

# Engendering Students' Positive Attitude to Sustainable Life Style through "Green Biology" Instruction

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## Abstract

The study investigated the effect of a "Green Biology" instruction, an environmental and sustainability responsive participatory instructional approach on students' knowledge and altitude to sustainability life style strategies. Three research questions and one hypothesis were used to guide the study. A quasi-experimental research design was used. The sample of 169 Post Basic year one students formed the experimental and control groups. The pre and post tests were conducted on the two groups using a Sustainability Attitude Questionnaire (SSAQ) and the experimental group treated with "Green Biology" instruction. Data analysis shows the "Green Biology" group showing significantly higher positive attitude towards sustainable life style strategies. It was recommended that seminars and workshops be organized to expose teachers to the "green" approach to instruction as a strategy for engendering sustainable life style in Nigeria youths.

**Keywords:** sustainable life style, students' attitude, Green Biology, instruction

## 1.1 Introduction

The term "green" has become associated with environmentally friendly, sustainability practices, goods and services that reduce harm to the environment. As a matter of policy nations encourage organizations and citizens towards "going green". This refers to cooperate and individual action consciously taken to curb the harmful effects on the environment through consumer habits and life style (Capital Althia 2010). "Going green" also includes ethical behavior, being socially responsible, and protecting the environment (king, Case & Premo, 2010). The UNDP (2012) advocated for a green economy among member nations: "one that results in improved human well-being and social equity while significantly reducing environmental risks and ecological scarcity" (p. 20).

While nations of the world call for 'green' policies and strategies that would avert the eminent dangers the world is facing and would increasingly face in the future, due to climate change, many Nigerian citizens and indeed African citizens go about their daily affairs oblivious of the harm some of their activities are causing to the environment. There is generally a poor understanding among the Nigerian populace of the hazards of climate change and the impact of some of their activities on the environment (Ogundare, 2014). Capital Althia (2010) recommended that the government of Nigerian embarks on environmental initiatives to develop a "green consciousness" amongst Nigerian people. Nonetheless, efforts have been made by the Federal Government of Nigeria to tackle the problems of environmental degradation with the establishment of; the Federal Environmental Protection Agency (FEPA) in 1992; Federal Ministry of Environment in 1999; National Environmental Standards & Regulations Enforcement Agency (NESREA) in 2007. At present experts are advocating for the inclusion of climate change in the primary, secondary and tertiary school curriculum so that the youths can start early to learn about climate change and the need for sustainability (Leadership, 2017). Education is an essential element of global response to climate change it helps young people to make changes in their attitude and behavior and adapt to climate change related trends (UNESCO, 2010).

Strategies for mitigation and adaptation of climate change have become a subject of importance not only in Nigeria but globally. Two major global discourses on environmental concerns served as a wake-up call to the world on the need for new approaches to environmental protection. These were the conference on Human Environment held in Stockholm in 1972 and the United Nations Conference on Environment and Development (UNCED), held at Rio De Janeiro in 1992 (Allen, Kilvington & Horn, 2002). Central to these international discourses on the environment and development was the adoption of approaches and strategies for tackling environmental degradation and the promotion of economic and human development through proper management of natural resources. Treaties and bench marks for the enforcement of intergovernmental policies and targets were also instituted for the mitigation and adaptation of environmental policies. These include Agenda 21 which arose from the UNCED. Agenda 21 streamlines a new approach to sustainable development that will include information, integration and participation as the key to achieving sustainable development and stressed on the need for public participation in decision making and the integration of environmental concerns into all development processes (Allen et al, 2002). The Kyoto Protocol further placed responsibility upon developed nations to be more concerned about global warming through the regulation of their greenhouse gas concentrations (GHC) so that the climate systems is not affected by their activities (United Nations Framework Convention on Climate Change, 2014). International environmental treaties and national environmental standards and regulations are duly adhered to in most nations including Nigeria; and agencies are established to

enforce them (NESREA, 2017). However, the integration of environmental concerns into the educational system needs to be fully explored in Nigeria.

Sustainable development has become one of the successful political approaches to national development. This, according to the Brundtland report is “development that meets the needs of the present without compromising the ability of future generation to meet their needs” (United Nations, 2014: 17). While not all climate change actions are synonymous with sustainable development some boarder on long term approaches to environmental conservation such as afforestation, reduction in energy consumption, energy saving technologies which could be incorporated into a sustainable development framework. A component of this frame work should not only include creating awareness in the youths through education but also , the inclusion of climate change in school curriculum and also inculcating early in our youths a desire for living sustainable life style through the provision of instruction that can impact on their attitude to climate change and engender sustainable life style (UNESCO, 2010).

