



THE IMPACT OF CLIMATE CHANGE ON SCHOOL CLIMATE: EXAMINING THE EFFECTS ON THE ACADEMIC PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN BAYELSA STATE

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ABSTRACT

Climate change impact on education has been highlighted by scholars in several dimensions including the impact on the academic performance of students. The argument is that it undermines school climate through the destruction of school infrastructure, displacement of students and teachers, disruption of classes etc. But empirical data on this is lacking in Bayelsa State. This paper intends to fill this gap by conducting an empirical study on climate change impacts on the school environment in Bayelsa State with a view to determining its impact on students' academic performance.

Key words: Climate Change, School Climate, School Environment, Academic Performance, Bayelsa State

Introduction

The literature has established a relationship between school climate and the academic performance of teachers and students. One of such studies concluded that:

High performing schools record a more favourable ecology, milieu, and school culture than the low performing schools... positive school climate fosters youth development and learning necessary for a productive, contributing and satisfying life in society. In other words, when students, in partnership with educators and parents, work to improve school climate, they promote essential learning skills as well as life and career skills. (Role, etal, 2011, p. 93 & 101)

School climate is influenced by a number of factors including school infrastructure, teacher competence and behaviour, supervision, among other factors. Scholars have examined the impact of climate change on school climate and made the argument that it endangers the school environment. According to Uqwoke and Abidde (2015):

...Climate change has great extent of impact on students learning in secondary schools in the areas of student's transportation to school, displacement of student, and spread of diseases in classrooms among others.... climate change affects secondary school educational facilities such as the school libraries, laboratories. desks and chairs, the school buildings and the playgrounds (p.60).





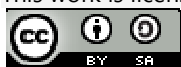
But one issue that is not given much attention as a factor in school climate is land topography. This paper intends to explore this with Bayelsa State as case study. The land topography of Bayelsa State justifies its choice as a case study for this paper.

What is Education?

Scholars have proffered different definitions and perspectives on the meaning of education. For example, Okorosaye – orubite (2008:1006) defines it as the development of man to enable him create and recreate himself. Others describe education as the pursuit of a wide-range of activities, planned and managed for the benefit of society and its members (Audu, 2004:45-46); and the systematic influencing of people’s knowledge, skills and attitudes (Nduka, 2006:216). For statesmen like Nyerere (1967:63) education is and the transmission from one generation to another, the accumulated wisdom, knowledge, skills, values and attitudes of the society. Education makes man moral and ethical; inducts the individual into the shared values of society; develops commitment to societal goals in the individual; prepares the young members of society for the future; defines behavioural patterns of individuals and society; and also enhances the productive capabilities of individuals. (Ibaba, 2009). Education is both formal and informal and it is expected to transmit knowledge, skills and values of society from one generation to another. Significantly, the teacher is the midwife or facilitator of all that education brings to society.

The question then is who is a teacher? This can be answered by knowing what teaching means. According to Ofojebe and Ezugoh (2010, 400) “teaching is the systematic, rational and organized process of transmitting knowledge, skills, attitudes, and values in accordance with certain professional principles”. From the above, a teacher can be seen as that individual who facilitates the transmission of knowledge, skills and values from one generation to another in any given society. The Teachers Registration Council Act of Nigeria (TRCN), CAP T3 of 2004 (formerly TRCN Decree No. 3,1993) describes the teacher as the individual who has received teacher training and has been licensed to teach by the Council. “The word ‘teach’ is derived from the Anglo Saxon word ‘teacon’ which means “to impart”, “to instruct”, “to make aware of” and “to train”. A teacher can be defined as a person who has enough knowledge in any field and conveys this knowledge to the ignorant one” (www.educational-system.blogspot.com/2012/05/role-of-teachers-in-global-scenario-my.html).

