PSYCHOSOCIAL DETERMINANTS OF SECONDARY SCHOOL TEACHERS' KNOWLEDGE OF ENVIRONMENTAL SUSTAINABILITY IN CALABAR EDUCATION ZONE OF CROSS RIVER STATE, NIGERIA

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Abstract

This study examined the influence of psychosocial determinants on teachers' knowledge of environmental sustainability in Calabar Education Zone of Cross River State, Nigeria. Two variables were operationalized from psychosocial determinants – school location and environmental perception. Available and relevant literature was reviewed based on the study's variables. A survey research design was used for the study. A sample of 712 respondents was drawn using purposive sampling technique. A data collection instrument tagged "Psychosocial Determinants and Teachers' Knowledge of Environmental Sustainability Questionnaire" (PDTKESQ) was used to elicit data for the study. Cronbach Alpha was applied to estimate the instrument's reliability. The data collected for the study were analysed using independent t-test and One-way Analysis of Variance and tested at .05 level of significance. The findings revealed that each of school location and environmental perception were found to significantly influence teachers' knowledge of environmental sustainability. Recommendations included that workshops and conferences should be organized for secondary school teachers on the need for them to appreciate having appreciable knowledge of areas related to environmental sustainability concepts.

Key Words: Psychosocial determinants, teachers, knowledge, environmental sustainability

Introduction

In recent times, due to man's pressing desire to protect the earth from further irreparable environmental damage, the concept of environmental sustainability has gradually become an imperative in every facet of man's developmental endeavour. So important is the concept that its' not being appropriately embedded in all the Millennium Development Goals (MDGs) was the main reason why they were redesigned to become Sustainable Development Goals (SDGs). The redesigning does not imply that the concept is very novel, i.e., a 21st century concept. The concept was actually brought to notice in the late 1970s during two global conferences where education was adopted as a tool through which people would acquire knowledge and awareness about the concept.

The outcome of the two conferences served to kick-start a series of activities in countries around the world. In Nigeria, activities commenced with the founding of the Nigeria Conservation Foundation (NCF) in 1982. Then in 1985, the Baguada Conference held and its outcome was the designing of a strategy for the implementation of the Nigeria Environmental Education Curriculum (NEEC). The following year, i.e., in 1986, the Nigeria Conservation Strategy (NCS) was launched. What followed next was the National Conservation Education Strategy (NCES) Conference which held at Yankari Game Reserve in 1988. Lastly, in 1990, the NCES was then adopted by the National Council of Education as part of the National Policy on Education (Emmanuel & Ambe, 2014). Prior to the adoption, i.e., between 1986 and 1988, NCF had already started promoting conservation education in the then Bendel, Borno, Cross River and Lagos states.

After the adoption, a national workshop was held in 1992 where environmental sustainability related concepts and themes were incorporated into an already existing Citizenship Education curriculum. In the workshop which was jointly sponsored by the Nigerian Education Research and Development (NERDC) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), persons invited for the series of brainstorming seminars and symposia included teachers of secondary and post-secondary levels. The outcome of the workshop then led to two major landmarks in the implementation of environmental sustainability related concepts and themes in school curricula in Nigeria. One was the establishment of the first environmental education unit at higher education level in the country in the Institute of Education in the University of Calabar in 1993 while the second landmark was the designing of the Nigerian National Environmental Education Core Curriculum in 1996 for secondary schools.

The curriculum was designed to ensure the concept of environmental sustainability is being taught in a multidisciplinary manner, i.e., across all subjects, thus implying that all secondary teachers are supposed to have well-grounded knowledge of the concept. Yet within the study area, research reports have revealed some issues with secondary school teachers' knowledge levels of environmental sustainability. Some of the issues raised include most of the teachers' revealing a very low level of knowledge concerning the objectives, methods, principles and history of environmental education (Arikpo, 2017). For Essien, Akpan and Obot (2016), it was reported that most teachers indicating below average knowledge of contemporary environmental happenings and how to infuse such into their various schemes of work. In another study, most teachers were observed to display a seeming high level of lack of belief concerning their competence on how to teach the themes and contents related to the concept (Omoogun, Omoogun, Domike, Odok & Onnoghen, 2016). In yet another study, most teachers were reported to engage in a seeming non-integration of the concept's themes and contents in the syllabi of most subjects (Omoogun, 2015).

Still on the issues raised concerning teachers' knowledge of environmental sustainability, Ekpiken and Ukpabio (2015) revealed a very unappreciable level of environmental sustainability literacy and information dissemination amongst them. For Anijaobi-Idem, Ukata and Bisong (2015), a very unappreciable awareness level of the concept amongst most of them was observed. In another study, Omoogun and Omoogun (2014), the issue of an unsubstantial level of teachers' know-how concerning the concept's themes and contents which then influenced their competence levels towards implementing the multidisciplinary approach was reported. This unsubstantial level of their knowledge of the concept was also revealed by Omoogun, Onnoghen and Ateb (2014) which made them infer that the teachers lack substantial skills on how to teach it as part of other subjects. Lastly, Ekpoh and Ekpoh (2011) found out that most of them showed a low level of eagerness to access information concerning the concept's themes and contents.