The United Nation had constituted 2005 to 2014 as the decade for educational sustainable development. Among the goals to be achieved for this was the rethinking and revising of education from nursery school to university to include clear focus of current and future societies on the development of knowledge, skills, perspectives and values related to sustainability. This, among others things, suggests and requires the review of the existing curricular in the form of new approaches of teaching , learning and assessment (p. 56).The second objective of the UNESCO ( 2010) Climate Change Education for Sustainable Development programme is innovative teaching and the action areas are; the “ integration of climate change into science education curricula, programmes and material, promoting a participatory and interdisciplinary teaching of the science of climate change”( p. 11). The green approach to instruction should be one such innovative teaching approach to be considered in this bid.

The ‘green’ teaching approach simply implies integrating sustainability knowledge and practices into the teaching of some school science subjects. As the term ‘green’ is synonymous with efforts geared towards sustainability, providing youths with instruction that is geared towards engendering a sustainable life style can be termed as “green” instruction. Some school subjects such as Biology have in their curriculum topics that deal with the environment and climate; Biology topics such as Ecosystem and Biomes in Ecology. These topics can be taught using participatory instructional techniques that can sensitize and inculcate in the students positive attitudes and behaviours towards sustainability. Thus, the ‘green instruction’ can be applied to the teaching of school subjects like Biology and Agricultural Science.

### **1.2 Students’ Knowledge, Attitude and Behaviour towards Sustainability**

Sustainability in itself is the act of not damaging or degrading natural resources. It is also seen as developmental activities that takes account of the environment (Prott, 1995). Accordingly, in a sustainable (green) economy, economic activities should not impose danger to the natural resources. A sustainable life style would then emanate as the application of sustainable lifestyle choices and decisions (U.S.EPA, n.d). Sustainable living involves touching as little of the earth’s natural resources as possible and causing little damage to the environment (Regenerative Leadership Institute, 2012).Sustainable living will include practices such as ; reducing water consumption, using renewable energy (such as, solar or biomass), reducing energy consumption through less transportation, proper waste management through re-use of waste, recycling or converting waste to energy, land fill, choosing locally and organically grown foods, vegetarian diets and less meat (Blackstone, Middleton , Robinson, & Arbon, 2014).

There has been a low level of environmental awareness among the populace in Nigeria. In a survey on environmental awareness and attitude among 326 citizens above 18 years across urban South –West Nigeria; Ogunbode and Arnold (2012) found a general low environmental awareness and a lower awareness among the youths and female folks. Similarly, Onoja (2014) found in a study of 6161 secondary school male and female students in both urban and rural areas in North Central Nigeria, that the students showed a low awareness and poor attitudes to environmental concerns.

However, the right values required by the citizenry in Nigeria to embrace sustainable life styles were appraised and found to include: interest in environmental issues and positive attitudes to preservation. These values were found to be possessed by most citizens in South -South Nigeria ( Nwosu & Nwosu , 2010). But, there is usually a gap between attitude and behaviour both among individuals and collectively (Cleiserouitz, Kates &Parris, 2006). Thus, translating positive attitude towards sustainability to behavioural actions that actualize sustainable life style should now be prioritized. The government has dwelt vastly on enlightenment campaigns; has created awareness on environmental degradation and solicited need for sustainability practices. However, stirring people to act upon this information or change their habits is challenging. Youths and children on the other hand can be taught about sustainability, learn to develop sustainability values and the importance of imbibing sustainable life styles while in school.

Nicholas, Crech, McDonald and Kahlke (2009), in measuring grade students’ knowledge, attitude and

behaviour towards sustainability found that the students gave the highest level of support to items like “every girl or boy should be taught the knowledge, values, issues and skills for sustainable development”. Targeting the youths can bring about a new generation of citizenry that not only have positive attitude to sustainable development but a behavioural disposition to living sustainable life style. Torbjornsson, Molen and Karlberg (2011) in studying high school students’ attitudes towards Biocentric and Anthropocentric values in sustainable development, found that the students in the city had a more favourable attitude towards nature preservation as compared to students in the rural areas. In another study, Meller and Bentley (2012) revealed that people who choose to live extremely sustainable life styles (go green) had a strong commitment to sustainability from early childhood and enjoyed being “early adopters and leaders” in sustainability. Students are also interested in knowing more about sustainability at the tertiary level of education. Drayson, Bone, Agombar and Kemp (2004) in a research into students’ attitude towards skill for sustainable development, found that over two thirds of the over five thousand students sampled believed that sustainable development should be covered in their universities curriculum and 60% want to know more about sustainability.

