 2 represents the significant relationship between students' exposure to global education and their environment. The sampled elements 108(72.0%) unanimously disagreed with the statement that after learning about global challenges, they are likely to adopt environmentally sustainable practices. Similarly, most of the respondents 131(87.3%) also confirmed that global education have not motivated them to participate in environment sustainability. Also, majority of the respondents 128(84.3%) also agreed that global education cannot inspire others to take action towards environmental sustainability. In general, the respondents agreed with mean score of 1.80 and standard deviation of ±0.934. The impact of global education on students' attitudinal and behavioural intentions towards environmental sustainability are not felt.

Research Question 3

What impact does Basic Science have on students' awareness of and attitudes toward global challenges?

Table 3: Students' Attitudes Towards Global Challenges.

S/N	ITEMS (N=150)	SA	A	D	SD	M±StdDev
1	After learning about global challenges, I am more aware of its impacts on the environment	36 (24.0%)	49 (32.7%)	38 (25.3%)	27 (18.0%)	2.63±1.040
2	Global education has increase my understanding of climate-related issues	27 (18.0%)	30 (20.0%)	42 (28.0%)	51 (34.0%)	2.20±1.106
3	I am knowledgeable abut the causes and effects of Global challenges after receiving global education	18 (12.0%)	39 (26.0%)	48 (32.0%)	45 (30.0%)	2.20±1.003
4	Global education has helped me to identify climate-related issues in my community	29 (19.3%)	24 (16.1%)	53 (35.3%)	44 (29.3%)	2.25±1.082
5	I feel more informed about global challenges and adaptation strategies after learning about it.	25 (16.7%)	23 (15.3%)	51 (34.0%)	51 (34.0%)	2.23±1.062
Summary		27(18.0%)	33(22.0%)	46(30.7%)	44(29.3%)	2.29±1.077

Table 3 highlights the significant impact on students' attitudes towards environmental sustainability. The sampled elements 93(62%) intensely disagreed that climate education has increase their understanding of global-related issues. The majority of the respondents also affirmed that they were not knowledgeable about the causes and effects of global challenges after receiving global education 93(62%). In the same vein, over one hundred students agreed that they didn't feel informed about global challenges

and adaptation strategies after learning about global challenges 102(64%). In overall, the respondents agreed with mean score of 2.29 and standard deviation of ±1.077. The exposure to climate global education has not affected students' awareness of global-related issues.

Hypothesis 1

There is no significant relationship between Basic Science education and the understanding of global challenges among junior secondary students.

Table 4: Cross-tabulation of climate change education and students' understanding of global challenges

Variables	Responses				Total	df	Chi²	p-value
	SA	A	D	SD				
CCE(item1)	14	36	41	59	150	3.0	23.689	0.0001
understanding (Item6)	36	49	38	27	150			
Total	50	85	79	86	300			

P<0.05*

Table 4 described significant relationship between Basic Science education and the understanding of global challenges among junior secondary students. The calculated chi-square chi² value was 23.689 while p-value was 0.0001 which is far less that benchmark of 0.05 of level of significance, the hypothesis that says there is no significant relationship between Basic science education and the understanding of global challenges among junior secondary students' was rejected, implies that Basic Science education and understanding og global challenges are not independent.

Hypothesis 2

Teachers' integration of sustainability themes into Basic Science instruction has no significant effect on students' attitudes toward global challenges and sustainable development.

Table 5: Cross-tabulation of teachers' integration of sustainability themes and sustainable development

Variables	**Responses**				**Total**	**d.f**	**Chi²**	**p-value**
	SA	A	D	SD				
Integration(Item6)	11	31	56	52	150	3.0	22.987	0.000
Sustainable(item9)	6	13	39	92	150			
Total	17	44	95	144	300			

P<0.05*

Table 5 indicated teachers' integration of sustainability themes into Basic Science instruction has no significant effect on students' attitudes toward global challenges and sustainable development. The calculated chi-square chi² value was 22.987 while p-value was 0.000 which is far less that benchmark of 0.05 of level of significance, the hypothesis that says teachers' integration of sustainability themes into Basic Science instruction has no significant effect on students' attitudes toward global challenges and sustainable development was rejected, it can be inferred that teachers' integration of sustainability themes into Basic Science instruction and students attitudes towards global challenges and sustainable development are dependent.

Hypothesis 3

There is no significant relationship between students' awareness of and attitudes toward global challenges

Table 6: Cross-tabulation of students' awareness and attitude

Variables	Responses				Total	d.f	Chi²	p-value
	SA	A	D	SD				
awareness(Item11)	36	49	38	27	150	3.0	15.858	0.000
Attitude(Item14)	29	24	53	44	150			
Total	65	73	91	71	300			

P<0.05*

Table 6 presented significant relationship between students' awareness of and attitudes toward global challenges. The calculated chi-square chi² value was 15.858 while p-value was 0.000 which is far less that benchmark of 0.05 of level of significance, the hypothesis postulated that says there is no significant relationship between students' awareness of and attitudes toward global challenges was rejected, its implication was that there is a significant relationship between students' awareness of and attitudes toward global challenges.

Discussion and Findings

Many students did not demonstrate a higher level of understanding of global challenges which is in agreement with UNESCO, (2012) which posited that to ensure effective learning and deep understanding of the subject matter, Karaduman (2013), observed that little attention was paid to the teaching of sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Also there was decreased awareness of the role of human activities in climate change and the importance of sustainability and it was evident that development of strategies for incorporating climate change topics into science lessons effectively was lacking which is also in agreement with the work of Oginni, Saibu, Awobodu and Olusegun, (2024) which posited that adequate knowledge of the impacts of climate change and its awareness by including its study in the educational curriculum at all levels of education and at both global and local scale will provide adequate knowledge of the effects of climate change on the environments, especially in the aspects of human activities

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