In contemporary times, a lot of happenings have taken place in efforts made to ameliorate environmental challenges and ensure environmental sustainability. Such happenings include the newly designed Sustainable Development Goals (SDGs), the conceptualization of the tenets of sustainability into every facet of human development, the development of a discipline known as Environmental Ethics and the coining of new dimensions of Environmental Education such as Education for Sustainable Development, Climate Change Education and Education for Sustainability. As for the curriculum which was designed for implementation, its expected outcome is to produce a citizenry who would be environmentally literate enough to evaluate and promote environmental quality and subsequently, sustainable development. Lack of knowledge about the recent happenings, and environmental sustainability related concepts and themes by the teachers who are supposed to teach same to learners in schools in this era of sustainability and population explosion could be very detrimental to the future of the earth.

In addition, without teachers' having adequate knowledge about environmental sustainability related concepts and themes, much might be left to be wished in achieving sustainable development (Agbor, 2016). This is because instead of having a citizenry equipped with knowledge, attitude and skills concerning exhibiting pro-environmental literacy behaviours, there will rather be a citizenry who will be grossly ignorant towards environmental sustainability and sustainable development. Furthermore, without teachers' adequate knowledge of environmental sustainability related themes and contents, it could be a situation where most of the citizenry might rather be well equipped with environmental sustainability information and not education concerning environmental sustainability. Being equipped with environmental sustainability information endows one with a much lower capability of pro-environmental problem-solving and decision-making skills while education concerning environmental sustainability has a much higher propensity of ensuring such (Agbor, 2016).

Some factors are connected with a teacher's knowledge of a given concept's themes and contents. Studies have shown that psychosocial determinants such as school location and

environmental perception are amongst the factors which could influence their capability to acquire knowledge of a given concept. School location is a variable which implies where the school is situated. Its surrogates are rural and urban. Some studies reveal it as having no significant influence on teachers' knowledge of a given concept (Ali, 2015) while some reveal it as a significant determinant of teachers' knowledge of a given concept (Oloyede & Asaaju, 2016). Environmental perception is a psychosocial determinant concerned with an individual's ability to utilize his or her senses to become aware of the environment. Studies have mainly revealed that a teacher's knowledge level varies directly with the teacher's environmental perception, i.e., if the teacher has a positive environmental perception, he or she would have a high level of knowledge of the issues concerning the environment and vice versa (Ongowo, 2013; Kiarie, 2016).

From the above stated evidences from research works, it is premised that secondary school teachers' knowledge of a given concept could be influenced by their psychosocial determinants. The psychosocial determinants of interest are school location and environmental perception. In line with the premise that teachers' knowledge of environmental sustainability could be influenced by their psychosocial determinants, this study ascertained the influence of psychosocial determinants on secondary school teachers' knowledge of environmental sustainability in Calabar Education Zone of Cross River State.

Statement of the problem

The multidisciplinary approach of environmental sustainability themes and contents in secondary schools implies that teachers are supposed to use their various subject areas as a vehicle for discourse of the concept during lesson delivery in class. This also implies that utilization of the various subject areas to discourse the concept of environmental sustainability requires them having appreciable knowledge of it. Yet, from research reports within the area, plaguing issues seem to have no end in sight concerning their knowledge levels of the concept. First of all, most of them have been found to have very low knowledge levels of environmental education's methods, objectives, principles and history. This seems to be due to a lack of interest concerning awareness of the concept. Next, most of them were reported to have below average knowledge of recent environmental issues and also, how to infuse such into their subjects' various schemes of work. This was deduced to be as a result of lack of exposure to in-service trainings concerning the concept. Also, most of them have been observed to have vague knowledge of the concept's themes and contents. This was inferred to depict their lack of substantial skills concerning instructional delivery of the concept's themes and content.

Still on the plaguing issues, most were found to have not only very unappreciable literacy levels of the concept but also very low levels of information dissemination concerning the concept amongst them. This was premised to be as a result of lack of curiosity concerning the concept. Most of them were also observed to have unsubstantial know-how levels concerning the subject. This has been hypothesized to suggest their unappreciable competence levels on how

to implement the multidisciplinary approach of teaching the concept's themes and contents. Most were also observed to have a seeming lack of belief in line with how to teach the concept's themes and content alongside their already designated subject areas. This can be presumed to imply their inadequacy of behavioural beliefs towards the concept, i.e., the development of an uncomfortable attitude toward the subject. The result of the scenario is that EE concepts are not effectively taught to students in schools. Lastly, most were found to show a low level of enthusiasm to access information concerning the concept and this could most possibly be as a result of the lack of desire to appreciate acquiring awareness concerning the concept.

This above stated situation is what the multitude of "supposed-to-be environmental literate" secondary school learners within the study area are facing in this era of environmental sustainability and sustainable development. In addition, some other unanswered issues that are worrisome about the condition of secondary school teachers' knowledge of the concept remain unsolved. It is against this backdrop that this study inquired the following question – could there be any influence of psychosocial determinants on secondary school teachers' knowledge of environmental sustainability in Calabar Education Zone of Cross River State, Nigeria?

Purpose of the study

The purpose of this study was to examine the influence of psychosocial determinants on secondary school teachers' knowledge of environmental sustainability in Calabar Education Zone of Cross River State.