In Nigeria, there is strong advocacy for climate change curriculum in schools (Leadership, 2017). But will studying about climate change bring about the desired behavioural and attitudinal changes that will result in pro-environmental behaviours? According to Rogerson, Bellingham and Shevtsova (2012) the United Kingdom citizenry can be segmented into three categories in respect of their attitude and behavior towards sustainability.

- Those who are pro-environmentally aware
- Those who are willing but remain cautious in their behaviour and
- Those who are largely disengaged from pro-environmental behaviour.

This implies that people can be environmentally aware but refuse to act on their knowledge.

### **1.3 Behaviour Modification through Participatory Learning Strategies**

Research studies have shown that “participation” is one of the critical components of success in bringing about developmental change (Prott, 1995; Thomas, nd). Participatory learning stems from transformational learning which is derived from the constructivist experiential learning theory (Kolb, 1984). The Experiential Learning theory (Kolb, 1984) describes it as a process whereby knowledge is created through a process of transformation of experiences. The process follows a cyclic continuum from reflection to conceptualization to application (Fry et al, 1999). These experiences are of two types: the first order experience which are past lived experiences that are tacit or implicit; appearing true but are actually incomplete, inadequate or distorted. The second order experience involves disorientation, surprise or recognition of ignorance (Merzirow, 1990) elements which challenge the first order experiences leads to reconsideration and modification of that experience or knowledge.

Transformation learning is often challenging and though enabling conditions can be established to facilitate its taking place; there is no guarantee that it actually will. It is possible, however to identify specific practical ways in which the theory of transformative learning can enhance second-order experiences, reflection and dialogue. Like introducing disorientating dilemmas as activating or critical events that expose learners to alternative perspectives (Taylor, 2000), also role-play and problem solving techniques can be employed. Transformative learning processes can be modeled by generating thought provoking questions, raising and testing proposition, and showing curiosity (Norstorm, 2004). Transformation learning is usually modeled with adults. Norstorm (2004) modeled transformative learning experience with adults and found that it was a continuous learning cycle, once it occurs individuals are more receptive to experiencing it again and it is unlikely that adults will revert back to their prior beliefs. Nazzari, McAdams and Roy (2007) also applied the transformative learning model for human rights education in adults.

Participatory Action Research (PAR) has been applied for years in education by its practitioners under a variety of circumstances. Among which are critical pedagogy and adult education to instill change through collaborative reflection (Chevalier & Buckles, 2013). Participatory research has also been used in youths to bring about change through youth engagement on issues ranging from violence to criminality, racial discrimination, education tactics, health care and the environment. (Carr & Kemmis, 1986; Fine & Torre, 2008 in Reason & Bradbury, 2008; Noffke & Somelch, 2009).

As these participatory learning theories can be applied by identifying specific practical ways in which transformative learning can enhance second order experiences (Percy 2005); in this context, teaching school children about sustainability with the “green” approach would involve enhancing already acquired knowledge/experience about nature (both informally and through formal instruction) by the students. These experiences can be re-shaped or re-interpreted to include the essence of preserving nature and the environment as a whole. Taylor (2000 in Percy, 2005, p11) suggested “introducing disorientating dilemmas as activating or critical event that exposes learners to alternative perspectives, role play and problem solving techniques; generating thought provoking questions, raising and testing proposition and showing curiosity”. These activities constitute participatory learning connotes. Children are interested in global social themes like environment, love,

peace, family and society, using participation is mainly like playing upon these topics in an educational way. Participation is more like a learning process than involving predefined learning objectives (Percy 2005).

Classroom drama plays an important role in the modification of learners' thoughts and behaviour using the classroom environment. There is strong relationship between play, critical thought and social change. The practice of drama is transformative. Classroom drama is a participatory activity that can also give the learners experience of democratic learning and positive living towards the transformation of their intellectual and social life. Theatre contributes to the process of child transformation by probing questions and offering suggestions that can be dramatically open or provided through metaphors. The ideas on the script present a snatch of someone's life and circumstances. Obadegwu (2012) recommends drama as participatory learning activity that can play an important role in the 'modification of learners thought and behavior.' According to him there is a strong relationship between play and critical thought and social change.