The teacher is therefore an instructor, facilitator, counsellor, mentor, and supervisor. The teacher is the one who develops what to teach (curriculum) why teach what (philosophy) and the methods of teaching. This makes the teacher the key figure in education, and teaching an exclusive occupation for some persons. Buijs (2005,331) defines profession as “an organized group of individuals that acquire a monopoly over specialised knowledge and skills that are of acknowledge social benefit in society”. The TRCN Act only considers licensed teachers as professionals, and this makes teaching a profession in Nigeria. As a profession, teaching is the exclusive preserve of individuals who have received professional training and have been inducted and licensed by relevant professional bodies or agencies such as the TRCN in Nigeria. Teacher quality, which is dependent on factors such as training and re-retraining which is required for knowledge of what to teach and the methodology/psychology of teaching, sense of





humour, flexibility, willingness to learn new ideas, fairness, empathy, humility and sense of judgement are important for job satisfaction and productivity (Nyam and William-West, 2014; (www.educational-system.blogspot.com/2012/05/role-of-teachers-in-global-scenario-my.html).

Teacher job performance is measured with the role of teachers in the school environment. These include activities such as preparation for classes (having lesson notes) , coverage of scheme of work, class attendance, early and regular reporting at school, involvement in extra-curricular activities, supervision of school activities (school assembly, labour/cleaning), attendance of school meetings, marking of continuous assessment and examination scripts. Teacher job satisfaction and by extension job performance is linked to the academic performance of students. However, the academic performance of students is influenced by several factors, including school climate, motivation of teachers, the home environment and socio-cultural issues. This paper looks at the role of the school climate in relation to climate change.

Academic Performance of Students

Generally, the academic performance of students implies their output in relation to examination grades. In this regard, students are considered to have performed well when they obtain high grades, and this is also used as one of the measures of performance for teachers. The academic performance of students is influenced by factors such as teacher quality, teaching method mathematical error, methods of evaluation, class size, teacher experience, teacher training/education, classroom practices, teacher-student relationship, school climate, working conditions, among others (Akinsolu, 2010; Josiah & Oluwatoyin, 2017; Oviawe, 2016; Whitle, Telford & Benson, 2018; Muema, Mulwa & Maila, 2018; Baidoo-Anu, 2018). An example of students' academic performance is shown below.



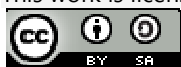


Table 1: Performance of Students in Senior Secondary Certificate Examination Science Subjects (Credit and above) – 1998-20007

Year	Biology		Chemistry		Physics	
	Total Number of Students	% of Credit Pass	Total Number of Students	% of Credit Pass	Total Number of Students	% of Credit Pass
1998	626,894	34.44	182,659	21.39	169,657	11.33
1999	745,102	27.81	223,307	31.08	210,271	30.57
2000	518,001	19.19	160,933	32.02	154,808	30.14
2001	995,345	23.25	301,740	36.25	287,993	34.46
2002	882,119	31.52	262,824	34.42	254,188	47.51
2003	909,101	43.14	282,120	50.98	275,369	47.56
2004	821,966	30.83	269,774	38.97	270,028	51.02
2005	1,051,550	35.74	349,936	50.94	344,391	41.50
2006	1,137,181	49.23	380,104	44.90	375,824	58.05
2007	1,238,163	33.37	422,681	45.96	418,593	43.19

Source: Adapted from Oredein and Awodum, 2013, 50

From the above table, the years and subjects that about 40 percent to 50 percent pass rate can be considered to have performed well, while the below 40 percent passes performed below average.





What is School Climate?

School climate characterizes the organization of the school building and classroom level. It refers to the “feel” of school and can vary from school to school within the same district. School climate reflects the physical and physiological aspect of the school that are more susceptible to change that provide the preconditions necessary for teaching and learning to take place. School climate is a significant element in discussion about improving academic performance and school reforms. It is also mentioned in discussion of potential solution to problem such as bullying inter-student conflicts, suicide character education (Best Practice Briefs, 2004). The school climate is thus the physical and social setting of the school, including school infrastructure, teachers, school administrators, students/pupils and the environmental conditions

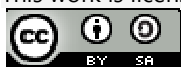
There are various factors that can inhibit quality school environment or climate; these include;

- Poor working environment
- The topography of the school climate
- The location of the school
- Poor infrastructural design
- Excessive flooding on land base school schools.

