ENVIRONMENTAL VARIABLES AND ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENT'S IN BASIC SCIENCE IN CALABAR SOUTH LOCAL GOVERNMENT AREA OF CROSS RIVER STATE, NIGERIA

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ABSTRACT

The main purpose of this paper was to evaluate the extent to which Environmental variables influences secondary school students' academic performance in Basic Science in Calabar South Local Government Area of Cross River State. To achieve the purpose of this study, two research questions were posed and two null hypotheses were formulated and tested at .05 level of significance. Review of literature was carried out according to the sub-variables of the study. The study adopted the descriptive survey design. The population of the study is restricted to all junior secondary three (JSS 3) students in Calabar south L.G.A. of Cross River State with a population of 1830, comprising of 912 males and 918 females respectively. The instrument was "Basic Science Performance Test (BSPT)". Face and content validity of the instrument was done by the supervisors and three experts in Test and Measurement Department Faculty of Education University of Calabar. Kuder Richardson formula 20. (KR-20) was used to determine the reliability of the instruments. From the administered test (BSPT), data was organized and analysed using One-way Analysis of Variance (ANOVA). The findings of the study revealed that the two environmental variables used in the study significantly influences secondary school student's academic performance in Basic Science in Calabar South Local Government Area of Cross River State. The researcher recommends among other things that, the government should make science education free to motivate people to go into sciences discipline which is the bedrock of every economy.

KEYWORDS: Environmental variables, Academic performance, junior secondary school students, Basic Science, Cross River State, Nigeria.

INTRODUCTION

Science is gotten from the Latin word "scientia" meaning "knowledge".

It is hence a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. Science plays a major role in society, and even

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nonscientists can appreciate scientific progress. Because of science, human understanding of the past, present, and future is constantly in a state of flux. Time and distance have been empowered by science. Within a few hours, we are on the other side of the globe. The traditional ploughs and bullocks have been replaced by tractors making agriculture and cultivation an easier process and with science there is also a great improvement in medical sciences like the invitro fertilization that makes it possible for almost everybody to have a child (Esiobu, 2000).

Basic Science in Nigerian schools Science covers Biology, Physics and Chemistry and provides students with the key, or core, scientific ideas and theories. Science education plays a vital role in the lives of individuals and the development of a nation scientifically and technologically (Alebiosu & Ifamuyiwa, 2008). It is widely and generally acknowledged that the gateway to the survival of a nation scientifically and technologically is scientific literacy which can only be achieved through science education. To make her citizens show interest in science education, Nigerian government came up with a policy that 60% of the students seeking admission into the nation's universities, polytechnics and colleges of education should be admitted for science oriented courses, while 40% of the students should be considered for arts and social science courses (Ajibola, 2008). This government's effort cannot be said to have yielded much fruits given the dwindling nature of number of students seeking admission into science-oriented courses in the Nation's tertiary institutions. Integrated science is defined as a cumulative approach of scientific study that synthesizes the perspectives of the individual disciplines, and integrates them during all phases of the approach to a question or problem, with the results having an influence on policy and management decisions (Gallagher et. al. 2008).

Basic Science is a revolutionary introductory science curriculum developed at Princeton, intended for students considering a career in science. By breaking down traditional disciplinary barriers, a year-long course taken in the freshman year provides students with first-rate preparation for a major in any of the core scientific disciplines, and in such a way that helps retain the connections to the other disciplines. The curriculum is founded on the expectation that learning, physical and socio-economic environment and it plays a key role in quality of educational activities of students, as dynamic and living factor. In fact, in science communication, education is considered as a kind of providing information. In this view, student education not only is influenced by teacher speech, but also numerous other elements are involved in the transmission of the message to him.

According to education experts, in a systematic perspective, school environment and its constituent elements such as student-teacher relationship, teacher teaching method, equipment, etc. as well as other factors can have significant impacts on learners and students. Learning involves the experience of the environment. This environmental experience is in three broad settings, which are, home, the school and the society. The home is the child's first social setting and the parents, the first batch of significant adults that the child associates with (Isangedighi, 2010). The very nature of the family is a very important agency of education. This is because the specific purpose of the family is generation, development and or formation of the offspring. Since the family is the initial take off point of any human being, it then implies that the child's education must begin at home and extend to the society at large. The aim of this study was to investigating the impact of environmental factors (teacher-students relationship, teachers teaching method, parent-child relationship and parental education) on learning and academic achievement of secondary school students.