Introducing disorientating dilemmas can assist learners to see various perspectives to issue and events (Taylor, 2000). This can also be used to create a comfort zone that enables learners to perceive being wrong is harmless and should not be discomfoting. This includes modeling that answering questions means being willing to accept corrections when incorrect. The class then explores why it is wrong not to say your thoughts. Other ways are to solicit incorrect answers from the students', or answers they suspect are wrong. The instructor light-heartedly interchanges, or alternates between correct and incorrect answers or asks students to simply make guesses the correct answer (Taylor, 2000).

Kenny and Wirth (2000) recommends among other activities "infusing relationship" as an activity for introducing participatory learning experiences in the classroom. This is done by the instructor asking students to act-out human type characteristic of objects or concepts. It does not require the students to know much about the concept or topic, for instance the students can play the role of an electron in a science class. The instructor can ask students to act human-like characteristics of the object or concept. It requires minimal knowledge of the topics by the students in the class, for instance in a science class, the teacher, to teach the topic electron, a student can play the role of an electron with questions like; how do you feel or what do you do all day"? Or use teaching questions like what other electrons do you spin around all day? Then add emotional tags to the questions such as not all electrons are friendly with each other and might repel.

A green biology instruction in this context is teaching Biology in a manner that would involve the creation opportunities for students to engage in variety of participatory learning activities that include drama, empowering the learner, infusing relationships which assist students to see their environment as precious and see the need for, and desire sustainable life style.

#### 1.4 The Problem

Nations of the world including Nigeria should key into the UNESCO (2010) Climate Change Education for Sustainable Development programme and work towards national frame works for sustainable development which will not only include a climate change curriculum for schooling youths but also include strategies to assist the larger audiences, including youths to:

- (i) Understand , address , mitigate and adapt to the climate change efforts
- (ii) Encourage the change in attitude and behaviours needed to lead countries in to a sustainable development path,
- (iii) Build a new generation of climate change sensitive citizenry.

These objectives can be achieved among schooling youths if instruction on climate change and environment related topics or areas in their school subjects can culminate to fostering positive attitude and behaviours towards sustainability. Participatory learning research has been used in youths to bring about behavioural changes through youth engagement in issues such as education tactics, environment among others (Carr & Kennis, 1986; Fine & Torre,2008 and Noffke & Somelch,2009). Incorporating participatory techniques into teaching school Biology topics and linking them to the environment and sustainability is here referred to as 'green Biology' instruction. Can introducing the 'green' instruction into the teaching of school subjects that study the environment help bring about positive changes to students attitudes to sustainable living? This study investigated the effect of 'Green Biology' instruction on students' attitude and behaviour towards sustainability.

#### 1.5 Research Questions

1. How knowledgeable are secondary school students in matters of sustainable environmental concerns?
2. What is the effect of 'green Biology' instruction on students' attitude to sustainable environment?
3. What is the effect of 'green Biology' instruction on students' behaviour towards sustainable environment strategies?

#### 1.6 Research Hypotheses

1. There is no significant difference in students' attitude towards sustainable environment strategies based on a

- 'green Biology' instruction.
2. There is no significant difference in students' behaviour towards sustainable environment strategies based on a 'green Biology' instruction.

## 2. Method

### 2.1 Research Design

The study used survey design to identify student's knowledge, attitude and behaviour towards sustainable environment strategies, using a sample of three hundred and twenty Post Basic year one students selected through multi stage simple random sampling. A quasi experimental design the Pretest, Posttest Non Equivalent Group design shown below was used to test the effect of a series of "green" Biology instructional approach on eighty six Biology students' attitude and behaviour towards sustainability strategies.  $O_1 C O_2$

$O_3 X O_4$

Where  $O_1$  and  $O_3$  represent pretests,  $O_2$  and  $O_4$  represent posttests (Best & Kahn, 1989)

### 2.2 The Sample and Sampling Procedure

A sample of one hundred and sixty nine (169) Post Basic year one students selected through multi stage stratified random sampling technique were used for the study. The Post Basic students are in their fourth year of Secondary School and are between the ages of fourteen to seventeen. First, the schools were stratified into groups urban and rural; two schools each were then randomly selected for the study groups, two experimental and two control (one rural school and one urban school each for the two groups). The students that form the groups were used in their intact classes Thus, eighty six (86) senior secondary school Biology students from two of the sampled schools (41 in one school and 45 in the other) formed the experimental groups and another eighty three (83) students from two schools (41 in one and 42 in the other) formed the control groups.

