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RESEARCH ARTICLE

Awareness and Implementation of Education for Sustainable Development in Technical Teacher Education in Tertiary Institutions, Rivers State, Nigeria

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ABSTRACT

Background/purpose – This study investigated the level of awareness and implementation of elements of education for sustainable development in technical teacher education programs in tertiary institutions in Rivers State, Nigeria.

Materials/methods – Descriptive survey design was employed to collect data using a validated questionnaire to elicit both closed- and open-ended responses. The study sample consisted of 117 participants including 29 teachers and 88 final-year students purposively selected from three tertiary institutions that offer a technical teacher education program in Rivers State, Nigeria. Data were analyzed using frequency counts and percentages and the results presented using charts and a table.

Results – The result showed a minimal level of awareness of the concept of sustainable development among the study participants. Also, elements of sustainable development were notably integrated into the technical education curriculum, albeit sparingly. Furthermore, the result showed that integration of elements for sustainable development in the process of preparing students of technical teacher education were practiced rarely and occasionally.

Conclusion – A low level of awareness and implementation was revealed among the study group regarding the concept of education for sustainable development, and that this could negatively impact the achievement of sustainable development goals.

Keywords – sustainable development, education for sustainable development, technical and vocational education, awareness, implementation of sustainable development.

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1. INTRODUCTION

A major motivation for sustainable development is to ensure that developmental activities translate to the social and economic well-being of humanity and the wellness of environmental resources, transcending in time and space. This has been expressed in the definitions of sustainable development, such as from the United Nations (1987). According to their definition, sustainable development is ensuring that development activities of the present time meet the needs of people leading to good quality of life and not hindering the development need and quality of lives of future generations. Pearce (1993) similarly defined sustainable development as societal development that does not produce an adverse effect on the future or in case of such effect, makes adequate provision for compensation. Other definitions provided by Van-der-Merwe and Van-der-Merwe, Vare and Scott, and Duran et al. (as cited in Klarin, 2018) include associate sustainable development with improvement in economic development, quality of life, environmental protection, technological development, achievement of human needs, and the longevity of development, among others. Elements of these sustainable development definitions have been expressed as 17 sustainable development goals: Zero poverty; zero hunger; good health and well-being; quality education; gender equality; clean water and sanitation; affordable clean energy; decent work and economic growth; industry, innovation, and infrastructure; reduced inequality; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice and strong institutions; and partnerships for goals (listed from goal one to goal 17) (United Nations, 2016).

Education plays a significant role in achieving sustainable development goals (Bonnett, 1999; Boyi, 2013; Didham & Paul, 2015; Majumdar, 2007; McKeown et al., 2002; Nnabuo & Asodike, 2012; United Nations Educational, Scientific and Cultural Organization [UNESCO], 2005, 2009). Education is a tool used for enlightenment, with knowledge gained through education and how to interact in a sustainable manner with the environment around us. For example, through educational processes, students and young people can learn and gain knowledge on how to incorporate sustainable development principles into their activities and practices in order to maintain and develop a safe environment where sustainable development can thrive.

In recognition of the significance of education on the achievement of sustainable development, the United Nations declared the 10-year period between 2005 and 2014 as a decade of “education for sustainable development” (ESD) to encourage the governments of various nations to devise ways of integrating sustainable development concepts and principles into school curricula (Jasper, 2008). Education on sustainable development has been described by Porrit (2005) as the process of learning to inculcate the ideologies of sustainability development in people so that they carry the consciousness of sustainability in their activities. UNESCO (as cited in Jasper, 2008) outlined four major areas of coverage toward achieving education for sustainable development. These areas are 1) the provision of basic education that leads individuals to consciousness of sustainability; 2) restructuring existing curricula to focus on sustainability; 3) creating public awareness of issues that border on sustainability; and 4) training the workforce to promote work-based activities in a sustainable way. These coverage areas, especially the second, third, and fourth, have significant implication for technical and vocational education and training (TVET). TVET is believed to be a global supplier of skilled manpower, and as such serves as a viable tool for inculcating principles of sustainable development into individuals that will serve in the

workforce of the industrial sector and the world of work at large. Incorporating these principles in technical and vocational education and training could thereby enhance a workforce with a sustainable mindset and awareness for social, economic, and environmental life. To effectively incorporate these principles requires TVET stakeholders at all levels (international, national, and school levels) to each play their respective role.

The literature reveals roles played towards education for sustainable development as well as education for sustainable development in technical and vocational education and training. These activities include: policy formulation; creating courses of study on sustainability and sustainable development at different school levels; and developing guidelines for integrating principles of sustainable development in curricula and instruction, among others. For example, in Canada, an organization known as Learning for a Sustainable Future (LSF) was created to implement education for sustainable development in the formal school system. In Australia, an initiative known as the Australian Sustainable School Initiative (AuSSI) was established to aid schools implement sustainability in their daily school operations and also to support teachers and students to develop the knowledge and skills needed to integrate sustainability in their decision making (Australian Research Institute in Education for Sustainability, 2009; Moy, 2008; Richard et al., 2017; UNESCO, 2017).

Activities with regards to education for sustainable development in technical and vocational education and training have been actively conducted by organizations such as UNSECO's International Center for Technical and Vocational Education and Training (UNEVOC), the European Centre for the Development of Technical Training (CEDEFOP), the International Labour Organization (ILO), and the Organisation for Economic Co-operation and Development (OECD). These international organizations conduct a range of training, conferences, and programs, as well as provide tools and knowledge resources such as databases to enhance access to reports and research activities on education for sustainable development in TVET (Taylor & Creech, 2012). The Commonwealth of Learning also developed a guideline on how to link the UNESCO learning objectives on sustainable development to the TVET curriculum (Commonwealth Secretariat, 2017).

