PRE-SERVICE TEACHERS' AWARENESS OF SDGs AND ROLES OF SCIENCE EDUCATION IN ACHIEVING SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract
Attainment of sustainable development without having adequate knowledge about it especially the goals known as Sustainable Development Goals (SDGs) may not be fruitful. Therefore, for sustainable development to be achieved, the goals of the development as they are being stipulated need to be prioritized. It is as a result of this that this study was carried out to determine the pre-service teachers' awareness of SDGs and also the role of science education in achieving sustainable development. The study is a descriptive research of the survey type. The study was carried out at Kwara State College of Education (Technical) Lafiagi. The respondents were 142 out of 213 students, in which 86 were males while 56 were females. Seventy-two of the respondents were in year two and the remaining 70 were in year three. The study was limited to year two and three students because they have undergone preliminary education courses in their year one. The instrument for the study was questionnaire entitled "Pre-service Teachers' Awareness of Sustainable Development, PTASD". The instrument consists of three sections, Section A has to do with demographic data of the respondents which are gender and year of study. Section B has to do with the respondents' awareness of the 17 SDGs and Section C comprises of 7 items on their views on roles of science education in achieving sustainable development. Both Section B and C were in Likert scale format which was validated by two experts in the field of chemistry education. The reliability of the instrument was determined using Cronbach Alpha and reliability coefficient of 0.75 was obtained for both Section B and C. The data collected from the respondents were analysed using descriptive statistics of Mean and Standard Deviation and inferential statistics of t-test. While the two null hypotheses formulated were tested using t-test statistics. Findings from the study revealed that the respondents were aware of all the SDGs because the mean of their responses were greater than 2.5 which is the grand mean. Also, both gender and grade level of the respondents did not influence their awareness of SDGs. Finally, the majority of the respondents agreed with the roles of science education in achieving sustainable development. It is therefore recommended among others that pre-service teachers should be adequately trained towards achieving the SDGs by equipping them with the scientific knowledge that will promote sustainable development.

Keywords: Sustainable development, SDGs, Pre-service teachers, Science education, Awareness

Introduction
For individual to be a contributor to sustainable development of a nation there is the need for such to be aware of what sustainable development entails. However, Zamora-polo, Sanchez-martin, Carrales-seeano and Espejo-antunez (2019) described sustainable development as a development that will provides the need of the present citizens without forsaking the needs of the incoming generation. In the same vein, Omole and Ozoji (2014) observed that sustainable

development is the act of making efforts by people to solve economic, social and environmental problems. It is about making life comfortable for people living in a particular area at a particular time in such a way that the yet unborn citizen will also be able to live comfortably later on. It is in the bid to achieve sustainable development that United Nations with 193 countries have come together to look at the various needs of individual nation in order to propose the goals that will be beneficial to member nations.

The proposed goals by the UN are known as Sustainable Development Goals. The SDGs consist of 17 goals and 169 targets. The history of the SDGs started with what is known then as Millennium Development Goals MDGs which was set to be achievable from year 2000 to 2015. It was as a result of some member nations especially, Africa and Asia lagging behind in the achievement of the MDGs that resulted to formation of SDGs which commenced in January 1, 2016 (Nwaebuni, 2017). It was explained further that SDGs are expected to balance the three important basis of human existence which are social, economic and environmental issues. Thus, the SDGs are set of goals that can be grouped into three categories of human needs which are social, economic and environmental needs. Also, if these set of goals are achieved will provide the member nations sustainable development.

The SDGs range from no poverty to partnerships for the goals, the fourth goal of the SDGs is provision of quality education for all. This can be regarded as the most important goal in the SDGs due to the emphasis laid on it as means of achieving all other goals. For instance, Nwaebuni (2017) observed that there is the need to prioritize quality education for the purpose of catering for social-economic development because low quality education has been recognized as problem encountered in Nigeria education. In a like manner Aramide (2017) observed that quality education is the starting point when it comes to discussion on SDGs because it is as a result of achievement of the fourth goal which is quality education that both poverty and hunger eradication can be attained. Hence, for achievement of sustainable development to be actualized, there is the need to prioritize quality education especially science education.

Science education can be described as a process which involves teaching and learning of both scientific concepts as well as educational concepts. It requires application of theories of learning in the field of education to learning of scientific concepts. It was also described by Okoli, Obiajulu and Ella (2013) as the acquisition of in depth knowledge of science and education and the prior knowledge for technological advancement. The importance of science education in nation building cannot be over looked and it is as a result of this Nwachukwu (2012) regarded it as yard stick for measuring level of development of a nation and crucial factor for sustainability globally.