### 2.3 Instrument for the Study

The instruments used for the study were a "Students' Sustainability Attitude Questionnaire" (SSAQ) and a "Green Biology" instruction template. The "Green" Biology Instruction template (see Appendix 1) was used to teach the experimental group. The template introduces activities based on educational principles and theories of Participatory Learning into the teaching of the some environment related topics in the Biology syllabus with the aim of arousing interest in and creating sensitivity among the students towards the issue of a sustainable environment. SSAQ is a sixteen (16) item, five point rating scale consisting of two sections. Section A requires the respondents to indicate their class and school, section B elicited the students responses to items on their attitude to sustainability strategies (8 items ) and items on their behaviour towards sustainable life style strategies (8 items ) on a scale of strongly agree 5, agree 4, not sure 3, disagree 2 and strongly disagree 1 for the items on attitude to sustainability ; and always 5, often 4, don't know 3, sometimes 2, never 1, for the items on behaviour towards sustainable life style strategies.

### 2.4 Method of Data Collection

Data was generated form the distribution of SSAQ to the one hundred and sixty nine students who formed the control and experimental group. Both the experimental and control groups answered the SSAQ at the beginning of the study. The experimental group was subjected to ten weeks of Biology lessons in which Biology topics that were related to with the environment were taught using the "green Biology" instruction template ( see table 6) and the control groups were taught with the usual method which is mainly expository. At the end of the eight weeks the two groups were asked to fill out SSAQ once more.

### 2.5 Method of Data Analysis

The data collected was subjected to descriptive and inferential statistical analysis. The mean and Standard deviation of the students' pretest responses of both the experimental and control groups to the items on knowledge , attitude to and behaviour towards sustainability were calculated item per item in order to answer research question 1 (see table 1). The mean and standard deviation pre and posttest responses of the two groups to the items on attitude and behaviour towards environmental sustainability strategies were also computed item per item to answer research questions 2 and 3 ( see table 2 and 3). To delineate the students' attitude towards sustainability based on their mean responses a decision rule was established whereby mean of 2.50 and above indicates positive attitude and behavior; while less than 2.50 indicate negative attitude and behavior. Similarly, on the knowledge scale, a mean score from 0.0 to 2.49 indicates below average; 2.50 to 3.49 indicates average and 3.50 to 5.0 above average knowledge of sustainable environmental concerns respectively.

The Analysis of Covariance (ANCOVA) was used to analyze the data obtained from the pretest and posttests responses of the experimental and control groups. The pre test scores were used as covariates to control for their effect on the posttest responses of the two groups. The two hypothesis were tested at .05 alpha levels,

implying that a calculated p value less than 0.05 indicates a significant difference in the posttest mean of the control and experimental groups; that is, that the difference in the mean responses of the two groups is attributable to the effect of the “green Biology” instruction.

### 3.0 Results

#### 3.1 Research Question 1

Table 1: Mean and standard deviations of students’ response to in items on knowledge of sustainable environmental concerns

	<b>Students' Knowledge of Sustainability</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Knowledge Decision</b>
1	Sustainability concerns living in a manner that appreciates and recognizes environmental concerns	3.884	0.999	Above average
2	Sustainability concerns energy conservation practices	3.38	0.77	Average
3	Sustainability has to do with good waste management practices	4.09	1.07	Above average
4	Sustainability is concerned with recycling of solid waste	4.62	0.89	Above average
5	Sustainability has to water conservation practices	3.81	0.74	Above average
6	Sustainability has to do with "green" practices such as planting more trees	4.19	1.14	Above average
7	Reduction of toxic waste and radioactive waste by companies also concerns sustainability	3.52	1.08	Above average
8	Lack sustainable life style can be hazardous to economic growth	3.22	0.71	Average
	<b>Overall</b>	<b>3.84</b>	<b>0.46</b>	<b>Above average</b>

Table 1 presents the mean scores of students’ responses to items on their knowledge of sustainable environmental issues. It shows that the student on the overall have an above average knowledge of issues of environmental concerns as indicated by the overall mean of 3.84.