Some national initiatives on integrating education for sustainable development into TVET can also be found in the literature. Notable among them are initiatives by Germany, Kenya, China, and Canada, as reported by Taylor and Creech (2012). In their report, Germany is believed to promote sustainable development in TVET through the provision of instructional aids for teachers, the utilization of demonstration plots in instructional delivery about sustainability, routine assessment of curricula in order to ensure training prepares students for green economy jobs, the creation of demonstration schools for training students for sustainable trades, and instructing students on sustainable principles. Kenya, as reported by Dubois et al. (as cited in Taylor & Creech, 2012), has been involved in promoting sustainable development into TVET through curricula reform for vocational polytechnics to include skills for sustainable livelihood; and the introduction of programs in schools to promote sustainability such as demonstration projects on solar/bio-gas energy generators, student projects on solid waste management systems, and peer education on health and community clean ups. In the same report, Taylor and Creech (2012) mentioned China as being involved in promoting sustainable development in TVET through collaboration with UNEVOC to restructure the TVET curriculum to integrate sustainable development principles of education in 27 TVET programs; identifying sustainable development issues to incorporate within teacher training programs. Similarly, Canada was reportedly very much involved in the process of integrating sustainable development in TVET through commissioning the

development of new curricula to integrate education for sustainable development into some TVET subjects in Manitoba.

The activities described were conducted at the international, national, and school level to promote education for sustainable development in technical and vocational education and training. These activities relate to policy formulation, initiative establishment, the infusion of sustainability principles within curriculum structure, creating sustainability courses in schools, and instructional strategies conducted to integrate sustainable development principles in TVET. However, these activities were all conducted outside of Nigeria. Information about activities undertaken within Nigeria to integrate or promote awareness of sustainable development education in TVET is very limited in the literature. Furthermore, empirical research on what teachers, instructors, lecturers, and even students are doing in Nigerian schools during daily instructional processes to enhance teaching and learning for sustainable development in TVET is scarce.

A preliminary literature search revealed a UNESCO document with three suggestions for how such linkage could be achieved during classroom instruction. One example suggested that teachers ask students to introduce a sustainable development concept into a lesson on the health risks associated with contaminated water: "Today we are discussing health risks related to contaminated water. Access to water is now considered a human right, and human rights are fundamental in creating sustainable communities" (UNESCO, 2012, p. 8). Such examples can significantly benefit teachers, instructors, trainers, and lecturers in TVET as they learn from them and apply their new knowledge to their own instructional delivery. Unfortunately, research conducted with the aim of getting such information is scarce in the literature. Therefore a need exists for research focusing on investigating examples of sustainable development concepts integrated into classroom TVET instruction. Additionally, the need for such studies has also previously been expressed in the literature (Simiyu, as cited in Dubois et al., 2010; Gu et al., 2011)

The purpose of the current study was to investigate the awareness level and implementation of sustainable development education in tertiary TVET institutions in Rivers State, Nigeria. In order to achieve this purpose, the study was guided by three research questions:

(i) What is the level of awareness of the concept of education for sustainable development among students and teachers of technical and vocational teacher education programs in Nigerian tertiary institutions?

(ii) What are the elements for promoting sustainability awareness prescribed in the curriculum or program description for technical and vocational education across tertiary institutions in Nigeria?

(iii) How are elements of education for sustainable development integrated into the process of preparing TVET students across tertiary institutions in Nigeria?

2. LITERATURE REVIEW

The idea behind the current study was to investigate the particular strategies employed to integrate the concepts of sustainable development into the process of preparing students' technical and vocational education and training in tertiary institutions in Rivers State, Nigeria. The diffusion and infusion models by Hungerford are useful in providing explanation on the strategies for integrating concepts of sustainable development into the teaching and learning process. In the diffusion model, issues that border on sustainable development from various

educational disciplines are integrated together to form a subject known as "education for sustainable development." On the other hand, in the infusion model, concepts of sustainable development are embedded (hence the confusion) into the various disciplines and implemented during the established process of instructional delivery (Majumdar, 2007). Typical instances of the diffusion and infusion models' integration in technical and vocational education and training adapted from Majumdar are depicted in Figure 1 and Figure 2, respectively.

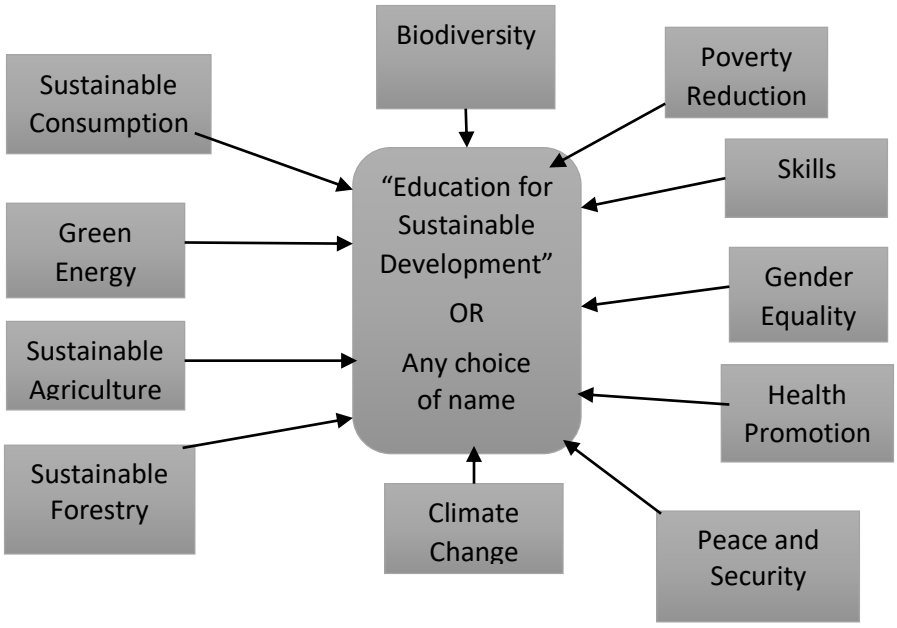


Figure 1. Diffusion Model

As shown in Figure 1, the diffusion model involves identifying concepts and elements of sustainable development such as skills development, green energy, and sustainable consumption, amongst others, and bringing them together to form a separate subject or course of study for students to enroll to.