Since success in the attainment of sustainable development has been attributed to provision of quality science education, there is the need for those saddled with responsibility of laying the foundation for the effective learning of science subjects to be aware of what SDGs stand for and the role of education in achieving these goals. This is of utmost importance because lack of awareness of SDGs has been recognized as a major setback militating against the achievement of the goals by Bello, Omachi, Adeboye and Adegboye (2019) which will automatically translate to sustainable development. Lack of awareness as an obstacle impeding the attainment of sustainability in many countries Nigeria inclusive has been reported by researchers (Aramide, 2017; Omole & Ozoji, 2014). Omisore, Babarinde, Bakare and Asekun-olarinmoye (2017) were also of the opinion that SDGs has much to do with development which its awareness and

knowledge should be welcome by everybody in the world for purpose of meaningful contribution. Thus, for attainment of sustainable development to be realizable there is the need to prioritize creation of awareness of SDGs among all citizen.

The creation of the SDGs awareness can start from the pre-service science teachers especially those at the college of education due to their importance in nation building. Also, the National Certificate in Education (NCE), which is the certificate issued by colleges of education is the minimum standard required to teach at the basic level of education in Nigeria as it being stated in National Policy of education (FRN, 2013). This set of pre-service teachers are expected to teach science at the basic level of education, moreover, they serve as feeder to faculty of education in the higher place of learning for the purpose of continuing the learning of science subjects in the country. Due to these two major responsibilities expected from college of education pre-service science teachers. There being aware of what will promote sustainable development in the country is very necessary. Therefore, the need to investigate their awareness of SDGs and role of education in achieving sustainability is a necessity. During the process of investigating pre-service teachers' awareness, some variables need to be considered such as gender, level of education etc. This is because of inconclusiveness of studies carried out on these variables by researchers.

As a result of enormous role expected to be played by science teachers in the attainment of sustainable developments in Nigeria, this has called for inclusion of "production of scientists for national development" as one of the goals of science teaching as it is being documented in the national policy of education. Hence, due to importance of awareness in achieving national policies and goals researchers have carried out studies to investigate science teachers' awareness of some policies and goals that will be beneficial to the country. For instance, Opateye (2012) carried out study on Nigeria secondary school science teachers' awareness and preparation for the challenges of vision 2020. The findings from the study revealed that science teachers have low awareness of vision 2020 educational goals. While Ekpiken and Odet (2014) carried out a study on the role of teacher education and Nigeria teachers in national development: the way forward. The finding from the study revealed that there is relationship between Nigerian teachers' professional roles and national development.

A study was also carried out by Benson (2017) on mapping awareness of the global goals using sustainable literacy test. Finding from the study revealed that students almost possessed the same knowledge about the 17 SDGs and there is no SDGs that all the students were aware of and none of the SDGs was of very low awareness. Another study was also carried out by Omisore et al. (2017) on awareness and knowledge of the SDGs in a university community in Southwestern Nigeria. Findings from the study showed that 43% of the respondents were aware of the SDGs and only 42% were of adequate knowledge of the SDGs, also 56.3% were of positive attitude towards it. Bello et al. (2019) also indulged in a study titled awareness and knowledge of SDGs among health workers in Bida, North Central, Nigeria. Findings from the study showed 48% out of 103 respondents were of adequate knowledge of the SDGs while the adequate knowledge was in favour of the male respondents. Zamora-polo et al. (2019) also investigated what the university students know about SDGs and the findings from the study revealed low knowledge of SDGs in general, difference in professional and personal implication of SDGs was also reported and significant difference was recorded between Health and Education students which was in favour of Education students.

The preceding studies such as that of Bello et al. (2019); Benson (2017); Omisore et al. (2017) were carried out involving university undergraduate and health workers. For the present study the awareness of college of education pre-service science teachers' sustainable development goals and role of science education in achieving sustainable development in Nigeria were investigated. A case study of College of Education (Technical) Lafiagi. This is thought to be necessary since colleges of education are higher places of learning where the minimum certificate for teaching at the basic level is obtained.

The major purpose of this study was to determine the pre-service college of education science students' awareness of SDGs and the role of science education in achieving sustainable development in the country. Specifically, the study determined the following: Awareness of SDGs by pre-service college students, influence of gender on the college students' awareness of SD, influence of grade level on college students' awareness of SDGs, role of education in achieving sustainable development in Nigeria

Research Questions

The following research questions guided the study:

(i) Are the pre-service college students aware of the SDGs?
(ii) Does gender influence the awareness of the college pre-service teachers?
(iii) Does grade level of the college pre-service teachers influence their awareness of SDGs
(iv) What are the views of the pre-service college teachers on the role of science education in achieving sustainable development?

