

Creating Environmental Awareness through University Sustainability Education: Evidence from Developing Economies

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The need to protect the environment from degradation has been topical for quite some time. Yet, there is still a lack of awareness among the general public on the importance of living eco-friendly life. This has made universities offer sustainability education programmes to support students to develop the knowledge and skills necessary to live a sustainable life. However, little is known of the impact of university sustainability education in creating students' environmental awareness, particularly in developing countries. Accordingly, this study investigates the impact of university sustainability education on environmental awareness of students in Nigeria. Guided by the theory of planned behaviour, data was collected via a questionnaire and analysed using multiple regression model. The study revealed that sustainability education impacts positively on students' environmental awareness. The study concludes that university sustainability education is an important requirement in creating students' environmental awareness in Nigeria.

Key words: *Environment; sustainability; education; university; curricular; extra-curricular; awareness.*

Introduction

The global increase in economic growth over the last few decades has, on one extreme, transformed the lives of millions of people and, on the other, led to widespread environmental degradation (Graff-Zivin, 2018). This has prompted governments and policy makers to develop policies that protect the environment while at the same time sustaining increased economic activities. These policies are commitments to rules, regulations and other policy instruments

relating to environmental issues such as pollution, waste and ecosystem management, protection of natural resources and wildlife, among others (Eccleston & March, 2010).

Despite the growing aspiration by governments across the globe to protect the environment, there is still a lack of awareness among the general public on the importance of living an eco-friendly life (Iizuka, 2000). Acknowledging this lack of awareness, many universities have introduced sustainability education programmes (Widener, 2016). In order to support students to develop knowledge, values and skills may lead to sustainable life pattern (Hill & Dymont, 2016). Thus, through formal (curricular) and informal (extra-curricular) education, universities prepared the students to enter the labour market with improved social and ecological friendly skills and attitudes essential for battling sustainability challenges and working in an ever-increasing greener economy.

Although there is no dispute among scholars on the role universities are playing in overcoming the challenges of sustainable development via education (Eizaguirre et al, 2019; Mochizuki & Fadeeva, 2010), little is known about the impact of such educational programmes on raising the awareness of students on the significance of green environment. Accordingly, this study investigates the extent to which university sustainability education creates awareness of the green environment among universities students in Nigeria.

Two reasons informed the focus of this study on Nigeria. First, literature on the role of sustainability education in creating environmental awareness is massive (Libunao & Peter, 2013; Sahin et al., 2012). However, there is still a dearth of research on Nigeria. The very few studies on Nigeria were mainly on primary and secondary education (Auwalu et al., 2017; Ine et al., 2015; Victoria, 2013). Second, despite Nigeria's policy towards sustainable environmental education, environmental degradation stemming from lack of awareness remains horrible in Nigeria (Ogburu & Anga, 2015).

The sample of this study consists of undergraduate university students drawn across universities in Nigeria. Data was collected via a five-point Likert questionnaire. Guided by the theory of planned behaviour, the analysis revealed a number of findings. First, the study revealed that both curricular and extra-curricular activities impact positively on the environmental awareness of students. Second, the study found that sustainability education (SE) in Nigerian universities is not adequately sufficient in terms of coverage. Third, the study found that SE in Nigerian does not address environmental issues within the context of the students' immediate environment. Finally, the study revealed that SE teaching strategies in Nigeria have adverse effects on students' environmental awareness.

The study contributes to knowledge in so many ways. First, it contributes to the increasing interest on studying the role of universities in creating environmental awareness. This is

particularly important in the case of Nigeria, as little research on the impact of SE on students' environmental awareness is conducted on Nigeria. Second, the different research approach used in this study significantly contributes to literature on university SE. Instead of the popular holistic approach, this study investigated separately the impact of two components – curricular activities and extra-curricular activities - of SE on students' environmental awareness. Finally, the study contributes to knowledge in serving as a guide relating to environmental policy reform. Many countries have good environmental education policies but environmental degradation is continuing. Therefore, the findings of this study are likely to be a useful guide for policy actions.

The rest of the study is divided into five sections. The section that follows presents the literature review and hypotheses of the study. Section three presents the methodology employed in the study.

This is followed by the presentation of results in section four. Section five discusses the study's results while section six concludes the study.

Literature Review

The relationship between environmental awareness and sustainability education is explained using various theoretical frameworks (e.g. ecological systems theory, theory of reasoned action, and theory of planned behaviour, among others). Of these theories, the theory of planned behaviour (TPB) is the most widely used (Chen & Deng, 2016). The theory primarily emphasises a person's intention to perform a given behaviour. Such behavioural intentions are explained by three motivational experiences, viz: attitude towards behaviour, perceived social norms, and perceived behavioural control (Ajzen, 1991).