Research questions

1. How does school location influence teachers' knowledge of environmental sustainability?
2. To what extent does environmental perception influence teachers' knowledge of environmental sustainability

Statement of hypotheses

1. School location has no significant difference on teachers' knowledge of environmental sustainability
2. Environmental perception has no significant influence on teachers' knowledge of environmental sustainability

Literature review

School location is a variable which refers to the human settlement type in which a school is sited. As a researchable variable, school location is mostly viewed by scholars from the standpoint of rural and urban based schools (Gupta, 2017) while at times, it is usually viewed from the three dimensions of rural, semi- or peri-urban, and urban (Onoyase, 2015). This variable is usually of interest to researchers due to the perceived externalities that characterize schools in the various locations. One of the most profound perceived externality is in form of student and teacher population with urban schools almost always being more populated than rural schools. This perceived externality is usually due to the disparity in population trend of

the two settings – urban areas are typified by higher populations than rural areas. Aside the population, other externalities which seem to typify differences between urban and rural schools are in terms of school facilities, easier access to social amenities such as water and health services, modern technology facilities and equipment, electricity, etc,. Another perceived externality is in the area of resource distribution to schools with urban schools being assumed to have higher amounts of allocated resources than rural ones by government (Olutola, 2017).

Some ripple effects of the above settings on teachers and students alike are that those in urban areas are seemingly more motivated to teach, and their students also appear to be more motivated to learn (Owoeye & Yara, 2011). This presumably signifies that urban school teachers are more likely to be more productive and their students are more likely to perform or attain better learning outcomes than their rural counterparts. The following research reports reveal how location has been found to impact on areas related to teachers' knowledge of environmental sustainability.

Victor-Ishikaku and Nyenwe (2014) investigated secondary school teachers' knowledge of climate change impacts in Nigeria in a study predicated on a descriptive survey method. All teachers in Rivers State schools formed the population. Inclusive in the study's posers was an evaluation of the difference in teachers' knowledge of the impact based on location (urban and rural). Using independent t-test, a significant difference was revealed with urban-based teachers showing significantly more knowledge than rural-based teachers. This therefore signified that rural-based teachers were less knowledgeable concerning impacts of climate change than urban-based teachers. In their study, Kira and Kafanabo (2016) probed Tanzanian secondary school teachers' knowledge level of the concepts of environmental education in a study which applied a survey research design. The population was made up of teachers from the country's Morogoro District with teachers being selected from the district's urban and rural areas. Part of the study's aims was to verify the difference in knowledge levels among the teachers in terms of school location. The result from the content analysis utilised by the study showed that there was no difference in knowledge among the teachers in terms of school location.

In an investigation of environmental awareness of Indian rural and urban secondary school teachers, Gupta (2017) adopted a survey method. All teachers of the country's Raipur City made up the population. The study's purpose included assessing the difference in environmental knowledge between urban and rural secondary school teachers. Independent t-test was applied for data analysis. The result reported location as an insignificant determinant of teachers' environmental knowledge levels. Ayeni (2021) examined attitude of Nigerian secondary school teachers towards environmental pollution by applying a descriptive survey design. The population consisted of teachers from schools in Ekiti State. The study's enquiries included verifying the influence of school location on teachers' attitude towards environmental

pollution. Using independent t-test, the result revealed that school location was a significant determinant of teachers' attitude towards environmental pollution.

In an inquiry of the awareness and attitude of Nigerian secondary school Biology teachers on climate change adaptation, Eugenia and Onyegegbu (2021) adopted a descriptive survey research design. Teachers from Anambra State served as the population. The study's objectives also included determining the effect of school location on awareness and attitude of teachers on climate change adaptation. The study's finding showed that school location was an insignificant determinant of teachers' adaptation to climate change. In an evaluation of Nigerian secondary school teachers' knowledge and perception of climate change, Nnadi, Nnoli, Ezeasor, Okolo, Nnadi and Okorocha (2021) utilised a survey research design. Teachers from Enugu State formed the study's population while a census was conducted. The study's posers included assessing the influence of school location on the teachers' knowledge/perception of climate change and the data obtained was analysed using independent t-test. The result indicated that school location had no significant influence on the teachers' knowledge and perception of climate change.

Okunade (2021) investigated Nigerian secondary school teachers' dispositions in line with environmental pollution in a study hinged on survey research design. All teachers across the south-western states formed the population. Inclusive in the study's objectives was an inquiry of the extent which school location impacted on teachers' disposition towards environmental pollution. Analysis with independent t-test showed that teachers' disposition towards environmental pollution was significantly impacted upon by school location. An assessment of climate change knowledge among secondary school teachers in Nigeria was conducted by Ugwu, Familoni, Anibueze, Onyekwere, Ajewole, Nwogu, and Ibeneme (2021). Adopting a descriptive survey design, the population comprised of teachers from Enugu State. One of the study's objectives was to ascertain the effect of school location on teachers' knowledge of climate change. The result of the analysis revealed that school location was not a significant determinant of teachers' knowledge of climate change.

Eze, Nwagu and Onuoha (2022) assessed secondary school teachers' self-reported climate science literacy and their perceptions towards training needs in line with climate change concepts in Nigeria by applying a descriptive survey design. Teachers of schools from Enugu State made up the population. Among the study's aims was an investigation of the effect of school location on teachers' climate science literacy. The result revealed that school location was an insignificant determinant of teachers' climate science literacy.