Research Hypotheses

The following hypotheses were tested in the study:

HO_1: There is no significant difference in the awareness of SDGs of male and female college pre-service teachers.

HO_2: There is no significant difference in the awareness of SDGs of Year two and three college pre-service teachers.

Methodology

The study adopted descriptive research of the survey type. The study was carried out at Kwara State College of Education (Technical) Lafiagi. Out of total of 213 students making 107 and 106 students in Year two and three respectively of 2017/2018 session, which comprises of science combinations such as chemistry/biology, chemistry/integrated science, chemistry/physics, chemistry/computer, and chemistry/ mathematics, 142 students which is equivalent to two-third of the population were randomly selected from the students, 72 of the students were in Year two while the remaining 70 were in Year three. The sample consists of 86 males and 56 females. The instrument used to collect the data was a researcher designed questionnaire titled as Pre-service Teacher Awareness of Sustainable Development (PTASD). The instrument consists of three sections, Section A has to do with the demographic data of the respondents such as gender and grade level. Section B is on the respondents' awareness of the 17 SDGs while Section C comprised of seven items on the views of the respondents on role of science education in achieving sustainable development.

The face and content validity of the instrument was determined by giving it to two experts in the field of chemistry education in which their observations were used to improve the final questionnaire used for the data collection. The reliability of the instrument was carried out using

Cronbach Alpha formula and reliability coefficient of 0.75 was arrived at when the instrument was administered to 20 pre-service teachers in biology science combinations apart from chemistry that did not take part in the study. The data were collected from the respondents by administering the questionnaire to the respondents after their chemistry lesson. The data were collated and subjected to descriptive statistics of Mean and Standard Deviation and inferential statistics of t-test which was used to test the two null hypotheses. The decision mean of the responses was determined by finding the average mean of the responses from the four likert scale of SA = Strongly Aware, A = Aware, NA = Not Aware, SN = Strongly Not aware which is 2.50. Any mean equals to or greater than 2.50 implies awareness (A) of the particular SDGs by the respondents while those means less than 2.50 implies not aware (NA) of the SDGs.

Results

Research Question 1: Are the pre-service college students aware of the SDGs?

Table 1: Mean and Standard Deviations of Responses on Awareness of SDGs

S/No	SDGs	Mean	STD
1	no poverty	2.96	1.23
2	zero hunger	2.58	1.18
3	good and well-being	3.09	1.02
4	quality education	3.18	1.04
5	gender equality	3.00	1.16
6	clean water and sanitation	2.83	1.16
7	affordable and clean energy	2.80	1.10
8	decent work and economic growth	2.80	1.13
9	industry, innovation and infrastructure	2.64	1.18
10	reduction of inequality	2.56	1.08
11	sustainable cities and communities	2.81	1.08
12	responsible consumption and production	2.94	1.11
13	climate action	2.68	1.15
14	life below water	2.56	1.23
15	Life on land	3.04	1.05
16	peace justice and strong institutions	2.85	1.09
17	partnerships for the goals	3.15	1.16
	Average Mean	2.50	

It can be seen from Table 1 that the respondents were unanimous in their awareness of the SDGs because they were aware of all the 17 SDGs. This is because all the items had mean values that are greater than 2.50 and standard deviations that range from 1.02 to 1.23 which shows that responses are not far apart.

Research Question 2: Does gender influence the awareness of the college pre-service teachers?

In response to research question two, gender did not influence the awareness of the college pre-service teachers.

Table 2: t-test Analysis of Respondents' Awareness based on their Gender

Gender	N	Mean	Std. Dev.	T	df	p
Male	86	49.51	9.29	1.86	140	.066
Female	56	46.88	6.42			

Research question 2 resulted to corresponding hypothesis one stated that: there is no significant difference in the awareness of SDGs by college pre-service teachers based on their gender.

Table 2 showed that there is no need to reject the null hypothesis formulated since the p-value is greater than 0.05 from the t-test analysis carried out. Both the female and male respondents were aware of the SDGs equally Female (M = 46.88, SD = 6.42), Male (M= 49.51, SD = 9.29), t (140) = 1.86, p= .066. This means that gender did not influence the awareness of the respondents as regard SDGs.