Personal attitude towards behaviour relates to one's judgement of a particular behaviour either as negative or positive. Thus, when a new problem emerged, people reflect on the beliefs they hold in mind and immediately attitude is made. An attitude is simply described as the like or dislike of certain action borne out of behaviour and belief (Krueger et al., 2000). Therefore, a person's attitude towards green environment is a measure of his perceived awareness of the environment and motivation to live an eco-friendly life. On the other and, perceived social norms relates to seeming social pressure from people around a person such as friends and family members that impact a person's behaviour (Ajzen, 1991). These social norms are measured by the influence friends and family members have on the behaviour of a person. Thus, in connection to environmental friendliness, normative beliefs are measured via the appraisal of the possible support a person receives from those around him. Furthermore, perceived behavioural control is the mindfulness of a person to control a given situation (Fretschner, 2014). Perceived behavioural control concerns self-assessment of the control a

person has over the behaviour he performs. On one hand, it indirectly influences the behaviour of a person through intention and, on the other hand, directly influences the behaviour of a person if the perception of a person tallies with the actual control he has over his behaviour.

Generally, if the score of any of the three motivational factors is high, it is likely that the individual's behavioural intention will be high and positive. Subject to specific behaviour, different possibilities are likely if only one or two of the antecedents have significant explanatory influence (Ajzen, 2005). However, if all three backgrounds have the same level of reliability, any lack of explanatory power would mean that the respective background is not significant in the formation of intention for the behaviour in question. Thus, an effective SE is expected to alter one or more of the motivational backgrounds of intention by impacting on the beliefs on which they are based, which, in turn, impacts environmental awareness.

Environmental awareness is a term that refers to the capacity of a person to understand the link between human activities, the existing state of environmental quality and his readiness to partake in environmental activities (Umuhire & Fang, 2016). This definition suggest that environmental awareness can be viewed through the three different lenses of i) environmental behaviour, which is a set of multifaceted activities stemmed from concerns for future generations of both human and other species (Ruepert et al, 2016), ii) environmental perception, which refers to the state of mind about the environment and the rational steps taken to understand it (Vincenzi et al, 2018), and iii) environmental attitude, which is an emotional response to environmental problems that has the potential of positively impacting the environment (Yi et al, 2018).

The last decade has seen an increase in the need for environmental awareness through sustained global enlightenment campaigns on the importance of the connection between a healthy planet and human livelihood. Universities, being considered agents of change (Mochizuki & Fadeeva, 2010), raise students' awareness of green environments by providing programmes that facilitate connection between a healthy planet and human livelihood (Shobeiri, 2007). With governmental policy directed towards a greener environment, universities are now more committed than ever to ensuring that sustainability is not only achieved in terms of their operations and research but also in their curriculum (Hugé, 2018). As a result, many universities now provide SE.

In its broader sense, SE is the process of developing the students' sustainability knowledge, attitudes and behaviours towards the environment and its social and economic effects (Leal & Pace, 2016; Besong & Holland, 2015). SE in universities has an exceptional impact in instilling sustainability behaviours in students (Chase, 2012). Through commitment to environmental wellbeing, universities provide SE through curricular and extra-curricular activities (Sady, et

al, 2019) with the sole aim of inspiring students to be aware of the environment and live environmentally friendly lives (Leal & Pace, 2016).

Traditionally, SE is offered only in natural science courses. However, in order to address complex problems cutting across social, economic and environmental boundaries, the subject matter of SE is now seen beyond the natural sciences (Mochizuki & Fadeeva, 2010). Realising that sustainability related problems is not only confined to natural sciences, universities are integrating sustainability topics across all disciplines and fields of study (Hopkinson & James, 2010). SE in universities does not stick to the normal disciplinary standards or theoretical meanings of disciplines (Biglan, 1973). Rather, SE is anchored on inter-disciplinary and multi-disciplinary frameworks (Pizmony-Levy, 2011). Thus, SE has both synergetic relationships with traditional disciplines and also cut across disciplinary boundaries (Johnston & Johnston, 2013).

SE is offered in universities either as a stand-alone (diffusion method) or part of an existing curriculum (infusion method) (Michel & Pizmony-Levy, 2017). The former occurs when new programmes (e.g. Environmental Accounting) and new courses (e.g. Environmental Financial Accounting) are introduced while the later occurs in existing courses that connect sustainability and environmental challenges with wider subject matters. While both methods are used in universities, the infusion method is favoured most by scholars because it gives students the opportunity to link sustainability related subject matters with other courses in their majors (Obach, 2009). In the same vein, SE is also offered in the form of extra-curricular activities. Extracurricular activities are optional, supplementary and unscored educational activities that are set within the school facilities but outside normal school hours (Mahoney & Cairns, 1997). Despite their supplementary nature, many activities (e.g. extended school hours, campus clubs, and modification to campus environment) fall within the ambit of extra-curricular activities which are closely connected to academic performance (Feldman & Matjasko, 2005).