When teachers form positive bonds with students, classrooms become supportive spaces in which students can engage in academically and socially productive ways (Hamre & Pianta, 2001). Positive teacher-student relationships are classified as having the presence of closeness, warmth, and positivity (Hamre & Pianta, 2001). Students who have positive relationships with their teachers use them as a secure base from which they can explore the classroom and school setting both academically and socially, to take on academic challenges and work on social-emotional development (Hamre & Pianta, 2001). This includes relationships with peers, and developing self-esteem and self-concept (Hamre & Pianta, 2001). Through this secure relationship, students learn about socially appropriate behaviors as well as academic expectations and how to achieve these expectations (Hamre & Pianta, 2001).

The purpose and goals of science education are to, develop creativity in learners, improve scientific and technological literacy of citizens, and prepare citizens for an active contribution towards their own culture and to inculcate the spirit of scientific thinking in the learner. To be

effective in teaching, the teacher must adopt varying strategies to satisfy the varying capabilities of students. There is no single method that meets the entire child's requirement. The teacher needs a combination of methods in order to achieve the goal of a particular lesson especially in the area of sciences (Uche, 1998). American Association for Advancement of Science (1989) argued that, an understanding of science concepts and principles is crucial to developing scientific literacy and meaningful, productive careers which require people who have the ability to learn, reason, think, make decisions, and solve problems as well as engage in scientific discourse. These views have been echoed by National Research Council (1996) which indicates that, scientific literate persons are those who can think, ask questions, and provide logical and coherent answers to any situation in everyday experiences. Constructivist theorists as John Dewey believe that education must engage with and expand experience and that methods used to educate must provide for exploration thinking, reflection and interaction with the environment necessary and uphold democracy (Kliebard, 1992). This research study sought to find out if teachers at Rev. Muhoro School were aware of these goals and how the teaching strategies adopted in class were contributing on performance in sciences

The effect of these environmental variables on academic achievement on students in Basic science was investigated in this work. As a result of the broad variables involved, a few environmental variables like home and school factors was the major concern of this study. The study is therefore meant to answer the question, is there any significant influence of environmental variables on secondary school students academic performance in Basic science in Calabar south, Cross River State, Nigeria?

THEORETICAL FRAMEWORK
This study is anchored on the theory of classical conditioning by Ivan Pavlov (1904).
Ivan Pavlov (1849-1936) was a Russian scientist interested in studying how digestion works in mammals. He observed and recorded information about dogs and their digestive process. As part of his work, he began to study what triggers dogs to salivate. It should have been an easy study: mammals produce saliva to help them break down food, so the dogs should have simply began drooling when presented with food. But what Pavlov discovered when he observed the dogs were that drooling had a much more far-

reaching effect than he ever thought: it paved the way for a new theory about behavior and a new way to study humans. The people who fed Pavlov's dogs wore lab coats. Pavlov noticed that the dogs began to drool whenever they saw lab coats, even if there was no food in sight. Pavlov wondered why the dogs salivated at lab coats, and not just at food. He ran a study in which he rang a bell every time he fed the dogs. Pretty soon, just ringing a bell made the dogs salivate.

Pavlov said the dogs were demonstrating classical conditioning. He summed it up like this: there's a neutral stimulus (the bell), which by itself will not produce a response, like salivation. There's also a non-neutral or unconditioned stimulus (the food), which will produce an unconditioned response (salivation). But if you present the neutral stimulus and the unconditioned stimulus together, eventually the dog will learn to associate the two. After a while, the neutral stimulus by itself will produce the same response as the unconditioned stimulus, like the dogs drooling when they heard the bell. This is called a conditioned response. Think of an unconditioned response as completely natural and a conditioned response as something that we learn.

The basics of Pavlov's classical conditioning serve as a historical backdrop for current learning theories (William, Manning & Smith, 2001). However, the Russian physiologist's initial interest in classical conditioning occurred almost by accident during one of his experiments on digestion in dogs (Tarpy, 2005). Considering that Pavlov worked closely with animals throughout many of his experiments, his early contributions were primarily about animal learning. However, the fundamentals of classical conditioning have been examined across many different organisms, including humans (William; Manning & Smith, 2001). The basic underlying principles of Pavlov's classical conditioning have extended to a variety of settings, such as classrooms and learning environments.