#### 3.2 Research Question 2

Table 2: Mean and standard deviation of students’ attitude to sustainability based on “green Biology” instructional approach.

Instructional approach	N	Mean	Std. Deviation
Green biology	46	31.87	3.390
Conventional	40	28.55	1.724
Total	86	30.33	3.197

Table 2 presents the mean scores of students’ responses to items on attitude to sustainable environment concerns. The table reveals that the mean posttest score of the experimental groups of students taught with the “green Biology” approach (mean 31.87) is greater than their counterparts (mean 28.55) in the control groups who were taught Biology using the conventional (expository) instructional approach. This implies that the green Biology instruction had a positive effect on the students’ attitude to sustainability.

#### 3.3 Research question 3

Table 3: Mean and standard deviation of students’ behavior towards sustainability based on “green Biology” instructional approach.

Instructional approach	Mean	Std. Deviation	N
Green biology	35.09	3.398	46
Conventional	30.03	3.301	40
Total	32.73	4.191	86

Table 3 presents the mean scores of students’ responses to items on sustainable environment behaviour. It shows that mean responses of the experimental group of students taught green Biology instructions (mean 35.09) is greater than their counterpart (mean 30.03) in the control group that were taught Biology using the conventional instructional approach, indicating that the green Biology instructions brought about more positive attitude to sustainability.

### 3.4 Hypotheses 1

Table 4: Analysis of Covariance of Green Biology instructional approach and students' attitude to sustainability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision at 0.05 alpha level
pretest	20.324	1	20.324	2.753	.101	Significant
Instructional approach	220.355	1	220.355	29.846	.000	
Error	612.793	837	383			
Total	79958.000	86				
Corrected Total	868.884	85				

Table 4 shows the ANCOVA result of instructional approach and students' scores in attitude towards environmental sustainability. The result shows that the calculated F-value for the two instructional approaches is  $F(1, 83) = 29.846$ ,  $p < 0.05$  alpha value. Since the p-value of 0.000 is less than 0.05 alpha levels, the null hypothesis is rejected. Therefore there is a significant difference in student attitude to environmental sustainability based on instructional approach. The students taught with the green biology approach performed significantly better than those taught with the conventional method.

### 3.5 Hypothesis 2

Table 5: Analysis of Covariance of Green Biology instructional approach and students behavior towards sustainability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision at 0.05 alpha level
pretest	1.255	1	1.255	.110	.740	Significant
Instructional method	518.057	1	518.057	45.580	.000	
Error	943.372	831	366			
Total	93635.000	86				
Corrected Total	1492.849	85				

Table 5 presents the ANCOVA result of instructional approach and students' scores on environmental sustainable behaviours. The result shows that the calculated F-value for the two instructional approaches is  $F(1, 83) = 45.580$ ,  $p < 0.05$  alpha value. Since the p-value of 0.000 is less than 0.05 alpha levels, the null hypothesis is rejected. Hence there is a significant difference in students' behaviours towards environmental sustainability based on instructional approach. The students taught with the "green biology" approach indicated significantly more positive behaviour to sustainability strategies than the conventional method group.

## 4. Discussion

### 4.1 Students' knowledge of Sustainable Environment Issues

The student's knowledge of sustainable environment issues was found to be above average (mean 3.84) these results implies that the students are well aware of area of concerns in sustaining the environment. This finding is not agreement with the findings of Onoja (2014) and Ogunbode and Arnold (2012), who reported low awareness among youths and adults in South West and students in North Central Nigeria respectively. This contradiction could be because the students are nowadays in contact with all sorts of communication technologies which keep them abreast with current global issues.

### 4.2 Students' Attitude to Environmental Sustainability Strategies

The results of the data analysis showed positive attitude to sustainability strategies (mean score above 2.50) this is corroborates the findings of (Nwosu & Nwosu, 2010) who found that the right values of interest in environmental issues and positive attitudes to preservation required by the citizenry in Nigeria to embrace sustainable life styles had already been were found to possessed by most citizens in Nigeria . And the study by Drayson, Bone, Agombar and Kemp (2004) in which over two thirds of the over five thousand students used in the study believed that sustainable development should be covered in their universities curriculum. A significant difference is revealed between the two groups in their attitude towards environmental sustainability strategies. The treatment group that were taught with the "Green" Biology instructional approach had a higher mean rating ( mean 31.87) than the control group( 28.55) implying that the Green" Biology instructional approach significantly increased the student's attitude towards the sustainability strategies and life style. The efficacy of the' green Biology 'instructional approach in improving students attitude towards sustaining the environment accentuates the efficiency of participation in strengthening capacity of people to learn and to act (World Bank 1994). This further proves that the participatory method in instruction can be utilized in other cases where the learners are required to be more involved or take ownership of policies.