Environmental perception refers to the manner which a person perceives the environment, including the process in which information received about the environment is evaluated and stored (Angel-Perez & Villagomez-Cortes, 2014). From the above definition of environmental perception, it is presumed to be a product of peoples' active communication with the

environment. That is, what an individual perceives in a given environmental setting is a function of how he/she perceives it, but in turn, the perception is totally dependent on the environmental information obtained as defined from the individual's own perceptive actions in the given setting (García-Mira & Real, 2005). Thus, the implication is that different persons or group of persons may perceive the "same environment" differently. Therefore, it can be said that different persons would certainly extract different information from the same environment, and different environments would certainly offer different kinds of information to the same person. This is even corroborated by the indicators which most researchers usually measure the concept of environmental perception which include components of attitude, behaviour, perceived susceptibility, severity, barriers, and benefits (Bayard & Jolly, 2007).

According to Almeida, Scatena and Da Luz (2017), in the field of environmental perception, the environment refers to anything external to an individual (the perceiver) which influences or could possibly influence the perception process. Generally the physical environment comprises of the natural environment and the built environment. The natural environment refers to natural places like hills, water-bodies, valleys, and mountains; environmental conditions such as rainfall and temperature; and biodiversity such as flora and fauna. The necessity of researchers investigating peoples' perception of the environment is due to the diversity of criteria which individuals base their judgments on the environment as they perceive it, not as it is (Alassaf, Alhunaiti, Dick, Al-Adwan, 2014).

In an investigation of Nigerian secondary school teachers' knowledge of climate change for inclusion in school curriculum, Ikoro and Ezeanyim (2016) employed a survey research design. Science teachers across schools in the country's south-east region served as the population. The study's aims involved assessing teachers' perceptions towards the inclusion of climate change contents in the syllabi of secondary school subjects' curricular. The result from the enquiry revealed that the teachers had favourable perceptions towards including climate change syllabi in the curricular. An assessment of secondary school teachers' perception of climate change vis-à-vis climate change education in Nigerian schools was researched by Ogunseemi and Ibimilua (2016). A survey method was used and population was composed of teachers who taught science and environmental-related subjects in Ekiti State schools. Two of the study's inquiries bordered on – (i) examining the teachers' extent of climate change perceptions, and; (ii) ascertaining the teachers' perception concerning climate change education. Analysing the data with chi-square technique, teachers' climate change perceptions were found to be insignificant and very low. Also, the teachers were found to have very low perceptions toward climate change education.

Namibian secondary school teachers' perception of implementing environmental education themes into the geography curriculum was evaluated by Loubser and Simalumba (2016). Adopting a case study design, study's population comprised of geography teachers in schools in the country's Caprivi region. The teachers were enquired of their perceptions of the

significance of indigenous environmental knowledge as content to be added to the geography curriculum for onward implementation of environmental education in schools. Thematic analysis procedures were applied to analyse the data. The finding revealed that most of them perceived that indigenous environmental knowledge could be of high significance to the geography curriculum as environmental education content.

Zulu (2016) applied a descriptive survey approach to ascertain teachers' perceptions of environmental education in Zambian primary schools. All teachers and pupils of schools in the country's Chipata District constituted the population. Qualitatively designed data included ascertaining the respondents' perceptions of environmental education. From the analysis, most of the respondents had favourable responses concerning the environment (based on their view of the physical environment, their definition of environmental education, and their view of the importance of teaching/learning environmental education in schools). The finding therefore meant that the respondents' perception towards environmental education favoured its implementation in schools. Rosidin and Suyatna (2017) assessed Indonesian teachers and students knowledge about global warming. Population consisted of teachers and students in secondary schools in the Lampung Province in the country. A survey of teachers' perceptions of global warming was one of the study's posers. Applying mean scores for analysis of data, the teachers' global warming perceptions were unappreciable. This symbolized that the teachers had very vague and unclear perceptions about the phenomenon.

Anyolo, Karkkainen and Keinonen (2018) used a case study method in their investigation of Namibian secondary school teachers' perceptions towards implementing education for sustainable development in schools. Teachers from the country's Oshana Education region served as population. Two of the posers enquired from the respondents were their perceptions towards; (i) education for sustainable development (ESD), and; (ii) integration of ESD into school curriculum. Data analysis was done with the use of content analysis. For the first poser, they were observed to perceive ESD from three dimensions; (i) as a strategy of extending environmental awareness so that learners learn and know more about the environment; (ii) as a means of educating people to become wiser in their use of natural resources so as to ensure that resources' availability for future generations is not jeopardized, and; (iii) as a way of encouraging/promoting critical thinking and problem-solving skills towards ensuring that development does not bring adverse environmental impacts. As for their perception concerning integrating the object into the curriculum, most were of the view that ESD topics should be integrated as within existing subjects while few opined that ESD be designed as a single independent subject. The responses from the respondents therefore meant that they not only had divergent perceptions of ESD but also, they held divergent perceptions on how the subject matter should be integrated into the curriculum.

Oladapo (2019) examined secondary school teachers' knowledge and perceptions towards global warming in Nigeria by utilising a descriptive survey design. Teachers from school in

Oyo State constituted the population and one of the study's objectives was to verify the disposition of teachers to global warming. The study's findings showed that the teachers' dispositions towards global warming were that the phenomenon is associated with natural disasters. A study on pre-service teachers' attitudes towards climate change by Oladipo, Awofala and Osokoya (2020) was predicated on a descriptive survey design. Pre-service teachers of schools in South-West Nigeria composed the population. Inclusive among the study's objectives was a determination of the manner of attitudes which the pre-service teachers harboured. The analysis of obtained data indicated that the pre-service teachers harboured both positive and negative dispositions towards climate change.