Hypothesis Development

As discussed in section 2 above, university SE is provided through curricular activities and extracurricular activities. The following paragraphs discuss the impact of each of the activities on students' environmental awareness.

Curricular Activities

The integration of SE in the university curriculum has enlightened students on the relevance of sustainability subject matter to their daily lives (Bransford, 2000). For example, through SE, the awareness of the danger of toxic pigments can be created in the minds of students who measure in arts discipline (Reid & Petocz, 2006). Similarly, the inclusion of the concept of

sustainability in engineering educates students on the implications of product design, manufacture, use and disposal (Dyehouse, 2010). All of these underscore the significance of university SE curriculum in creating students' environmental awareness. However, empirical results on the impact of curricular activities in creating environmental awareness is mixed. For example, Dyehouse (2010) investigated the environmental awareness of first-year university engineering students. They found that students had general awareness about environmental issues due to the SE they received. On the other hand, in a study on students' sustainability awareness in Pakistan, Malik et al (2019) found that majority of students were not aware of sustainability terms in their respective fields. Not only that, their study also revealed that the SE curriculum was not sufficient enough to help students understand sustainability. Still further, Gratelia & Saracli (2019) investigated the impact of environmental sustainability education on the perception of students of North Center University of Baia Mare. They found no difference in the students' level of perception concerning the significance of environmental education.

On the basis of this discussion, the following hypothesis is developed for this study.

H₁: There is a positive relationship between university sustainability curricular activities and students' green environmental awareness

Extra-curricular Activities

Extra-curricular activities are optional and ungraded educational activities outside regular school hours (Mahoney & Cairns, 1997). They are supplementary activities that are closely connected to academic performance. Extra-curricular activities cut across all phases of education (Mannion, 2019), particularly higher education (Winter & Cotton, 2012). Studies on extra-curricular activities mainly show a positive relationship with environmental awareness.

For example, Ha-Brookshire & Norum (2011) examined the effect of intensive extra-curricular leaning opportunities on students' knowledge, skills and attitudes. The study revealed that the summit provided the students with insight that is not readily available in the education curricula. Similarly, Lipscombe et al (2008) explored the extent and the use of extra-curricular education related to sustainability development in UK universities. They found that extra-curricular activities were widespread, but their voluntary nature can both extend and limit the reach of sustainability education. Moreover, in a study on extra-curricular and reflective learning for sustainability, Diaz-Iso et al (2019) found that voluntary extra-curricular activities are valuable in the development of reflections that lead to changes in the belief, attitudes and everyday behaviours of students that are necessary for the attainment of sustainability. On the basis of this discussion, the following hypothesis is developed for this study.

H₂: There is positive relationship between university sustainability extra-curricular activities and students' green environmental awareness

Methodology

This study emphasises the use of a qualitative research method because it is based on students' perception of the impact of sustainability education on green environmental awareness. In the same vein, the use of the qualitative research method seems appropriate in this study because the findings of the study cannot be generalised to universities in other countries.

Sample and Data Collection

The population of the study comprises of undergraduate university students across Nigeria. Having considered factors such as the purpose, usefulness, time and resources available for the study (Patton, 2002) and, consistent with the argument that the size of a qualitative research is a matter of judgement (Sandelowski, 1995), a total of 120 were purposely selected as a sample for the study. The choice of purposive sampling is appropriate to this study because it results in the determination of proper sample size (Sandelowski, 1995) with a high level of precision (Thietart, 2001).

The data for the study was collected through a five-point Likert questionnaire. In order to identify likely problems and deficiencies of the questionnaire and also be familiar with the research protocol (Blaxter et al, 2010; Lancaster et al, 2004), the questionnaire was subjected to a pilot test across some of the respondents. Similarly, in order to reduce the likely threats to the credibility of the findings of the study, reliability and validity tests of the questionnaire were carried out (Golafshani, 2003). After these processes, the entire 120 questionnaires were personally administered to the respondents. A total of 104 questionnaires, representing 87% of the total administered questionnaires, were returned accurately completed. This high rate of return, as Walonick (2010) noted, is an indication that the questionnaire was well constructed.

Description of Variables

Two sets of variables are employed, namely: dependent and independent variables. The dependent variable is environmental awareness and the independent variables are SE and individual specific attributes. Table 1 presents the description of all the variables used.