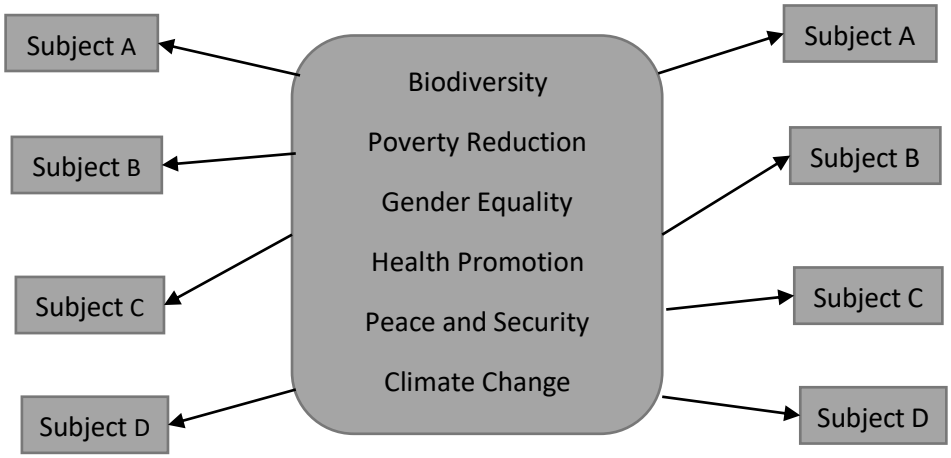


Figure 2. Infusion Model

The infusion model shown in Figure 2 involves integrating concepts and elements of sustainable development, as listed in the central box, into relevant and existing subjects or courses without need to create a separate subject. For example, integrating knowledge and skill of green energy such as supplying electrical power through solar and wind energy into the curricula content of an electrical program would be a typical example of the infusion model being implemented.

A brief literature review revealed a number of empirical studies conducted on the subject of education for sustainable development in technical and vocational education and training. For example, the study by Peter et al. (2016) assessed the extent that education for sustainable development was integrated into curricula; research and scholarship; operation; faculty and staff hiring, development and rewards; outreach and services; students' opportunities; and institutional mission, structure, and planning in community colleges in Malaysia, in a quantitative-qualitative, cross-sectional design research study. In another study, Thienemann (2014) investigated the extent to which UNESCO's concepts of education for sustainable development were integrated in a Philippine TVET institution. Specifically, the study employed a qualitative approach to focus on school-level activities in trying to incorporate sustainability in the TVET institution. In a case study by Gu et al. (2011), the researchers focused on how technical and vocational education and training in the Republic of Ireland could be best delivered in order to move society towards sustainability.

In a report published by Dubois et al. (2010), six case studies were compiled on the integration of sustainable development in technical and vocational education and training in selected African countries (Botswana, Kenya, Malawi, Mauritius, and Zambia). In their report, Dubois et al. (2010) noted that generally education for sustainable development was embedded into the TVET courses of each case study. The report also stated that a variety of approaches were employed in imparting sustainability knowledge in TVET, which included: problem solving; projects; demonstration; role-modeling; drama; role playing; dance; study tours; ICT tutorial; and industrial placement. Also, notable aside lectures, workshops, and seminars employed value integration sessions within which students were introduced to knowledge about education for sustainable development. For example, building trade trainees engaged in a carpentry and joinery course were trained on how a tree felled for timber could be replaced. They were also invited to tend trees and plant grass within their campus and also to create signboards requesting people not step on the grass. Income was also generated from the sales of saplings. Furthermore environmental clubs were also formed in order to carry out community service on sustainability issues.

3. METHODOLOGY

The current study employed a cross-sectional survey design and was conducted in three tertiary institutions (Rivers State University [RSU], Ignatius Ajuru University of Education [IAUOE], and the Federal College of Education (Technical) Omoku [FCOE]) which offered a technical teacher education program in Rivers State, Nigeria. The sample of the study consisted of 117 research participants, and was comprised of 88 final-year students purposively selected and 29 lecturers/instructors from the departments of technical education at the three participant institutions. Final-year students were purposively selected since the researcher reasoned that having already spent 3 years, or more, studying at their respective institution, they would have had enough time to gain a certain level of knowledge and awareness regarding the concept of education for sustainable development.

Two instruments were used for data collection. One was a questionnaire which consisted of both closed-ended and open-ended items. The second was a curriculum document for each institution's technical education program. The first instrument consisted of three major parts aimed at addressing the study's three research questions.

Three dimensions of awareness were used to gather data to answer the first research question: "How much did the participants know about the concept of education for sustainable development? How much did the participants read about the concept? and Through what medium did the participants know/learn about the concept?" Both the participant students and lecturers/instructors responded to these same questions.

For the second research question, a list of possible sustainability elements were presented to the lecturers/instructors (only). The second data collection instrument was a curriculum document about the technical education programs of each respective institution, which were used to identify elements of sustainable development integrated in the program of study.

Research question three was addressed through a set of Likert-type items used to elicit data on how elements of education for sustainable development were integrated into the process of preparing technical and vocational education and training students. Provision was also made for respondents to state what other practices were integrated as elements of sustainable development in preparing the students. Only the lecturers/instructors completed this section of the questionnaire. The reliability of the Likert-type scale was obtained using Cronbach's alpha value, which was obtained through IBM's SPSS statistical software and yielded a reliability coefficient of .87.

The collected quantitative data were then analyzed using frequency counts and percentage calculations, and then presented in chart and tabular format. The qualitative data gathered from the open-ended responses and curriculum content were used to provide a detailed description of how the concepts of education for sustainable development had been integrated in the participant tertiary institutions' technical education programs.

4. RESULTS

Research Question 1: What is the level of awareness of the concept of education for sustainable development among students and teachers of technical and vocational teacher education programs in Nigerian tertiary institutions?

How much do you know about the concept of education for sustainable development?