According to Akporehe (2011), it is observed that many Nigerians avoid sending their wards to public secondary school because the products of such school are greater victims of the inability to read and write due to poor working environment. Studies also reveal and observed that secondary school teachers in the public or government owned school have stories of woes to tell as regard their poor work environment which includes factors like;

- Irregularities in the payment of their salaries and allowances.
- They are dissatisfied with the infrastructural facilities in school.
- Equipment and general environment
- Nkpodia (2006) also observed that in any educational arrangement, the success lies in the commitment of the teachers, but in Nigeria, as opined by him, teachers who are the shapes of civilization are affected by (low self-esteem and poverty) which include dilapidated school building, leaking and ill ventilated school buildings with broken window panel and defective walls, muddy and sandy floor.

Land based school has a great effect on the school climate unlike the riverine part of a state that not easily accessible by road. Thus the location has given rise to factors like over population in admission, refusal of transfer by teachers, over-crowded classroom, and overstretched facilities such as conveniences. As opined by (UNESCO 2006) school climate is an integral and indispensable component of teaching and learning and the world at large. Indeed, no meaningful teaching and learning can take place in an environment that is not conducive and safe to both learners and teachers. It is therefore imperative that educational stakeholders foster safe and





secure school environment to facilitate increased learner's enrolment, retention and completion and hence attainment for quality education.

What is Climate Change?

According to the World Meteorological Organization, climate is the statistical description (mean and variability) of surface weather conditions such as temperature, precipitation, and wind over a period of 30 years. 'Climate change is a statistically significant and persistent (decades or longer) variation in the mean state or variability of climate' (Butler and Gates, S 2012:26). According to Ibaba (2012):

Climate change is seen as variation in the Earth's global or regional climates overtime as a result of natural variability or anthropogenic factors, caused by increasing concentrations of greenhouse gases¹ (GHG) in the atmosphere. Carbon dioxide or CO₂ is largely blamed for this warming. Other important greenhouse gases include water vapour (H₂O_v), chlorofluorocarbons, methane, nitrous oxide, ozone, and halocarbons, which is more commonly associated with the ozone layer and ultraviolet radiation released from landfills and agriculture, and the loss of plants that would otherwise store CO₂. The increasing concentration of chlorine and bromine atoms which originates from man-induced emissions of chlorofluorocarbons (used in air conditioners, refrigerators, aerosols, foams, and sterilants) and haloes (used in fire extinguishing equipments) significantly contributes to global warming by exacerbating the thinning of the ozone layer meant to shield the planet from excessive heat. These GHG trap the heat in the atmosphere by preventing terrestrial re-radiation from escaping into space; thereby continuously warming the atmosphere (GLCA, 2009; Onuoha & Gerald, 2010). It is estimated that CO₂, CFC, CH₄, and N₂O contribute 55 percent, 24 percent, 15 percent, and 6 percent respectively to global warming (Efe, 2010, p. 4)

Climate change effects include high and unpredictable rainfall, desertification, flooding, among others. These effects impact on the environment in different ways. An example is provided below

¹They are called greenhouse gases because they display effects similar to that in a 'greenhouse'. The glass in a 'greenhouse' allows the sunlight to pass through but trapping the heat formed and preventing it from escaping, thereby causing a rise in temperature.





Table 1: Environmental Problems linked to Climate Change in the Niger Delta

Climate Change Effect	Type of Environmental Problem	Impact on Environment
Sea Level Rise	(a)Coastal/ river bank erosion	(i) Loss of coastal vegetation (ii) Destruction of settlements and economic infrastructure such as oil pipelines (iii) Destroys farmlands, crops, and economic trees (iv) Removes top soil
	(b)Coastal Flooding	(a) Enhances the Intrusion of sea water into fresh water sources. (ii) Increases the salinity of surface and underground water (iii) Worsens erosion (iv) Removes top soil (v) Destroys settlements and infrastructure such as roads (vi) Destroys farmlands and crops
Change in Rain Fall Pattern	Makes the dry and rainy seasons unpredictable	Disrupts agricultural activities and reduces crop yield

Source: Adapted from Uyigue&Agho, 2007, pp.8-12; Efe 2010, pp.2-3; Onuoha& Gerald, 2010, pp.11-19

The effects of climate change destroy the environment and infrastructure in a manner that impacts negatively on socio-economic development. The literature has for instance provided information on how climate change impacted on the 2015 Millennium Development Goals (MDGs) as shown in Table 2 below. Table 3 provides further information on climate change impact on poverty.