Table 1: Description of Variables

Type	Name	Proxy	Description
Dependent	Green Environmental Awareness	GEA	This refers to the extent of students' awareness to environmental issues such as water control, waste management, sustainable travel and proper littering.
Independent (Sustainability Education)	Curricular Activities	TM	Teaching methodology employed in sustainability education
		TS	Teaching strategies such as lectures, assignments, group work employed in sustainability curriculum
		NC	Number of sustainability courses offered in the university
		EL	Sustainability courses that deal with environmental issues within the context of the students' immediate environment
		GP	Sustainability topics on government policies relating to greener environment
	Extra-Curricular Activities	CS	On-campus conferences and seminars to promote students' environmental awareness
		CO	Clubs and organisations within the universities promoting green environmental awareness
		OC	Off-campus events organised by universities in collaboration with the community aim at promoting environmental friendliness
		IS	Infrastructural supports such as libraries and laboratories devoted to environmental sustainability awareness
		MC	Modification to campus environment to enhance green environmental awareness
Independent (Individual Specific Attributes)	Gender	GN	Defined as male or female university student
	Enrolment Status	ES	Defined as full time or part time student

Table 1 gives the types and the descriptions of the variables employed in the study

Model Design

This section presents descriptions of the models used to test the relationship between SE and environmental awareness. Specifically, two components of SE – curricular activities and extracurricular activities – are used. Thus, the following models (1) and (2) are estimated to respectively test the predictive powers of curricular activities and extra-curricular activities in creating green environmental awareness among university students:

$$GEA_{it} = \beta_0 + \beta_1 TM_{it} + \beta_2 TS_{it} + \beta_3 NC_{it} + \beta_4 EL_{it} + \beta_5 GP_{it} + \beta_6 GN_{it} + \beta_7 ES_{it} + \varepsilon \quad (1)$$

$$GEA_{it} = \beta_0 + \beta_1 CS_{it} + \beta_2 CO_{it} + \beta_3 OC_{it} + \beta_4 IS_{it} + \beta_5 MC_{it} + \beta_6 GN_{it} + \beta_7 ES_{it} + \varepsilon \quad (2)$$

Where: GEA represents green environmental awareness. All other variables are described in Table 1.

Results

Descriptive Statistics

Table 2 presents the descriptive statistics of the study. From Table 2, it can be seen that the responses to most of the activities range between 3.4135 to 3.9904, indicating that the majority of the respondents agree that SE, both in the form of curricular and extra-curricular activities, impact students' environmental awareness. However, on sustainability issues relating to teaching strategies (TS), the immediate environment of the students (EL) and off-campus events (OC), the respondents have a mean score of 2.2404, 2.5481 respectively. 2.1923, disagree that SE raises students' awareness of the environment. In the case of the specific attributes of the respondents, the statistics show on average that the respondents were male and mainly full-time students.

Table 2: Descriptive Statistics

Variables	Observations	Mean	Median	Std Deviation
GEA	104	0.5052	0.6600	0.22150
TM	104	3.4135	4.0000	1.20364
TS	104	2.2404	2.0000	1.07482
NC	104	3.4327	4.0000	1.15552
EL	104	2.5481	2.0000	1.26091
GP	104	3.7019	4.0000	1.12241
CS	104	3.7212	4.0000	0.89721
CO	104	3.5481	4.0000	1.04165
OC	104	2.1923	2.0000	1.06194
IS	104	3.9904	4.0000	0.80647
MC	104	3.7981	4.0000	0.94899
GN	104	1.3365	1.0000	0.47481
ES	104	1.1058	1.0000	0.30903

Table 2 presents the descriptive statistics of the study. All variables are described in Table 1.

Correlations

Table 3 presents the Pearson correlation coefficient of the study. From Table 3, GEA has a positive relationship with all SE activities except TS, EL and OC, which have a negative relationship. The results also show that all the variables have a significant relationship with each other.

Table 3: Pearson Correlation Coefficient

Variables	GEA	TM	TS	NC	EL	GP	CS	CO	OC	IS	MC	GN	ES
GEA	1												
TM	.038 .698	1											
TS	-.385 .000	.823 .000	1										
NC	.147 .135	.938 .000	.760 .000	1									
EL	-.360 .000	.751 .000	.905 .000	.709 .000	1								
GP	.119 .230	.919 .000	.784 .000	.924 .000	.748 .000	1							
CS	.184 .061	.872 .000	.745 .000	.932 .000	.694 .000	.929 .000	1						
CO	.230 .019	.894 .000	.722 .000	.946 .000	.671 .000	.938 .000	.934 .000	1					
OC	-.300 .002	.720 .000	.878 .000	.683 .000	.776 .000	.708 .000	.740 .000	.650 .000	1				
IS	.174 .077	.774 .000	.686 .000	.744 .000	.674 .000	.876 .000	.815 .000	.769 .000	.671 .000	1			
MC	.231 .018	.856 .000	.724 .000	.868 .000	.686 .000	.927 .000	.925 .000	.899 .000	.733 .000	.898 .000	1		
GN	-.469 .000	.604 .000	.791 .000	.511 .000	.905 .000	.554 .000	.473 .000	.448 .000	.602 .000	.516 .000	.475 .000	1	
ES	-.414 .000	.456 .000	.712 .000	.414 .000	.597 .000	.400 .000	.493 .000	.361 .000	.884 .000	.433 .000	.438 .000	.483 .000	1

Table 3 presents the Pearson correlation coefficient the study. All variables are described in Table 1. Correlation is significant at the 0.01 (1%) level

Regression Results

Regression analysis tests were carried out to examine the impact SE has on creating green environmental awareness among university undergraduate students. Specifically, two regression tests were conducted to test the hypotheses formulated in section 3.1.