In their study, Abdu-Raheem and Adeosun (2022) adopted a descriptive survey design in the evaluation of pre-service teachers' knowledge, perception and attitudes towards global warming in Nigeria. With the population from schools in Ekiti State, the study's purpose also involved examining the pre-service teachers' perceptions towards global warming. The finding from the study revealed that the pre-service teachers had good perceptions towards global warming. Ede, Nwajioha, Njoku and Benjamin (2023) verified climate awareness among secondary school teachers in Nigeria. Using a survey research design, the population was sourced from teachers of schools in Ebonyi State. Inclusive in the study's aims was a poser concerned with verifying the teachers' perceptions towards climate change impacts and its adaptation/mitigation strategies. The study's finding was that on the average, the teachers' perceptions were very shallow.

Methodology

The study adopted a survey research design. The population of the study consisted of all the 2,213 secondary school teachers of all public secondary schools in Calabar Education Zone of Cross River State during the 2021/2022 academic year, out of which a sample of 712 respondents was purposively drawn from 18 out of 84 schools representing approximately 32% of the population for the study. A questionnaire tagged the "Teachers' Psychosocial Determinants and Knowledge of Environmental Sustainability Questionnaire" (TPDKESQ) served as the study's instrument for collecting data. It has sections A, B and C. Section A was concerned with respondents' demographics. Section B elicited responses concerning environmental perception (6 items with response rubric of strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD) while section C was concerned with teachers' knowledge of environmental sustainability (20 items with response rubric of true (T) or false (F).

The face validity of the instrument was determined by two measurement and evaluation experts in the Department of Educational Foundations and two experts in Department of Environmental Education who ascertained the degree to which the items on the instrument measures what it is expected to measure. To determine the reliability of the research instrument, a trial testing was done using 30 respondents from schools that were not part of the sample and

data collected from them were analysed using the Cronbach Alpha reliability method which gave a reliability coefficient of .74 for environmental perception and .78 for knowledge of environmental sustainability. The data collection for the study was done by the researchers which lasted for about six weeks. The data collected were analysed using independent t-test and One-way Analysis of Variance (one-way ANOVA) and tested at .05 level of significance.

Presentation of results

Ho1:
The first hypothesis states that school location has no significant difference on teachers' knowledge of environmental sustainability. The independent variable is school location which was categorized into urban and rural while the dependent variable is teachers' knowledge of environmental sustainability. The hypothesis was analysed using independent t-test analysis tested at .05 levels of significance to compare the mean scores of the teachers in urban schools with that of their counterparts in rural schools. The result of the analysis is presented in Table 1.

Table 1: Independent t-test analysis for school location and teachers' knowledge of environmental sustainability

School location	N	Mean	SD	t-value	p-level
Urban	401	10.33	2.55		
				12.061*	.000
Rural	288	7.93	2.61		

*Significant at .05 level; p<.05.

The result in Table 1 revealed that the mean score obtained by the 401 teachers from urban schools as regards their knowledge of environmental sustainability was 10.33 with SD of 2.55 is greater than the mean score of 7.93 with SD of 2.61 obtained by the 288 teachers from rural schools. The mean difference was statistically significant since the obtained t-value of 12.061 with a p-value of .000 met the criteria for significant at .05 level since the p-level is less than .05. Based on this, the null hypothesis which stated that school location has no significant difference on teachers' knowledge of environmental sustainability was rejected. This implies that teachers from urban schools differ significantly from their counterparts from rural schools on their knowledge of environmental sustainability with the teachers from urban schools having better knowledge of environmental sustainability than those from rural schools.

Ho2:
The second hypothesis states that environmental perception has no significant influence on teachers' knowledge of environmental sustainability. The independent variable is

environmental perception while the dependent variable is teachers' knowledge of environmental sustainability. Teachers' environmental perception was measured using six items on a modified 4-point Likert type scale and their scores ranged from six to 24. Based on this, any teacher that scored from 6 – 11 in the six items that measured environmental perception was categorized as low while those that scored from 12 – 18 and 19 – 24 in the six items were categorized as moderate and high respectively. The hypothesis was analysed using One-way ANOVA tested at .05 level of significance and the result of the analysis is presented in Table 2.

Table 2: One-way ANOVA for environmental perception and teachers' knowledge of environmental sustainability

Environmental perception	N	Mean	SD
Low	79	6.77	2.21
Moderate	386	9.03	2.67
High	224	10.74	2.49
Total	689	9.33	2.83

Source of variance	Sum of Squares	df	Mean Square	F-ratio	p-level
Between Groups	994.538	2	497.269	75.487*	.000
Within Groups	4518.985	686	6.587		
Total	5513.524	688			

* Significant at .05 alpha level; p<.05.

The result in Table 2 revealed that the mean score obtained by the 79 subjects who are low in their level of environmental perception was 6.77 with SD of 2.21 while the mean score of 9.03 with SD of 2.67 was obtained by the 386 subjects who are moderate in their level of environmental perception and the mean score of 10.74 with SD of 2.49 was obtained by the 224 subjects who are high in their level of environmental perception. The result further revealed that the calculated F-ratio obtained was 75.487 with a p-level of .000 at .05 level of significance with 2 and 686 degrees of freedom. With the obtained result, the F-ratio was statistically significant since the p-level is less than .05 and based on this, the null hypothesis which stated that environmental perception has no significant influence on teachers' knowledge of environmental sustainability was rejected.