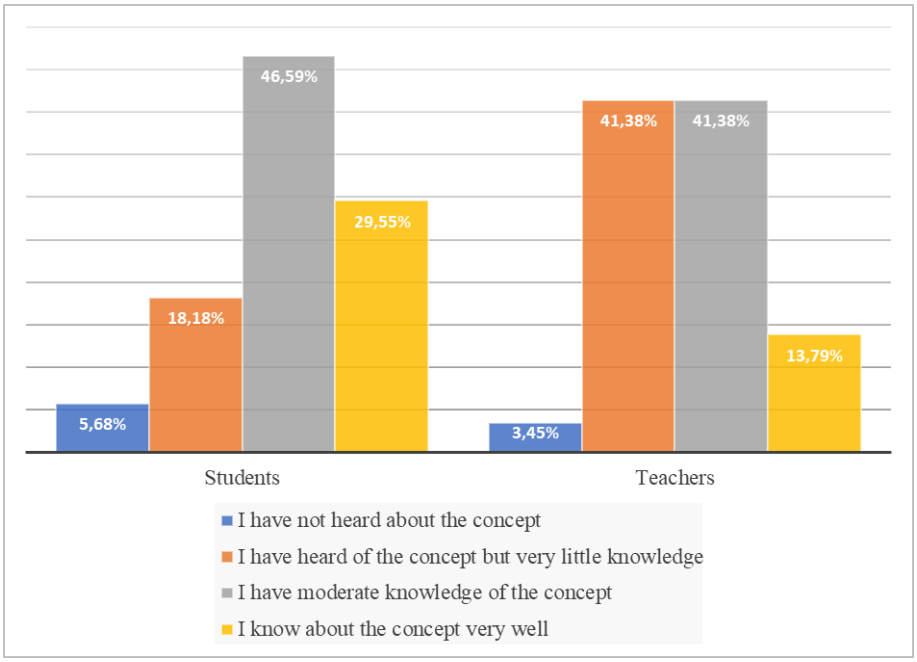


Figure 3. Level of Awareness of ESD Concepts among Students and Lecturers/Instructors

The results presented in Figure 3 illustrate the level of knowledge about the concept of education for sustainable development (ESD) held by the participant students and teachers. As shown, 5.68% of the students reported having not heard about the concept, whilst 18.18% had heard of the concept but had very little knowledge, 46.59% had moderate knowledge of the concept, and 29.55% reported that they knew about the concept very well. Of the participant teachers (lecturers/instructors), whilst 3.45% reported having not heard about the concept, 41.38% had heard of the concept but had very little knowledge about it, 41.38% had moderate knowledge of the concept, while 13.79% reported that they knew about the concept very well.

Have you read about the concept?

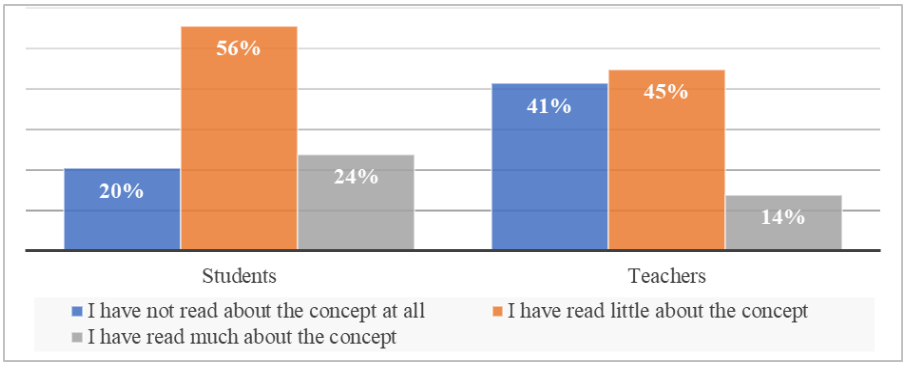


Figure 4. Levels that Students and Lecturers/Instructors had read about ESD

The results presented in Figure 4 shows the level of reading about the concept among the study participants. For the students, 20% reported that they had not read about the concept at all, whilst 56% had read little about the concept, and 24% had read considerably about the concept. For the teachers (lecturers/instructors), 41% reported that they had not read about the concept at all, whilst 45% had read little about the concept, and 14% had read considerably about the concept.

If you know about the concept, how did you find out about it?

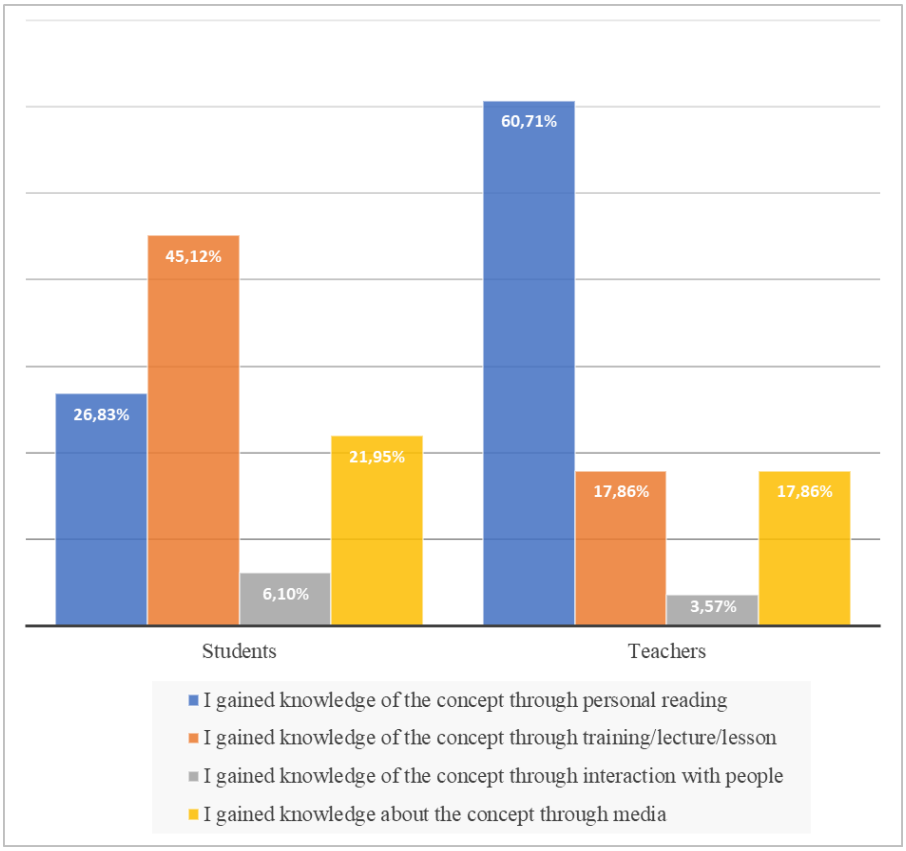


Figure 5. Medium through which Students and Lecturers/Instructors new about ESD

The results from Figure 5 illustrate the medium through which the students and teachers (lecturers/instructors) had gained their knowledge about the concept of ESD. For the students, 26.83% reported having gained knowledge of the concept through personal reading, whilst 45.12% gained their knowledge of the concept through training, lectures, or lessons, 6.10% gained their knowledge of the concept through interaction with people, and 21.95% gained their knowledge about the concept through media.