Test of Hypothesis H_1

Table 4 presents a summary of the regression results of the relationship between SE curricular activities and green environmental awareness. The model summary indicates that the independent variables taken together explain 67.1% of the variation in environmental awareness of universities students, out of which SE curricular activities accounts for 64.7% and the model is at a significant level. This finding supports H_1 .

At an individual level, the results reveal a number of positive and negative relationships. First, the results disclose that teaching methodology (TM), number of sustainability courses (NC) and government policies (GP) have positive relationships with green environmental awareness.

This is consistent with expectations of the study and hence support hypothesis H₁. On the other hand, contrary to the expectation of the study, teaching strategies (TS) and sustainability subject matters relating to the immediate environments of the students (EL) are negatively related to the students' green environmental awareness.

Table 4: Regression Result (Curricular Activities)

Variable	Expectation sign	β	Sig.
TM	+	.170	.428
TS	+	-.144	.000
NC	+	.424	.038
EL	+	-.055	.814
GP	+	.596	.001
GN		-.178	.295
ES		-.028	.771
Summary: $R^2 = .671$; Adjusted $R^2 = .647$; $F = 20.071$; Sig. = .000			

Table 4 present a summary of the regression results for SE curricular activities. All other variables are described in Table 1.

Test of Hypothesis H₂

Table 5 presents, in a similar way to Table 4, a summary of the regression results of the relationship between SE extra-curricular activities and green environmental awareness. The model summary reveals that the independent variables collectively accounts for 71.3% of the variations in the green environmental awareness of the students. The adjusted R^2 of 69.3%, on the other hand, indicates the percentage of variation explained by the extra-curricular activities alone. This result clearly supports hypothesis H₂.

However, on an individual basis, the results reveal that off-campus events have a negative relationship with green environmental awareness of the students. While these findings negate the expectations of the study, the remaining four activities – conferences and seminars, campus clubs and organisations, infrastructural supports and modification to campus environment – are all positively related to students' green environmental awareness.

Table 5: Regression Result (Extra-Curricular Activities)

Variable	Expectation sign	β	Sig.
CS	+	.134	.503
CO	+	.120	.585
OC	+	-.115	.000
IS	+	.109	.412
MC	+	.830	.000
GN		.510	.000
ES		.299	.074
Summary: $R^2 = .713$; Adjusted $R^2 = .693$; $F = 34.148$; Sig. = .000			

Table 5 present a summary of the regression results for SE extra-curricular activities. All other variables are described in Table 1.

Discussions of Results

The results in section 5.3 above revealed a number of findings. First, there was no contradiction between the outcomes of the two forms of SE - curricular activities and extra-curricular activities - studied. Consistent with Pauw et al (2015), the study revealed that sustainability curricular activities were effective in raising green environmental awareness of students. This finding supports the argument that the integration of SE into university curriculum creates awareness of the relevance of green environment in the daily activities of students (Bransford & Brown, 2000). Though contradicted by other studies (e.g. Gratelia & Saracli, 2019), this study suggests that the SE curricular activities of Nigerian universities have effectively captured the nation's environmental policy which aims at environmental protection, environmental assessment and environmental education (Ikporukpo, 1983).

While the finding above stands, this study also finds that not all curricular activities were effective in creating students' awareness of green environment. For example, this study revealed that SE teaching strategy (TS) and subject matter relating to the immediate environment of students were negatively related to students' environmental awareness. First, in the case of TS, the absence of positive relationship could be due to an inconsistent attempt across universities to provide lecturers and instructors with the requisite professional development to teach sustainability related topics (Christie et al, 2013). Arguably, this has negatively impacted a lecturer's ability to translate sustainability ideas into subject matter which, in turn, affects their TS. In connection to subject matters relating to students' immediate environment, the negative relationship could be because the curriculum is not sufficiently adequate, as revealed in Malik et al (2019), to cover environmental issues that relate to the environment in which the students live. It could also be that the emphasis of the curriculum is

on general environmental sustainability education matters mainly offered as periphery of curriculum included in one specific class or specific discipline (Hopkinson & James, 2010), instead of being infused across the whole university curriculum. However, despite these negative relationships, prior studies have confirmed that by just offering one SE course, students' eco-friendly behaviour and attitude increases (SmithSebasto, 2010; Stewart, 2010; Wolfe, 2001).