Since teachers' knowledge of environmental sustainability was significantly influenced by environmental perception, the source of the difference was determined using a Post Hoc Test analysis to test for the source of the difference. The result is presented in Table 3. An

examination of the results in Table 3 showed that, the subjects who are low in their level of environmental perception had a significant lower mean score on knowledge of environmental sustainability, when compared with those who are moderate in their level of environmental perception (MD=-2.26; p<.05) and they also had a significant lower mean score on knowledge of environmental sustainability, when compared with those who are high in their level of environmental perception (MD=-3.96; p<.05). Other pair wise comparison show that the subjects who are moderate in their level of environmental perception had a significant lower mean score on knowledge of environmental sustainability, when compared with those who are high in their level of environmental perception (MD=-1.71; p<.05). Based on these, it was concluded that, the source of the difference was basically from all the various levels of teachers' environmental perception.

Table 3: Fisher's Least Significance Difference (LSD) multi-comparison test analysis for the influence of environmental perception on knowledge of environmental sustainability among secondary school teachers

(I) Environmental perception	(J) Environmental perception	Mean difference (I-J)	p-level
Low	Moderate	-2.26*	.000
	High	-3.96*	.000
Moderate	Low	2.26*	.000
	High	-1.71*	.000
High	Low	3.96*	.000
	Moderate	1.71*	.000

*The mean difference is significant at the .05 level.

Discussion of Findings

The result of the first hypothesis revealed that school location had a significant difference on teachers' knowledge of environmental sustainability with teachers from urban schools differing significantly from their counterparts from rural schools on their knowledge of environmental sustainability. This implied that on the average, teachers from urban schools had better knowledge of environmental sustainability than those from rural schools. The result most probably might have been as a result of the perceived externalities prevalent within urban settings that are not available within rural settings. This includes more access to wider range of information, more access to internet services for information sourcing and more access to technology.

The finding is in consonance with that of Victor-Ishikaku and Nyenwe (2014) who reported that rural-based teachers were less knowledgeable concerning impacts of climate change than urban-based teachers. It is also in consonance with that of Ayeni (2021) whose finding showed

that school location was a significant determinant of teachers' attitude towards environmental pollution. However, the finding is not in agreement with that of Kira and Kafanabo (2016) who observed that there was no difference in knowledge among the teachers in terms of school location. Also, Gupta (2017) reported school location as an insignificant determinant of teachers' environmental knowledge levels. Eugenia and Onyegegbu's (2021) finding showed that school location was an insignificant determinant of teachers' adaptation to climate change. Nnadi *et al*.'s (2021) study revealed that school location had no significant influence on the teachers' knowledge and perception of climate change. Ugwu *et al*., (2021) also found out that school location was not a significant determinant of teachers' knowledge of climate change. Lastly, Eze *et al*., (2022) revealed that school location was an insignificant determinant of teachers' climate science literacy.

The result of the second hypothesis revealed that environmental perception had a significant influence on teachers' knowledge of environmental sustainability with the analysis of a Post-Hoc test indicating that the source of the difference was basically from all the various levels (high, moderate and low) of teachers' environmental perception. This invariably meant that teachers with a high level of environmental perception significantly differed in terms of knowledge of environmental sustainability from teachers with each of moderate and low levels of environmental perception. In addition, teachers with moderate levels of environmental perception significantly differed in terms of knowledge of environmental sustainability from teachers with low level of knowledge of environmental sustainability. This finding could possibly be as a result of the teachers perceiving the environment from a variety of viewpoints mostly due to the environmental-related information at their disposal for the perception process.

The finding is in line with that of Ikoro and Ezeanyim (2016) whose finding revealed that teachers had favourable perceptions towards including climate change content in the curricular of various subjects. The finding also corroborated with that of Loubser and Simalumba (2016) who reported that most teachers perceived that indigenous environmental knowledge could be of high significance to the geography curriculum as environmental education content. The finding also was in consonance with that of Zulu (2016) who observed that most teachers had favourable responses concerning the environment (based on their view of the physical environment, their definition of environmental education, and their view of the importance of teaching/learning environmental education in schools). Lastly, Abdu-Raheem and Adeosun (2022) reported that pre-service teachers had good perceptions towards global warming.

On the other hand, the finding is not in agreement with that of Ogunseemi and Ibimilua (2016) who revealed that teachers' climate change perceptions were not only found to be insignificant and very low but also the teachers were found to have very low perceptions toward climate change education. In addition, Rosidin and Suyatna (2017) observed teachers' global warming perceptions to be unappreciable, thus symbolizing that the teachers had very vague and unclear

perceptions about the phenomenon. Lastly, Ede *et al*., (2023) reported that on the average, the teachers' perceptions towards climate change impacts and its adaptation/mitigation strategies were very shallow.