For the teachers (lecturers/instructors), 60.71% had gained their knowledge of the concept through personal reading, whilst 17.86% had gained their knowledge of the concept through training, lectures, and lessons, 3.57% had gained their knowledge of the concept through interaction with people, and 17.86% had gained their knowledge about the concept through media.

Research Question 2: What are the elements for promoting sustainability awareness prescribed in the curriculum or program description for technical and vocational education across tertiary institutions in Nigeria?

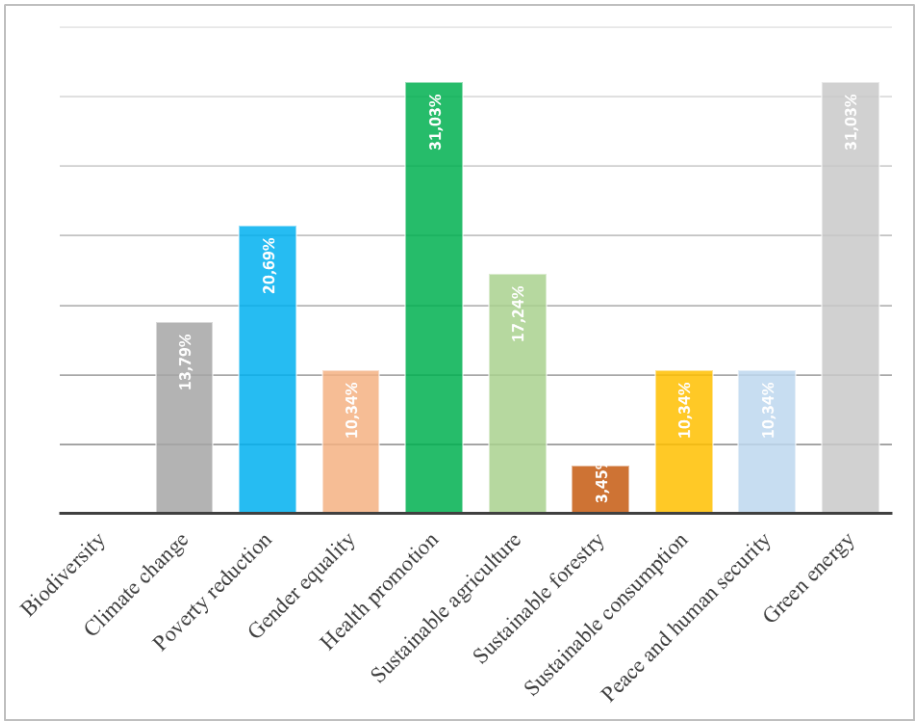


Figure 6. Elements of ESD integration in Curriculum

As shown in Figure 6, the subjects prescribed in the curricula descriptions to prepare technical and vocational education and training students in the participant tertiary institutions were as follows: Biodiversity (0%), climate change (13.79%), poverty reduction (20.69%), gender equality (10.34%), health promotion (31.03%), sustainable agriculture (17.24%), sustainable forestry (3.45%), sustainable consumption (10.34%), peace and human security (10.34%), and green energy (31.03%).

The results of the documentary analysis of the curriculum description of the courses offered in the three participant tertiary institutions' technical education programs showed that elements such as industrial training (Students Industrial Work Experience Scheme – SIWES) and practical courses for the acquisition of work-based skills formed major elements of the sustainability concepts integrated in the programs of instruction offered to the students in their technical education. For example, one respondent mentioned in the open-ended section of the questionnaire that, "Students are exposed to practical exercises that could enhance their critical-thinking and problem-solving skills to make them more entrepreneurial."

Research Question 3: How are elements of education for sustainable development integrated into the process of preparing TVET students across tertiary institutions in Nigeria?

Table 1. Strategies for Integrating Elements of Education for Sustainable Development in Preparing TVET Students

S/N	Integration of ESD in Instructional Delivery	POF	POC	PR
1	Social, economic and environmental sustainability are reflected in school policy.	24.14%	37.93%	37.93%
2	Reflection of sustainability in school management practices (e.g., in waste management/water and energy use).	24.14%	20.69%	55.17%

S/N	Integration of ESD in Instructional Delivery	POF	POC	PR
3	Organization of extracurricular activities to create sustainability awareness among students and teachers.	6.90%	20.69%	72.41%
4	Organizing training for teacher educators to build their capacity for integrating the concept of sustainable development into their instructional delivery.	10.34%	55.17%	34.48%
5	Books recommend to students with topics that reflect knowledge, skills, and values of education for sustainable development.	24.14%	27.59%	48.28%
6	Students encouraged to make use of learning resources that support transformative learning focus, developing their decision-making and citizenship.	20.69%	0.00%	79.31%
7	Students encouraged to make use of learning resources that support enquiry-based learning.	10.34%	10.34%	79.31%
8	Students encouraged to make use of learning resources that links subject of learning to cultural context.	6.90%	41.38%	51.72%
9	Questions integrated into assessment that probe students' awareness of education for sustainable development.	6.90%	20.69%	72.41%
10	In workshops, rules (e.g., safety rules) applied that enhance students' level of awareness of concepts of sustainable development education.	75.86%	24.14%	0.00%
11	Elements of sustainability (knowledge, skills development, and values covering the three dimensions of sustainable development) built into lesson planning.	0.00%	3.45%	96.55%
12	Classrooms have posters that establish students' consciousness of the concept of education for sustainable development.	44.83%	20.69%	34.48%
13	Students are exposed to activities that enhance practical skills acquisition in their area of specialization.	20.69%	13.79%	65.52%
14	Students are exposed to activities that enhance their acquisition of employability skills.	20.69%	31.03%	48.28%
15	Employment of instructional strategies (e.g., discussion or problem solving) that encourage critical thinking among students.	10.71%	32.14%	57.14%
16	During teaching, examples used that help students build their conceptual understanding of sustainability.	0.00%	20.69%	79.31%
17	Relationship between topic of lesson and sustainability explicitly stated.	24.14%	3.45%	72.41%

Note: POF = Practiced often, PO = Practice occasionally, PR = Practiced rarely.