Furthermore, consistent with prior studies (Diaz-Iso, 2019; Ha-Brookshire & Norum, 2011; Lipscombe, 2008), this study found a positive relationship between students' environmental awareness and SE extra-curricular activities. This finding is not surprising because extra-curricular activities take place outside the lecture room, thus creating the space for interactions necessary for different types of teaching and learning to take place. For this reason and for being voluntary, extra-curricular activities are highly valued by students (Lipscombe, 2008). Their participation is out of passion and this makes it possible for them to become easily aware of the significance of the environmental issues they learn.

On an individual basis, the study revealed a negative relationship between environmental awareness and off-campus events. This negative relationship might not be unconnected with the fact that the activities are outside the university environment which is likely to create in the minds of the students some feelings of disconnection with their study. As these activities are off-campus and ungraded, and in some cases available on-campus (e.g. conferences, seminars), students do not see them as important because participation in extra-curricular activities do not improve their grades or educational expectations (Hunt, 2005). Notwithstanding this finding, extra-curricular activities, just like curricular activities, are important requirements for creating students' environmental awareness and, for this reason, many universities across the world are offering extra-curricular activities (Checkoway, 2001; Kennedy, 1997).

Conclusion

This study investigated the impact of university sustainability education on students' environmental awareness. Consistent with previous studies and in an effort to bridge the dearth of research on Nigeria, the study uses regression analysis to test the relationship between green environmental awareness and university sustainability education. On the bases of the literature reviewed and the discussion of the findings, the study concludes that university sustainability education is an important requirement in creating students' environmental awareness in Nigeria. It is also the conclusion of the study that some of the curricular activities (e.g. teaching strategies) and extra-curricular activities (e.g. off-campus events) are not adequately and sufficiently infused into the university curriculum. This conclusion is informed by the failure of these activities, whose effectiveness in creating environmental awareness is arguably undisputable, to meet the expectations of this study. Moreover, on the basis of the negative



relationship between subject matters relating to the students' immediate environment and students' environmental awareness, this study concludes that sustainability education in Nigerian universities focuses more on general environmental subject matters.

While the conclusions above have met the objectives of the study, the discussion of results in section 6 call for further studies that could be seen as a possible extension of this study. First, the SE curricular and extra-curricular activities studied are limited. There are other SE activities that are being implemented in Nigerian universities that are not used in this study. Thus, further study is recommended to include those other activities that are not included in this study. Second, this study only emphasises the environmental awareness of students. Further research is recommended to examine how students translate their awareness to eco-friendly behaviour. Finally, further studies are recommended to examine the impact of co-curricular activities (i.e. activities outside the classroom but within class hours) as a component of SE.



REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211
- Ajzen, I. (2004). *Attitudes, Personality and Behavior* (2nd ed), Maidenhead, England, Open University Press.
- Auwalu, R. A., Azizah, E. & Rahimah, E. (2017). Investigating the environmental awareness level of secondary school students: Effects of race, school type, and location. *Journal of Science & Technology*, 9(4), 30-36
- Besong, F. & Holland, C. (2015). The dispositions, abilities and behaviors (DAB) framework for profiling learners' sustainability competencies in higher education. *Journal of Teacher Education for Sustainability*, 2015, 17(1), 5-22.
- Biglan, A. (1973). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology*, 57(3), 195-203.
- Blaxter, L., Hughes, C. & Tight, M. (2010). *How to research* (3rd ed), maidenhead, England, Open University Press.
- Bransford, J. D., Brown, A. L. & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC, USA, National Academy Press.
- Chase, G., Barlett, P., & Fairbanks, R. (2012). Sustainability, leadership, and the role of the chief academic officer. In, Martin, J.; Samels, J. E. (Ed), *The sustainable university*, Baltimore, USA, John Hopkins University Press,
- Checkoway, B. (2001). Renewing the civic mission of the American research university. *The Journal of Higher Education*, 7(2), 125-147.
- Chen, K. & Deng, T. (2016). Research on the green purchase intentions from the perspective of product knowledge. *Sustainability*, 8, 943.
- Christie, B. A., Miller, K. K., Cooke, R., & White, J. G. (2013). Environmental sustainability in higher education: How do academics teach? *Environmental Education Research*, 19(3), 385-414.
- Diaz-Iso, A., Eizaguirre, A. & Gartia-Olalla, A. (2019). Extracurricular activities in higher education and the promotion of reflective learning for sustainability. *Sustainability*, 11, 4521