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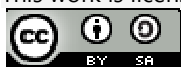




Table 2: Implications of Climate Change for the MDGs

MDGs	Targets	Effect of Climate Change
Eradicate extreme poverty and hunger	(a) Halve, between 1990 and 2015, the population whose income is less than US \$ 1 per day (b Halve, between 1990 and 2015, the proportion of people who suffer from hunger	Food security jeopardised; more intense disasters threaten livelihoods.
Achieve universal primary education	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete full course of primary school	More vulnerable livelihoods mean more children engaged in employment; infrastructure damage from disasters.
Promote gender equality and empower women	Eliminate gender disparities in primary and secondary education, preferably by 2015, and at other levels of education not later than 2015	Women make up two-thirds of world's poor and are more adversely impacted by disasters.
Reduce child mortality	Reduce under-five mortality by two-thirds by 2015	Children more vulnerable to malaria and other diseases, which are spread more widely by climate change.
Improve maternal health	Reduce the maternal mortality ratio by three-quarters between 1990 and 2015	Pregnant women particularly susceptible to malaria.
Combat HIV/AIDS, malaria and other diseases	(a) Halve halted by 2015 and begin to reverse the spread of HIV/AIDS	Increased prevalence of mosquito-borne diseases.
Ensure environmental sustainability	(a) Integrate the principle of sustainable development into country policies and	Climate change indication of unsustainable practices. Move towards more energy-efficient





	<p>programmes and reverse the loss of environmental resources.</p> <p>(b) Halve by 2015, the proportion of people without sustainable access to safe drinking water and sanitation.</p> <p>(c) By 2020, achieve a significant improvement in the levels of at least 100 million slum dwellers</p>	models of consumption
Promote global partnerships for development	<p>(a) Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term</p> <p>(b) Address the special needs of the least developed countries, including through more generous ODA(official development aid) for countries committed to poverty reduction</p> <p>(c) In cooperation with the private sector, make available the benefits of new technologies, especially for information and communication</p>	Wider forums must acknowledge the role of climate change in impacting MDGs.

Source: Adapted from Mitchell & Tanner, 2006, p.8; UNDP, 2006, P. 43-44





Table 3: The Impacts of Climate change and Implications for Poverty

Effects of Climate Change	Environmental, Economic and Health Implications	Socio-Health	Impact on Poverty
Increased temperature and changes in precipitation	Reduced agricultural and natural resources		(i) Lowered industrial output and labour productivity, high inequality, impacts on trade, and fiscal and macro-economic burdens lead to reduced economic growth , and poverty reducing effects (ii) Reduced productivity and security of poor people's livelihood assets , and reduced access for the poor to their livelihood assets (iii) Less effective coping strategies among the poor, and increased vulnerability of poor
Change in precipitation, run-off and variability	Greater water stress		
Increased incidence or intensity of climate related disasters	Damage to assets and infrastructure		
Temperature, water and vegetation changes	Increased prevalence of diseases		

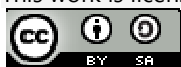
Source: Adapted from Mitchell & Tanner, 2006, p.8

These impacts, in addition to unfriendly environmental conditions undermine the motivation of teachers, and subsequently affect their input and academic performance of students.

Statement of Problem

The impact of climate change on the environment is partly influenced by the topography which determines the type of vulnerability the area suffers and its implications for school environment. But this issues as it relates to Bayelsa State has not been given much attention. However, the location of the state makes such a study imperative. Bayelsa state is located between latitude 4⁰ 151 and 5⁰ 231 South and longitude 5⁰ 221 West and 6⁰ East (State government report, 2007.7) with population of over 1.7 million people. The state is crisscrossed by several rivers and creeks and has the Ijaw as the indigenous inhabitants. The State is divided into eight local governments areas (Brass, Ekeremor, Kolokuma,/Opokuma, Nembe, SagbamaOgbia, Yenagoa, South-Ijaw Local government that have been split into 32 rural development areas and eight development centres.