Table 1 shows how elements of education for sustainable development were integrated into the process of preparing technical and vocational education and training students in tertiary institutions in Rivers State, Nigeria. The results shows that reflection of social, economic, and environmental sustainability in school policy was practiced often, occasionally, and rarely by 24.14%, 37.93%, and 37.93% of the participants, respectively, and that reflection of sustainability in school management practices (e.g., in waste management/water

and energy use) was practiced often, occasionally, and rarely by 24.14%, 20.69%, and 55.17% of the participants, respectively.

The organization of extracurricular activities to create sustainability awareness among students and teachers was practiced often, occasionally, and rarely by 6.90%, 20.69%, and 72.41% of the participants, respectively, whilst the organization of training for teacher educators to build their capacity to integrate the concept of sustainable development into their instructional delivery was practiced often, occasionally, and rarely by 10.34%, 55.17%, and 34.48% of the participants, respectively. Recommending books to students with topics that reflect the knowledge, skills, and values of education for sustainable development was practiced often, occasionally, and rarely by 24.14%, 27.59%, and 48.28% of the participants, respectively, whilst encouraging students to make use of learning resources that support transformative learning focus, and develop their decision-making and citizenship was practiced often, occasionally, and rarely by 20.69%, 0.00%, and 79.31% of the participants, respectively.

On encouraging students to make use of learning resources that support enquiry-based learning, the results showed that this was practiced often, occasionally, and rarely by 10.34%, 10.34%, and 79.31% of the participants, respectively, whilst encouraging students to make use of learning resources that linked their subject of learning to cultural context was practiced often, occasionally, and rarely by 6.90%, 41.38%, and 51.72% of the participants, respectively. On integrating assessment with questions that probed the students' awareness of sustainable development, it was found to be practiced often, occasionally, and rarely by 6.90%, 20.69%, and 72.41% of the participants, respectively, whilst creating rules in workshops, (e.g., safety rules) to enhance students' level of awareness of sustainable development concepts was practiced often, occasionally, and rarely by 75.86%, 24.14%, and 0.00% of the participants, respectively.

Building in elements of sustainability (knowledge, skills development, and values covering the three dimensions of sustainable development) into lesson planning was practiced often, occasionally, and rarely by 0.00%, 3.45%, and 96.55% of the participants, respectively, whilst the placement of posters in classrooms to build consciousness among students of the concept of sustainable development education was practiced often, occasionally, and rarely by 44.83%, 20.69%, and 34.48% of the participants, respectively. On exposing students to activities that enhanced their acquisition of practical skills in their area of specialization, this was reportedly practiced often, occasionally, and rarely by 20.69%, 13.79%, and 65.52% of the participants, respectively, whilst students' exposure to activities that enhanced their acquisition of employability skills was practiced often, occasionally, and rarely by 20.69%, 31.03%, and 48.28% of the participants, respectively.

Regarding the employment of instructional strategies (e.g., discussion or problem solving) that encouraged critical thinking among students, this was practiced often, occasionally, and rarely by 10.71%, 32.14%, and 57.14% of the participants, respectively, whilst the citing of examples during teaching to help students build their conceptual understanding of the concept of sustainability was practiced often, occasionally, and rarely by 0.00%, 20.69%, and 79.31% of the participants, respectively. As the final entry in Table 1, it was shown that explicitly stating the relationship between lesson topics and sustainability was practiced often, occasionally, and rarely by 24.14%, 3.45%, and 72.41% of the participants, respectively.

The study's findings from the open-ended question responses showed that the TVET students in tertiary institutions were occasionally taken on field trips and industrial attachments to aid them acquire industrial experience that would help equip them with work-related skills in readiness for their future employment. The findings also revealed that the TVET students were exposed to some forms of practical activity to enable them to use tools and equipment that would help provide practical skills towards their future work readiness. Furthermore, it was found that the TVET students were exposed to skills acquisition through industrial training programs. Another similar finding from the open-ended questions showed that the students received practical exercises aimed at enhancing their critical-thinking and problem-solving skills, which aimed at making them more entrepreneurial. As evidence of this, one of the participants reported how elements of sustainable development had been integrated into vocational teacher education to prepare the students, listing them as: "1. Giving students a practical understand of the trade; 2. Enabling students to use the tools and equipment available; and 3. Teaching students how to be creative."

5. DISCUSSION

The first research question sought to ascertain the level of awareness of the concept of sustainable development education among students and teachers of technical teacher education programs in tertiary institutions in Rivers State, Nigeria. The results as to how much the participants knew about the concepts of education for sustainable development showed that under 10% (both students and teachers) had not heard of the concept at all. Less than 50% of the students and teachers reported that, whilst they had heard of the concepts of sustainable development education, they had very little knowledge; indicating that the concept was not entirely new to them. Also, less than 50% (both students and lecturers/instructors) reported that they had moderate knowledge of the concept. However, less than 30% of the participants (both students and teachers) were able to report that they knew about the concept of sustainable development education very well.

The results in general showed that the majority of the study's participants (both students and teachers) had a moderate knowledge of the concept of sustainable development in education. Although a moderate level of knowledge existed among the majority, the results suggested that the level of knowledge of the concept of sustainable development was slightly less than average. This may be attributable to the majority (approximately 50% for both students and teachers) stating that they had read little about the concept, while much fewer (less than 30% of both students and teachers) had reportedly read considerably about the concept. The results also revealed that the majority of the participant teachers knew about the concept through personal reading, while a majority of the students had gained their knowledge about the concept through either training or lectures, which in itself is not a surprising result. Teachers, in the course of their research and preparation for instructional delivery, may have undertaken personal studies or reading about the concept, and this could have enhanced their conceptual knowledge. The students, however, may have been exposed to knowledge of the concepts through training from attendance to classes, seminars, or workshops organized by their schools. This finding corroborates the open-ended question response from one participant who stated that students were exposed to skills acquisition through industrial training as well as engagement through field trips.