- Dyehouse, M., Webers, N., Fang, J., Harris, C., Tomory, A. & Strobel, J. (2010). First-Year engineering students' environmental awareness and conceptual understanding with participatory game design as knowledge elicitation. Proceedings of the 9th International Conference of the Learning Sciences, Nashville, USA.
- Eccleston, C. H. & March, F. (2010). *Global environmental policy: Concepts, principles and practice*. Boca Raton, USA, CRC Press.
- Eizaguirre, A., García-Feijoo, M., & Laka, J. P. (2019). Defining sustainability core competencies in business and management studies based on multinational stakeholders' perceptions. *Sustainability*, 11(8), 2303.
- Feldman, A.F.& Matjasko, J. L (2005). The role of school-based extracurricular activities in adolescent development: A comprehensive review and future directions. *Review of Educational Research*, 75(2), 159–210.
- Fretschner, M. (2014). Ajzen's Theory of Planned Behavior in Entrepreneurship Education Research. In, Weber, S.; Oser, F. K.; Achtenhagen, F. Fretschner, M.; Trost, S. (Ed), *Becoming an Entrepreneur*, Rotterdam, Netherlands, Sense Publishers.
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597-607.
- Graff-Zivin, J. (2018). *Environmental policy-making: Theory and practice*. Rockefeller Foundation Economic Council on Planetary Health, The Rockefeller Foundation, Oxford Martin School, 2018.
- Boca, G. D., & Saraçlı, S. (2019). Environmental education and student's perception, for sustainability. *Sustainability*, 11(6), 1553.
- Ha-Brookshire, J. & Norum, P. (2011). Cotton and sustainability: impacting student learning through sustainable cotton summit. *International Journal of Sustainability in Higher Education*, 2011, 12(4), 369-380.
- Hill, A. & Dymont, J. E. (2016). Hopes and prospects for the sustainability cross-curriculum priority: Provocations from a state-wide case study. *Australian Journal of Environmental Education*, 32(3), 225–242.
- Hopkinson, P. & James, P. (2010). Practical pedagogy for embedding ESD in science, technology, engineering and mathematics curricula. *International Journal of Sustainability in Higher Education*, 11(4), 365-379.



- Hugé, J., Mac-Lean, C., Vargas, L. (2018). Maturation of sustainability in engineering faculties— From emerging issue to strategy? *Journal of Cleaner Production*, 172, 4277–4285.
- Hunt, D. (2005). The effect of extracurricular activities in the educational process: Influence on academic outcomes? *Sociological Spectrum*, 25(4), 417-445.
- Iizuka, M. (2000). Role of environmental awareness in achieving sustainable development. Retrieved from: <https://repositorio.cepal.org/bitstream/handle/11362/31562/S00111003>
- Ikporukpo, C.O. (1983). Environmental deterioration and public policy in Nigeria. *Applied Geography*. 3(4), 303-316.
- Ine, I. E.; Oyelowo, O. J.; Oloketuyi, A. J.; Jeminiwa, O. R.; Olaoti Laoro, S. O. J. (2015). Assessment of environmental awareness among secondary teachers in Ibadan metropolis, *Journal of Agriculture, Forestry and Social Sciences*, 13(2), 23-46.
- Johnston, D. D. & Johnston, L. F. (2013). Introduction: What's required to take EfS to the next level? In, Johnson, L. (Ed), *Higher education for sustainability: Cases, challenges, and opportunities from across the curriculum*, New York, USA, Routledge. Kennedy, D. (1997). *Academic Duty*. Cambridge, UK, Harvard University Press.
- Krueger, N. F., Reilly, M. D. & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5-6), 411- 432.
- Lancaster, G.A., Dodd, S. & Williamson, P.R. (2004). Design and analysis of pilot studies: recommendations for good practice. *Journal of Evaluation in Clinical Practice.*, 10(2), 307–312.
- Leal, F. W. & Pace, P. (2016). Teaching education for sustainable development: past, present and future. In, F. W.; Pace, P. (Ed), *Teaching Education for Sustainable Development at University Level*, Leal, Switzerland, Springer International Publishing.
- Libunao, W. H. & Peter, C.J. (2013) Education for sustainable development practices among polytechnics in Malaysia. Proceedings of the International Conference on Social Science Research, ICSSR, Penang, Malaysia. 4-5 June.
- Lipscombe, B. P., Burek, C. V., Potter, J. A., Ribchester, C. & Degg, M. R. (2008). An overview of extra-curricular Education for Sustainable Development (ESD) interventions in UK Universities, *International Journal of Sustainability in Higher Education*, 9(3), 222-234.