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The state lies within the rainforest Zone, with a humid equatorial climate and mean annual rainfall ranging from 2000 – 4000.,and altering rainy (March to November) and dry (December to February) seasons. Featuring a short dry period between July and September, (August break).The maximum temperature average 30⁰c with a relative humidity between 55 and 90 percent depending on the season and location. Bayelsa state is drained by the distribution of the Niger/Benue rivers system, emptying into the Atlantic Ocean on its lower border of 185km coaster.

Objective of Study

The objective of this paper is to examine the impact of climate change on school climate in Bayelsa State. The specific objectives include:

1. To determine the relationship between climate change and school environment in Urban and rural schools in Bayelsa State
2. To determine the impact of school climate on the job performance of teachers in Urban and rural schools in Baylsa State
3. To determine the impact of school climate on the academic performance of students in Urban and rural schools in Bayelsa State.

Research Questions

1. What is the relationship between climate change and school climate in Urban and Rural areas of Bayelsa State?
2. What is the impact of school climate on the job performance of teachers in Urban and Rural Areas of Bayelsa State?
3. Does school climate affect the academic performance of students in Urban and Rural areas of Bayelsa State?

Methodology

The design for the study is a correlational survey. It involved a study which aimed at assessing the quality of teachers and students academic performance in ssecondary schools in Bayelsa State. Such research tends to collect data, tabulating, describing, analyzing and interpreting them to ascertain relationship among variables.

The sample of this study was drawn from secondary school principals and teachers in Bayelsa State. It was based on simple random sampling techniques method and this was chosen because it focuses on the process of selecting q sample in such a way that identifies the groups in the population which are represented in the sample of the same proportion as they exist in the population. Three research instruments were developed and used to collect relevant data for the study. They are document analysis, observation schedule and questionnaire titled “Teachers and Students Academic Performance questionnaire” (TSAPQ) was used for the study.





The respondents were expected to indicate the quality of teachers and students academic performance and it was designed after carefully reviewing some literature relating to the study.

Instrumentation

Three research instruments were developed and used to collect relevant data for the study. They are document analysis, observation schedule and questionnaire titled “Teachers and Students Academic Performance questionnaire” (TSAPQ). The respondents were expected to indicate the quality of teachers and students academic performance and it was designed after carefully reviewing some literature relating to the study.

The weight of the responses for research questions 1 - 5 were as follows:

1. SA = Strongly Agree = 4
2. A = Agree = 3
3. D = Disagree = 2
4. SA = Strongly Disagree = 1

$$\text{The criterion scale} = \frac{4 + 3 + 2 + 1}{4} = \frac{10}{4} = 2.5$$

Any item that is less than the criterion mean was accepted while items above the criterion mean of 2.5 was rejected

Method of Data Analysis

The research questions 1- 7 were answered using the mean scores, standard deviation and rank order and one way analysis of variances (ANOVA) used to answer research question 1-3

Results and Findings

Research Question One

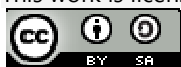
What is the relationship between land topography and school climate in Urban and Rural Areas of Bayelsa State?





Table 1: Showing the mean scores and standard deviation (SD) of principals and teachers on the relationship between climate change and school climate

S/ N	Questionnaire Items	Principals					Teachers					Cumulative Mean	Rank Order	Remarks
		Urban		Rural		Total	Urban		Rural		Total			
		\bar{X}	SD	\bar{X}	SD	$\Sigma\bar{X}$	\bar{X}	SD	\bar{X}	SD	$\Sigma\bar{X}$			
1.	Flooding destroys school infrastructure	2.53	1.59	2.68	1.64	2.61	2.68	1.64	2.73	1.65	2.71	2.67	7 th	Accepted
2.	Erosion Destroys school Infrastructure	2.74	1.66	2.73	1.65	2.74	2.57	1.60	2.89	1.70	2.73	2.75	4 th	Accepted
3.	Difficult access by transportation reduces teacher motivation	3.18	1.78	2.67	1.65	2.93	2.68	1.63	2.63	1.62	2.83	3.21	5 th	Accepted
4.	Cost of infrastructure results in inadequate classrooms and overcrowding	3.22	1.79	3.18	1.78	3.20	2.59	1.61	2.68	1.68	2.63	2.91	1 st	Accepted
Aggregate Mean														





The average mean scores was 2.75 and the criterion mean scores was 2.50. Since the calculated average mean scores is greater than the criterion mean scores ,we rejected, this implies that there is a significant relationship between land topography and school climate in urban and rural schools in Bayelsa State.