### 4.3 Students' Behaviour towards Environmental Sustainability Strategies

The results of the data analysis also revealed a positive behavior to sustainability strategies (mean score above

2.50). These findings agree with Rogerson, Bellingham and Shevtsova (2012) and these students can be classified as “those who are pro-environmentally aware”. However, the ‘green Biology’ instruction has brought about a significant difference in behaviour towards environmental sustainability strategies between the two groups again implying that the ‘Green Biology’ instructional approach can significantly engender in the students a more positive behaviour towards applying the sustainability strategies and life style. However, although Cleiserouitz, Kates and Parris (2006) stated that there is a gap between attitude and behaviour both among individuals and collectively it is hoped that the exposure to the participatory instructional approach will keep the students committed to sustainability as they have indicated. Using the “green Biology” approach, these students can as revealed by Meller and Bently (2012) show a strong commitment to sustainability from this early stage and become “early adopters and leaders” in sustainability.

## 5. Conclusion

The study has shown that although the students have above average knowledge of sustainable environment issues and positive attitude and behaviour to sustainability strategies; the “green Biology” instructional approach has significantly improved the students attitude and behaviour towards environmental sustainability strategies; this implies that the “green Biology” approach can help engender a more positive attitude and general behaviour towards sustainability and sustainable life style among the students. While Nigeria makes climate change mitigation and adaptation policies the “green” approach to instruction is one of the practical steps that can be taken to entrench sustainability values in its youths.

## 6. Recommendations

The study recommends that:

1. As part of government’s mitigation strategies, school teachers should be trained on techniques to sensitize the growing youth population on proper response to the environmental issues.
2. Aspects of the school science curriculum that relates to the environment should be extended to include topics that teach more on environmental concerns
3. School environment day should be introduced in schools to further sensitize students on the need for environmental protection.

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**Table 6: Template for Green Biology Instruction Using Participatory Learning Strategies**

<b>Stages of the Lesson</b>	<b>Participatory Learning Environment Activity</b>	<b>Expected Outcome</b>
<b>Stage 1:</b> Set induction Introduction of topic	While on this stage <ul style="list-style-type: none"> <li>• Raise dilemma on the environmental aspects of the topic/ and link topic to environment where possible.</li> <li>• Raise some thought provoking questions concerning environment</li> </ul>	<ul style="list-style-type: none"> <li>• Students start looking at environmental issues concerning the topic.</li> <li>• Students start asking questions and become aware or see the topic as an environmental issue.</li> </ul>
<b>Stage 2:</b> Lesson presentation (Instructional delivery)	<ul style="list-style-type: none"> <li>• While delivery instruction the teacher can use all or any of these activities to direct the students thoughts to sustainability.</li> <li>• Introduce dilemmas were possible.</li> <li>• Simulate some drama of environmental scenes on the topic</li> <li>• Raise propositions where possible.</li> <li>• Role-play some situations.</li> </ul>	<ul style="list-style-type: none"> <li>• Students' start to relate some aspects of the topic to the environment and sustainability.</li> </ul>
<b>Stage 3:</b> Evaluation Stages of lesson	<ul style="list-style-type: none"> <li>• During evaluation include a question or two on sustainability. Such as; How environmental problems identified can be alleviated.</li> <li>• Participatory environment activities.</li> <li>• Questions on solutions to some environmental problems related to the topic.</li> </ul>	<ul style="list-style-type: none"> <li>• Students understand aspects of the topic as it relates to the environment and sustainability is tested.</li> <li>• Students attitude to sustainable life style is tested</li> </ul>
Stage 4 Summary/ assignment on the topic.	<ul style="list-style-type: none"> <li>• Teacher summarizes the lesson linking the topic to the environmental and sustainability concerns discussed.</li> <li>• Gives thought provoking/problem solving assignment.</li> <li>• Or ask students to work an essay on their thoughts linking the topic to sustainable life style.</li> </ul>	<ul style="list-style-type: none"> <li>• Students go home to apply what they have learned to their daily living.</li> </ul>