- Mahoney, J.L. & Cairns, R.B. (1997). Do extracurricular activities protect against early school dropout? *Developmental Psychology*, 33(2), 241–253.
- Malik, M. N., Khan, H. H., Chofreh, A.G., Goni, F. A., Klemeš, J. J. & Alotaibi, Y. (2019). Investigating Students' Sustainability Awareness and the Curriculum of Technology Education in Pakistan, *Sustainability*, 11, 2651.
- Mannion, G. (2019). Re-assembling environmental and sustainability education: orientations from new materialism. *Environmental Education Research*, 25, 1-20.
- Michel, J. O. & Pizmony-Levy, O. (2017). Pro-environmental attitudes and behaviors in higher education: Investigating the role of formal and informal factors. Presented at the annual meeting of the Association for the Study of Higher Education, Houston, USA,
- Mochizuki, Y. & Fadeeva, Z. (2010). Competences for sustainable development and sustainability. *International Journal of Sustainability in Higher Education*, 11(4), 391–403.
- Obach, B. K. (2009). Consumption, ecological footprints and global inequality: A lesson in individual and structural components of environmental problems. *Teaching Sociology*, 37, 294- 00.
- Ogburu, I.& Anga, R. A. (2015). Environmental degradation and sustainable economic development in Nigeria: A theoretical approach. *journal of economics*, 3(6), 1-13.
- Patton, m.q. (2002). *qualitative research and Evaluation Methods* (3rded), California, USA, Sage Publishers.
- Pauw, J. B., Gericke, N., Olsson, D. & Berglund, T. (2015). The effectiveness of education for sustainable development. *Sustainability*, 7, 15693-15717.
- Pizmony-Levy, O. (2011). Bridging the global and local in understanding curricula scripts: The case of environmental education. *Comparative Education Review*, 55(4), 600-633.
- Reid, A. & Petocz, P. (2000). University lecturers' understanding of sustainability. *Higher Education*, 51, 105-123.
- Ruepert, A., Keizer, K., Steg, L., Maricchiolo, F., Carrus, G., Dumitru, A., García Mira, R., Stancu, A. & Moza, D. (2016). Environmental considerations in the organizational context: A pathway to pro-environmental behaviour at work. *Energy Research and Social Sciences*, 17, 59–70.



- Sady, M., Zak, A. & Rzepka, K. (2019). The role of universities in sustainability-oriented competencies development: Insights from an empirical study on Polish Universities. *Administrative Sciences*, 9(62), 1-20.
- Sahin, E., Ertepinar, H. & Teksoz, G. (2012). University students' behaviors pertaining to sustainability: A structural equation model with sustainability-related attributes. *International Journal of Environmental and Science Education*, 2012, 7(3), 459-478.
- Sandelowski, M. (1995). Rigor or rigor mortis: The problem of rigor in qualitative research revisited. *Advances in Nursing Science*, 1995, 16(2), 1-8.
- Shobeiri, S. M., Omidvar, B., Prahallada, N. N. (2007). A comparative study of environmental awareness among secondary school students in Iran and India. *International Journal of Environmental Research*, 1(1), 28-34
- Smith-Sebasto, N. J. (2010). The effects of an environmental studies course on selected variables related to environmentally responsible behavior. *Journal of Environmental Education*, 26(4), 3034.
- Stewart, M. (2010). Transforming higher education: A practical plan for integrating sustainability education into the student experience. *Journal of Sustainability Education*, 1, 195-203.
- Thietart, R.A. (2001). *Doing management research: A comprehensive guide*. London, England, Sage Publishers.
- Umuhire, M.L. & Fang, Q. (2016). Method and application of ocean environmental awareness measurement: Lessons learnt from university students of China. *Mar. Pollut. Bull.*, 2016, 102(2), 289–294.
- Victoria, O. B. (2013). Environmental Education in Nigeria: Issues, challenges and prospects. *Mediterranean Journal of Social Sciences*, 4(15), 159-167.
- Vincenzi, S.L., Possan, E., de Andrade, D.F., Pituco, M.M., de Oliver Santos, T., Jasse, E.P. (2018). Assessment of environmental sustainability perception through item response theory: A case study in Brazil. *Journal of Cleaner Production.*, 170, 1369–1386.
- Walonick, D.S. (2010). *Survival statistics* (6th ed), Bloomington, USA, StatPac.
- Widener, J. M., Gliedt, T. & Tziganuk, A. (2016). Assessing sustainability teaching and learning in geography education. *International Journal of Sustainability in Higher Education*, 17(5), 698–718.



- Winter, J. & Cotton, D. (2012). Making the hidden curriculum visible: sustainability literacy in higher education. *Environmental Education Research*, 18(6), 783-796.
- Wolfe, V. L. (2001). A survey of the environmental education of students in non-environmental majors at four-year institutions in the USA. *International Journal of Sustainability in Higher Education*, 2(4), 301-315.
- Yi, D., Wang, X., Brombal, D., Moriggi, A., Sharpley, A., Pang, S. (2018). Changes in environmental awareness and its connection to local environmental management in water conservation zones: The case of Beijing. *China Sustainability*, 10, 2087.