These results corroborate those obtained by Taylor and Creech (2012), in that a basic level of knowledge exists of sustainable development amongst teachers and administrators involved in TVET. Taylor and Creech (2012) further reported that teachers and administrators

who had some level of knowledge of the concept of sustainable development attained their knowledge through personal professional association. The current study's results also corroborate the findings of Thienemann (2014), in that a low level of awareness was found to exist amongst students in a TVET school in the Philippines regarding the concept of education for sustainable development.

The second research question of the current study aimed to reveal the elements used to promote sustainability awareness as prescribed in the curriculum for technical teacher education program in tertiary institutions in Rivers State, Nigeria. The result suggests that health promotion and green energy ranked highest, followed by poverty reduction, sustainable agriculture, and climate change as elements of education for sustainable development according to the curriculum description for preparing TVET students within the three participant tertiary institutions. One possible explanation for this finding could be that these elements of sustainable development education form an integral part of the curriculum. For example, poverty reduction through skills acquisition is a major theme associated with technical and vocational education and training (King & Palmer, 2007).

This finding can be said to agree with the report by Taylor and Creech (2012), in that Germany promotes sustainable development in TVET through the provision of instructional aids for teachers, the utilization of demonstration plots in instructional delivery about sustainability, through routine assessment of the curriculum to ensure training prepares students for green economy jobs, the creation of demonstration schools to train students for sustainable trades, instructing students on sustainable principles, and encouraging them to investigate how to make their trades more sustainable as they interact with the school environment. The result also agrees with a report from Kenya published by Dubois et al. as cited in Taylor & Creech, 2012), whereby strategies for promoting sustainable development into TVET included conducting curriculum reform to include skills for sustainable livelihood into vocational polytechnics, the introduction of programs in schools to promote sustainability such as demonstration projects on solar/bio-gas energy generation, solid waste management systems, and peer education program by students on health and community cleanups. The result further agrees with the recommendations put forth by Gu et al. (2011) to support sustainable development in TVET, whereby the sustainability concept should be integrated into the curriculum and TVET courses should be designed to meet the demands of the current and future labor market.

The third research question in the current study investigated how elements of education for sustainable development were integrated into the processes of preparing technical teacher education program students in the study area. This was revealed by examining the practices conducted by those who taught in the respective technical teacher education programs in terms of integrating the concepts of education for sustainable development. The results generally showed that the majority of activities were rarely practiced, according to the participant teachers. However, the activity described as the following; "In workshops, rules (e.g., safety rules) applied that enhance students' level of awareness of concepts of sustainable development education" was practiced often by the majority of the participant teachers in the study. This result was not considered surprising since it is common to expect safety rules and regulations to be in place in workshop environments. Another activity, "Classrooms have posters that establish students' consciousness of the concept of education for sustainable development" was practiced to a reasonable level among the study group. This result was also not considered surprising since posters with inscriptions of "Keep the classroom clean" and "Use the trash can," for example,

(as elements of sustainable development) are commonplace in classrooms to encourage students to maintain cleanliness of the teaching and learning environment, and such activities would have likely contributed to this result. Furthermore, the findings suggest that the activity described as: "Students are exposed to activities that enhance practical skills acquisition in their area of specialization" was revealed to have a somewhat minimal level of practice. This finding may be traceable to a number of factors; for example, limited provision of facilities for practical exercises have been mentioned in the literature as a major challenge facing engagement in practical activities in technical education programs (Islam, 2021; Okoye & Arimonu, 2016).

This result is in line with the findings of Thienemann (2014) in that training activities incorporated into TVET programs in the Philippines aimed to equip students with skills in areas such as agribusiness. Thienemann further found that elements of economic sustainability such as economic literacy, sustainable production, sustainable consumption, and the management of small businesses were addressed during the training of TVET students. The result further agrees with the findings of Peter et al. (2016), who reported that sustainability concepts were integrated into the process of preparing community college students, although the integration was only limited. Typical examples of courses that addressed sustainability in the findings of Peter et al.'s (2016) study were "electrical" (as in energy sources), energy saving, and the principles of electricity; "automotive," as in considering hybrid technologies; and "hotel and catering" which dealt with hospitality, hygiene, and food technology.

6. CONCLUSION

The current study focused on ascertaining the level of awareness among students and lecturers of technical education in tertiary institutions in Rivers State, Nigeria, regarding the concepts of sustainable development. The study also focused on elements of sustainable development integrated within the curriculum descriptions for technical education, as well as the practices carried out in promoting sustainability concepts in preparing technical and vocational education and training students in the study area.

The result showed that the level of awareness of the concept of sustainable development was low amongst the students and teachers in the study area. Concepts of sustainable development expressly integrated in the curriculum for preparing students of technical and vocational education was found to be very minimal. Furthermore, some activities to incorporate concepts of sustainable development into the day-to-day process of preparing TVET students were revealed in the study's findings; however, the majority of such activities were found to be practiced only occasionally or rarely. A low level of awareness and implementation of the concept of sustainable development education could be said to negatively impact the achievement of goals set for sustainable development.

7. SUGGESTIONS

Based on the findings of the current study, the following recommendations are made:

1. Policies that will ensure the effective integration of sustainability practices should be enacted from the Nigerian Ministry of Education or at the school board level.
2. Policy adherence should be enforced, with regular inspections of schools to ensure compliance to the implementation of sustainability policies.

3. At the school level, principals and administrators should be committed to ensuring that policies concerning sustainability practices are appropriately implemented and observed.
4. Activities such as seminars, workshops, and drama presentations should be organized on a regular basis in schools in order to create and maintain awareness and knowledge of sustainability concepts. This would improve students' awareness and help them to gain more knowledge about the concept.
5. Posters and signboards advertising sustainability concepts should be positioned at strategic locations within schools so as to create sustainability consciousness among both students and teachers.