Conclusion and Recommendation

This study highlights the significance of secondary school teachers' knowledge of environmental sustainability from the standpoint of school location and environmental perception. Appreciation of the need to have grounded knowledge of the concept of environmental sustainability amongst teachers in secondary schools is of necessity without which there will be almost no hope of salvaging our environment as learners who go through schooling without environmental sustainability-based learning experiences could end up having little or no pro-environmental attitudes. If not for any other glaring environmental consequence in recent times, the phenomenon of climate change due to global warming with its attendant academic, ecological, socio-cultural, economic and political implications is enough to give evidence that man might have to brace up for more reactions from the environment if we do not learn to appreciate that people need to be educated on how to develop a stewardship-like mentality towards the environment. In addition, in this era of increased school enrolment, if advantage is not taken to ensure the implementation of environmental sustainability learning experiences, it could serve to be a spanner in the works when the environment will bring about more reactions.

Based on the finding, it is recommended among others that workshops and conferences should be organized for secondary school teachers on the need for them to appreciate having appreciable knowledge of areas related to environmental sustainability concepts. Also, secondary school teachers should also be encouraged to develop the need to infuse environmental sustainability based themes and content into their instructional delivery plans.

References

Abdu-Raheem, B. O., & Adeosun, A. T. (2022). Undergraduates' perception, knowledge and attitudes towards global warming in Ekiti State, Nigeria. *International Journal of Research and Innovation in Social Science (IJRISS), VI*(XI), 116-120

Agbor, C. N. (2016). The importance of incorporating Environmental Education (EE) into Teacher Education Programmes in Nigeria. *International Journal of Scientific Research in Education (IJSRE), 9*(4), 248-263

Alassaf, A., Alhunaiti, D., Dick, J., & Al-Adwan, T. (2014). Differences in perceptions, attitudes, and use of ecosystem services among diverse communities in an arid region: A case study from the South of Jordan. *Journal of Human Ecology*, 45, 157-165

Ali, A. R. (2015). Influence of school location on environmental awareness level among secondary school students in Terengganu, Malaysia. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), 9*(3), 54-61

Almeida, R., Scatena, L. M., & da Luz, M. S. (2017). Environmental perception and public policies – dichotomy and challenges to the development of a sustainability culture. *Ambiente & Sociedade n São Paulo, XX*(1), 43-64

Angel-Perez, A. L. D., & Villagomez-Cortes, J. A. (2014). Environment perceptions and conservation preferences along the Coatepec-La Antigua Watershed, México. *Journal of Human Ecology, 46*(3), 309-318

Anijaobi-Idem, F. N., Ukata, B. N., & Bisong, N. N. (2015). Environmental awareness and school sanitation in Calabar Metropolis of Cross River State, Nigeria. *Journal of Education and Practice, 6*(4), 68-71

Anyolo, E. O. (2018). Implementing education for sustainable development in Namibia: School teachers' perceptions and teaching practices. *Journal of Teacher Education for Sustainability, 20*(1), 64-81

Arikpo, J. B. (2017). *Teachers' variables and knowledge of environmental education in Calabar Education Zone of Cross River State*. Unpublished Master thesis submitted to Department of Environmental Education, Faculty of education, University of Calabar, Calabar

Ayeni, M. F. (2021). The attitudes of Nigerian secondary school teachers and students towards environmental pollution. *British Journal of Education, 9*(12), 30-39

Bayard, B., & Jolly, C. M. (2007). Environmental perceptions and behavioural change of hillside farmers: The case of Haiti. *Farm & Business: The Journal of the Caribbean Agro-Economic Society (CAES), 7*(1), 122-138

Ede, F. N., Nwajioha, P. N., Njoku, M. I. A., & Benjamin, U. (2023). Assessment of Climate Change Awareness among Secondary School Teachers in Ebonyi State, Nigeria. *Journal of Education and Practice, 14*(8), 1-6

Ekpiken, W. E., & Ukpabio, G. (2015). Environmental literacy awareness and information dissemination among adolescents in Calabar Municipality Local Government Area secondary schools in Cross River State, Nigeria. *Asia Pacific Journal of Education, Arts and Sciences, 2*(3), 73-79

Ekpoh, U. I., & Ekpoh, I. J. (2011). Assessing the level of climate change awareness among secondary school teachers in Calabar Municipality, Nigeria: implication for management effectiveness. *International Journal of Humanities and Social Science, 1*(3), 106-110

Emmanue, I. A., & Ambe, B. A. (2014). *Influence of teachers' professional qualification and area of specialization on the implementation of environmental education in Cross River State*. Paper presented at the International Conference on Chemical, Environment & Biological Sciences (CEBS-2014) held at Kuala Lumpur, Malaysia between September 17th -18th

Essien, E. E., Akpan, O. E., & Obot, I. M. (2016). The influence of in-service training, seminars and workshops attendance by social studies teachers on academic performance of students in Junior Secondary Schools in Cross River State, Nigeria. *Journal of Education and Practice, 7*(22), 31-35

Eugenia, U., & Onyegegbu, N. (2021). Awareness and attitude of secondary school Biology teachers and students on climate change adaptation in Awka Education Zone of Anambra State. *African Journal of Science, Technology & Mathematics Education (AJSTME), 6*(1), 204-216

Eze, E., Nwagu, E. K. N., & Onuoha, J. C. (2022). Nigerian teachers' self-reported climate science literacy and expressed training needs on climate change concepts: Prospects of job-embedded situative professional development. *Science Education*, 106, 1535-1567

García-Mira, R., & Real, J. E. (2005). Environmental perception and cognitive maps. *International Journal of Psychology, 40*(1), 1–3