Research Question 3: Does level of education of the college pre-service teachers influence their awareness of SDGs?
In response to research question three, level of education of the college pre-service teachers did not influence their awareness of SDGs

Table 3: t-test Analysis of Respondents' Awareness of SDGs based on their Grade Level

Grade	N	Mean	Std. Dev.	T	df	p
Two	72	49.69	9.75	1.78	140	.077
Three	70	47.21	6.43			

Hypothesis 2 which was formulated based on research question 3 goes thus: there is no significant difference in the awareness of SDGs Year two and three college pre-service teachers. As it can be observed from Table 3, there was no significant difference in the awareness of both Year two and three students because the t-test analysis revealed that Year two (M = 49.69, SD = 9.75), Year three (M= 47.21, SD = 6.43), t (140) = 1.78, p= .077, Since the p-value is greater than 0.05, it means both levels are of equal awareness of SDGs. There for the null hypothesis formulated is not rejected.

Research Question 4: What are the views of the pre-service teachers in college of education on the role of science education in achieving sustainable development?

Table 4: Mean and Standard Deviations of Responses on Views on the Roles of Science Education in Achieving Sustainable Development

S/No	Questionnaire items	Mean	SD
1	Quality science education can be used to achieve sustainable development	3.18	0.83
2	Science Education can be used to create awareness of sustainable development for students	3.11	0.89
3	Creation of awareness about sustainable development through media such as television is necessary for those who are not in school	2.87	1.10
4	Sustainable development cannot be achieved without the 17 goals	2.63	1.10
5	Science education is the most appropriate education for achieving the sustainable development in Nigeria	3.01	0.92
6	All the sustainable development goals have much to do with field of science than any other field	2.89	1.04
7	Creating awareness about sustainable development is a pre-requisite for achieving the goals	2.81	1.06

The pre-service teachers in the college of education had positive views about roles of science education in achieving sustainable development. This is because they all agreed with all the roles of science education presented to them in the questionnaire as it can be observed in Table 4. Where all the mean value are greater than 2.5 which is the average mean value and the standard deviation range from 0.83 to 1.10 which shows that the variation between their responses is not far apart.

Discussion of Findings

Finding from the study revealed that the respondents were all aware of the 17 SDGs, although the level of awareness varies. This finding is in agreement with that of Benson (2017) who found that university students were relatively aware of all the 17 SDGs. But the finding disagreed with that of Bello et al. (2019) Omisore et al. (2017) in which 48% and 43% of their respondents respectively were aware of the SDGs. Another finding from the study showed that there is no significant difference in the awareness of male and female respondents as regard SDGs. The finding disagreed with that of Bello et al. (2019) whose finding revealed significant difference in the awareness of SDGs by health workers in favour male respondents. Another finding from the study showed that significant difference did not exist between Year two and three respondents; this disagreed with the finding from the study of Zamora-polo et al. (2019) who reported significant difference between Health and Education students which was in favour of Education students. Finding from the study also revealed that respondents have positive views about role of science education in achieving sustainable development in Nigeria. For example, item 1states that "Quality science education can be used to achieve sustainable development" the mean value 3.18 which is greater than 2.50, it means that greater number of respondents agreed with the statement. This finding is in agreement with observations of researchers such as Nwachukwu (2012); Okoli et al. (2013) that science education is a priority for the achievement of sustainable development.

The finding is also in line with submission of (Omole & Ozoji, 2014; Aramide, 2017) who emphasized on lack of awareness as impediment to achievement of SDGs. The third item has to do with creation of awareness about sustainable development through media such as television is necessary for those who are not in school, and the mean value of respondents that agreed with the statement is 2.87. The finding corresponds with the view of Omole and Ozoji (2014) who ascertained the use of entertainment through media for creating awareness of SDGs for those not in school. Having positive views about role of science education in promoting sustainable development by majority of the respondents may help the pre-service teachers in preparing the younger ones for the task ahead in achieving sustainability in the nation.

Conclusion

The findings from the research revealed that pre-service science teachers of the college of education Lafiagi were aware of the SDGs stipulated by the UN. This is good for country such as Nigeria that is aspiring to achieve sustainable development and to meet up the 2030 deadline for the achievement of these SDGs. The study also revealed that gender did not influence the awareness of SDGs by the respondents. This means that both male and female possessed adequate awareness about SDGs. Another finding from the study showed that there was no significant difference in the respondents' awareness of SDGs based on their grade level. It means that irrespective of the grade level of students their awareness of SDGs was the same.

Recommendations

Based on the results and conclusion from the study, it is therefore recommended that the stake holders in the field of education such as government, college management, curriculum planner and lecturers should ensure working towards achievement of the SDGs by providing the pre-service teachers with necessary resources both human and material ones that will aid contribution of their own quota to the achievement of the SDGs. Also the provision of resources by the stake holders for the purpose of the achievement of the SDGs should not be gender and grade level biased, both male and female as well as Year two and three should be exposed to knowledge of SDGs equally. Finally, all avenues to provide the necessary requirements needed in training the pre-service teachers on how to achieve sustainable development through science education should be explored.

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