Research Question Two

Does school climate affect the academic performance of teachers in urban and rural schools in Bayelsa State?

Table 4: Showing the mean scores and standard deviation (SD) of principals and teachers on the relationship between school climate and academic performance of teachers

S/N	Questionnaire Items	Principals					Teachers					Cumulative Mean	Rank Order	Remarks
		Private		Public		Total	Private		Public		Total			
		\bar{X}	SD	\bar{X}	SD	$\Sigma\bar{X}$	\bar{X}	SD	\bar{X}	SD	$\Sigma\bar{X}$			
1.	Flooding disrupts academic calendar and affects teacher output	2.53	1.59	2.68	1.64	2.61	2.61	1.62	2.71	1.64	2.66	2.66	4 th	Accepted
2.	High cost of transportation reduces teacher attendance in schools	2.64	1.62	2.74	1.66	2.69	2.72	1.65	2.89	1.70	2.81	2.69	3 rd	Accepted
3.	Destruction of school infrastructure limits learning	2.77	1.66	2.53	1.59	2.65	2.53	1.59	2.93	1.71	2.73	2.65	5 th	Accepted





4.	The swampy nature of the area and associated diseases keep teachers away from work	2.13	1.46	2.68	1.64	2.41	2.49	1.58	2.53	1.59	2.51	2.52	6 th	Accepted
Aggregate Mean														

The average mean scores was 2.75 and the criterion mean scores was 2.50. Since the Calculated average mean scores is greater than the criterion mean scores, we rejected this, meaning that there is a significant relationship between school climate and the job performance of teachers.

Research Question Three

Does school climate affect the academic performance of students in urban and rural schools in Bayelsa State?

Table 3: Showing the mean scores and standard deviation (SD) of principals and teachers on the relationship between school climate and academic performance of students

S/N	Questionnaire Items	Principals					Teachers					Cumulative Mean	Rank Order	Remarks
		Urban		Rural		Total	Urban		Rural		Total			
		\bar{X}	SD	\bar{X}	SD	$\Sigma\bar{X}$	\bar{X}	SD	\bar{X}	SD	$\Sigma\bar{X}$			
1.	Flooding disrupts calendar and results in loss of valuable learning hours	2.58	1.64	2.73	1.65	2.71	3.13	1.77	2.69	1.64	2.91	2.77	6 th	Accepted
2.	Water borne diseases keep students away from classes	2.74	1.66	2.97	1.72	2.86	3.24	1.80	2.53	1.59	2.89	2.85	5 th	Accepted





3.	Teachers stay away from classes with the excuse of high cost of transportation and flood	2.53	1.59	2.83	1.64	2.68	3.14	1.77	3.32	1.82	3.23	2.94	3 ^f _d	Accepted
4.	Valuable learning hours are lost to cleaning and rehabilitation of school compound and classrooms	2.90	1./2	2.69	1.64	2.83	2.69	1.64	3.42	1.86	3.05	3.04	2 ⁿ _d	Accepted
Aggregate Mean														

The average mean score was 2.73 and the criterion mean scores was 2.50. Since the calculated average mean score is greater than the criterion mean scores we reject this ,meaning that that there is a significant relationship between school performance and the academic performance of students

Conclusion

The paper examined the impact of climate change on the academic performance of students in Bayelsa State and concluded that the environmental degradation arising from climate change has undermined the quality of school climate; noting that this has contributed to unfavourable work environment that negatively affects the performance of students. The paper recommends aggressive environmental education as a policy option.

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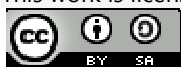
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