Gupta, N. (2017). Environmental awareness of urban and rural school students. *International Journal of Engineering Development and Research, 5*(3), 128-130

Ikoro, I. S., & Ezeanyim, U. E. (2016). Assessment of secondary school science teachers' knowledge of climate change in the South East Nigeria for inclusion in the secondary school curriculum. *International Journal of Weather, Climate Change and Conservation Research, 2*(3), 9-19

Kiarie, S. M. (2016). Effects of teachers' perceptions on students' perceptions and achievement in environmental education in secondary school Biology in Gilgil Sub-County of Nakuru County, Kenya. *International Journal of Environmental & Science Education, 11*(12), 5736-5761

Kira, E., & Kafanabo, E. (2016). Secondary school teachers' knowledge level of the concepts of environmental education in Morogoro, Tanzania. *Huria: Journal of the Open University of Tanzania, 23*(1), 1-16

Loubser, C., & Simalumba, P. (2016). The implementation of Environmental Education in Geography (Grades 8–10) in the Caprivi Region, Namibia. *Southern African Journal of Environmental Education*, 32, 51-65

Nnadi, V. E., Nnoli, N. G., Ezeasor, I. C., Okolo, O. J., Nnadi, V. U., & Okorocha, K. N. (2021). Evaluating the perception of climate change among secondary school science teachers for knowledge-based sustainable development. *Civil and Environmental Research, 13*(5), 26-34

Ogunseemi, O. E., & Ibimilua, F, O. (2016). Assessment of science teachers' perception of climate change: Implication for climate change education in schools in Nigeria. *International Journal of Advanced Academic Research - Arts, Humanities & Education, 2*(8), 11-18

Okunade, A. I. (2021). Knowledge and attitude of secondary school teachers toward environmental pollution in Southwest, Nigeria. *Euro-Afro Studies International Journal, 3*(4), 1-14

Oladapo, S. O. (2019). Knowledge and perception of secondary school teachers on global warming in Ibadan Oyo State, Nigeria. *American International Journal of Education and Linguistics Research, 2*(2), 29-34

Oladipo, A., Awofala, A. O. A., & Osokoya, M. M. (2020). Investigating pre-service Science, Technology, and Mathematics teachers' attitudes toward climate change in Nigeria. *Journal of Educational Sciences, 4*(2), 220-238

Oloyede, O. O., & Asaaju, O. A. (2016). The interactive effect of outdoor activities and school location on senior secondary students' environmental problem solving skills in Biology. *African Research Review, 10*(2), 194-212

Olutola, A. T. (2017). School Location and Gender as Predictors of Students' Performance in WASSCE Multiple Choice Test in Biology. *Liceo Journal of Higher Education Research, 12*(1), (e-journal). Retrieved on 19/12/2018 from doi: http://dx.doi.org/10.7828/ljher.v12i1.960

Omoogun, A. C., & Omoogun, R. M. (2014). Teachers' experience and teachers' competency needs in the multidisciplinary approach to implementation of environmental education curriculum in Cross River State, Nigeria. *Research on Humanities and Social Sciences, 4*(26), 183-188

Omoogun, A. C. (2015). Teachers' competence needs in the multidisciplinary approach of implementing of environmental education. *British Journal of Education, Society & Behavioural Science, 8*(3), 189-196

Omoogun, A. C., Omoogun, R. M., Domike, G. C., Odok, A. O., & Onnoghen, U. N. (2016). Influence of teachers' belief on competence for the implementation of environmental education curriculum. *British Journal of Education, Society & Behavioural Science, 16*(4), 1-9

Omoogun, A. C., Onnoghen, U. N., & Ateb, G. A. (2014). Adequacy of knowledge of environmental concepts among junior secondary school teachers for the multidisciplinary approach of implementing environmental education curriculum. *Journal of Education and Practice, 5*(36), 106-111

Ongowo, R. O. (2013). Secondary school teachers' perceptions of a biology constructivist learning environment in Gem District, Kenya. *International Journal of Educational Research and Technology, 4*(2), 01-06

Onoyase, A. (2015). Academic performance among students in urban, semi-urban and rural secondary schools: Counselling implications. *Developing Country Studies, 5*(19), 122-126

Owoeye, J. S., & Yara, P. O. (2011). School location and academic achievement of secondary schools in Ekiti State, Nigeria. *Asian Social Science, 7*(5), 170-175

Rosidin, U., & Suyatna, A. (2017). Teachers and students knowledge about global warming: a study in smoke disaster area of Indonesia. *International Journal of Environmental & Science Education, 12*(4), 777-785

Ugwu, N. F., Familoni, J. K., Anibueze, A. U., Onyekwere, O. K., Ajewole, P. I., Nwogu, O. F., & Ibeneme, C. B. (2021). Assessment of climate change knowledge and attitude among secondary school teachers' in Enugu State. *Trends in Educational Studies Journal, 13*(2), 123-134

Victor-Ishikaku, E. C., & Nyenwe, J. (2014). Teachers' knowledge of climate change impacts in secondary schools in Rivers State, Nigeria. *International Journal of Education Learning and Development, 2*(3), 18-24

Zulu, N. M. (2016). *Teachers' and pupils' perceptions of Environmental Education in selected Primary Schools of Chipata District of Eastern Zambia*. Dissertation submitted to the Department of Geography and Environmental Studies, School of Natural Sciences, University of Zambia, Lusaka