DECLARATIONS

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REFERENCES

Australian Research Institute in Education for Sustainability. (2009). *Education for sustainability: The role of education in engaging and equipping people for change.* http://aries.mq.edu.au/publications/aries/efs_brochure/pdf/efs_brochure.pdf

Bonnett, M. (1999). Education for sustainable development: a coherent philosophy for environmental education? *Cambridge Journal of Education*, *29*(3), 313-324. https://doi.org/10.1080/0305764990290302

Boyi, A. A. (2013). Education and sustainable national development in Nigeria: challenges and way forward. *Mediterranean Journal of Social Sciences*, *4*(8), 147-152. http://dx.doi.org/10.5901/mjss.2013.v4n8p147

Commonwealth Secretariat. (2017). *Curriculum Framework for Enabling the Sustainable Development Goals.* The Commonwealth Library. https://doi.org/10.14217/ComSec.1064

Didham, R. J., & Paul, O. M. (2015). The Role of Education in the Sustainable Development Agenda: Empowering a learning society for sustainability through quality education. In *IGES (2015) Achieving the Sustainable Development Goals: From agenda to action* (pp. 94-129). Institute for Global Environmental Strategies. https://www.iges.or.jp/en/publication_documents/pub/bookchapter/en/4931/05_Ch5_Achieving_the_SDGs_.pdf

Dubois, R., Balgobin, K., Gomani, M. S., Kelemba, J. K., Konayuma, G. S., Phiri, M. L., & Simiyu, J. W. (2010). *Integrating Sustainable Development in Technical and Vocational Education and Training.* UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training. https://unevoc.unesco.org/fileadmin/user_upload/docs/CS_vol2_ESD_Africa_Final.pdf

Gu, C. C., Gomes, T., & Brizuela, V. S. (2011). *Technical and vocational education and training in support of strategic sustainable development* [Master's thesis]. Blekinge Institute of Technology, Sweden. http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A832727&dswid=-1656

Islam, M. (2021). Problems of insufficient practical equipment: A study through technical and vocational education in Bangladesh. *International Journal of Vocational and Technical Education*, *7*(1), 43-68. https://www.eajournals.org/journals/international-journal-vocational-technical-education-research-ijvter/

Jasper, C. J. (2008). *Teaching for sustainable development: teachers' Perceptions*. [Master's thesis]. University of Saskatchewan, Canada. https://harvest.usask.ca/handle/10388/etd-02042009-212522

King, K., & Palmer, R. (2007). *Skills development and poverty reduction: A state of the art review.* European Training Foundation. https://www.etf.europa.eu/en/publications-and-resources/publications/skills-development-and-poverty-reduction-state-art-review

Klarin, T. (2018). The concept of sustainable development: from its beginning to the contemporary issues. *Zagreb International Review of Economics & Business*, *21*(1), 67-94. https://doi.org/10.2478/zireb-2018-0005

Majumdar, S. (2007). *Integrating sustainable development in TVET curriculum* [Conference presentation]. 11th UNESCO–APEID International Conference on Reinventing Higher Education: Toward Participatory and Sustainable Development, Bangkok, Thailand.

McKeown, R., Hopkins, C. A., Rizi, R., & Chrystalbridge, M. (2002). *Education for sustainable development toolkit*. Energy, Environment and Resources Center, University of Tennessee. http://kpe-kardits.kar.sch.gr/Aiforia/esd_toolkit_v2.pdf

Moy, S. (2008). *The importance of incorporating education for sustainable development (ESD) into the secondary curriculum in order to minimise the problems of waste on South Tarawa* [Master's thesis]. University of Wellington New Zealand. https://researcharchive.vuw.ac.nz/xmlui/bitstream/handle/10063/1017/thesis.pdf?sequence=1

Nnabuo, P. O., & Asodike, J. D. (2012). Exploring education as a tool for sustainable development in Nigeria. *European Scientific Journal,* *8*(10). https://eujournal.org/index.php/esj/article/view/158

Okoye, R., & Arimonu, M. O. (2016). Technical and Vocational Education in Nigeria: Issues, Challenges and a Way Forward. *Journal of Education and Practice*, *7*(3), 113-118. https://iiste.org/Journals/index.php/JEP/article/view/28425

Pearce, D. (1993) *Blueprint 3: Measuring Sustainable Development.* Earthscan Publications.

Peter, C. J., Libunao, W. H., & Latif, A. A. (2016). Extent of education for sustainable development (ESD) integration in Malaysian community colleges. *Journal of Technical Education and Training*, *8*(1), 1-13. https://publisher.uthm.edu.my/ojs/index.php/JTET/article/view/1194

Richard, V., Forget, D., & Gonzalez-Bautista, N. (2017). Implementing Sustainability in the Classroom at Université Laval. In W. L. Filho, M. Mifsud, C. Shiel, & R. Pretorius (Eds.), *Handbook of Theory and Practice of Sustainable Development in Higher Education* (pp. 133-147). Springer. https://doi.org/10.1007/978-3-319-47895-1_9

Taylor, S. K., & Creech, H. (2012). *Technical-vocational education for sustainable development in Manitoba*. International Institute for Sustainable Development. https://www.iisd.org/system/files/publications/technical_vocational_education_sd_mb.pdf

Thienemann, E. R. C. (2014). *Education for Sustainable Development in Technical and Vocational Education and Training* [Master's thesis]. Stockholm University, Sweden. http://www.edu.su.se/polopoly_fs/1.204488.1411628990!/menu/standard/file/Elisabeth%20Thienemann%20No.%2027.pdf

United Nations. (1987). *Our common future: report of the World Commission on Environment and Development (WCED)*. Oxford University Press.

United Nations. (2016). *Sustainable Development Goals*. http://un.org/sustainabledevelopment/sustainable-development-goals/

United Nations Educational, Scientific and Cultural Organization. (2005). *UN Decade of Education for Sustainable Development 2005-2014 International Implementation Scheme* https://unesdoc.unesco.org/ark:/48223/pf0000148654

United Nations Educational, Scientific and Cultural Organization. (2009). *Review of contexts and structures for education for sustainable development*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000184944

United Nations Educational, Scientific and Cultural Organization. (2012). *Education for sustainable development: sourcebook.* https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=926&menu=1515

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