Classical conditioning focuses on using preceding conditions to alter behavioral reactions. The principles underlying classical conditioning have influenced preventative antecedent control strategies used in the classroom (Mugulis, 2001). Classical conditioning set the groundwork for the present day behavior modification practices, such as antecedent control. Antecedent events and conditions are defined as those conditions occurring before the behavior (Mugulis, 2001). Pavlov's early experiments used manipulation of

events or stimuli preceding behavior (i.e., a tone) to produce salivation in dogs much like teachers manipulate instruction and learning environments to produce positive behaviors or decrease maladaptive behaviors. Although he did not refer to the tone as an antecedent, Pavlov was one of the first scientists to demonstrate the relationship between environmental stimuli and behavioral responses. Pavlov systematically presented and withdrew stimuli to determine the antecedents that were eliciting responses, which is similar to the ways in which educational professionals conduct functional behavior assessments. Antecedent strategies are supported by empirical evidence to operate implicitly within classroom environments. Antecedent-based interventions are supported by research to be preventative, and to produce immediate reductions in problem behaviors

By implication to this work, a poor environment may not provide stimulation and reinforcement that is needed for academic performance. Students should be active respondents to learning and the learning processes. They should be given an opportunity to actually behave or demonstrate learning. But when a behavior is learned it is easily displayed. Therefore drill, practice repetition of stimulus response habit can strengthen those habits. For example, some believe that the best way to improve reading is to have the students read more and more.

STATEMENT OF THE PROBLEM
Basic Science in Nigeria context treats scientific concepts in a manner free of the restrictions imposed by the arbitrary subject boundaries of the separate sciences. It has a dynamic process approach to the teaching and learning of science. Science is a body of knowledge characterized by unbiased observation and systematic experimentation. In all level of education and in any nation of the world science is the same but the teachings differ. There is no good foundation for teacher teaching science teaching in secondary school especially in the unit discipline under integrated science

Since introduction of Basic science into Nigeria secondary schools a lot of achievement has been made but at the same time there are many challenges like the presence of unqualified science teachers in secondary schools as one of such challenges. Science is different from all other disciplines and its teaching and curriculum must be different too. Akinola (2006) observed poor teacher's method of teaching and structuring of curriculum as problems of secondary science teaching. Uchenna (2005) affirmed that, the greatest challenge in education in Africa has been the question of curriculum development, especially science curriculum at all levels of education. Maduabum (1991) in a paper titled primary school science teaching in Nigeria: Other challenges include teacher student relationship, home environment and parents' socioeconomic status playing a role in influencing students' performances in science.

Sequel to the challenges above, the researcher was poised to investigate the influence of environmental variables on secondary school students' performance in Basic science in Calabar South Local Government Area Cross River State, Nigeria.

PURPOSE OF THE STUDY
The main purpose of this study is to investigate influence of environmental variables on secondary school students' performance in Basic science in Calabar South Local Government Area Cross River State, Nigeria.

METHODOLOGY
The study adopted a survey research design. The population of the study is restricted to all junior secondary students (JSS 3) in Calabar south L.G.A. of Cross River State. The study area has 30 secondary schools, with a population of 1830, comprising of 912 males and 918 females respectively.

The sample for the study consisted of ten (10) schools; one hundred and fifty junior secondary school students were used for the study. From each junior secondary school, 15 sampled students were taken, making a total sample of 150 used for the study. The brake down of study sample is shown in Table 1.

TABLE 1: Sample distribution by gender

S/N	Name of School	Total	Male	Female	Total
1.	Calabar Academy, Mayne Avenue	200	7	8	15
2.	Modern Comprehensive Collage Ekpo Abasi	200	7	8	15
3.	Government Technical College Mayne Avenue	200	7	8	15
4.	Holy Child Secondary School Goldie	200	7	8	15
5.	Government Science School Idang	200	7	8	15
6.	Pin Margaret Commercial Secondary Sch. Atakpa	200	7	8	15
7.	Duke Town Secondary School Henshaw Town	200	7	8	15
8.	Government secondary School Anantiga	200	7	8	15
9.	Government Science School Atu	200	7	8	15
10.	Government Secondary School Atu	200	7	8	15
Total		1,830	70	80	150

The instrument used in collecting data is Basic Science Performance Test (BSPT) to test students' academic performance.

Research questions

1.   Is there any significant influence of teacher-students' relationship on students' academic performance in Basic science in Calabar South Local Government Area Cross River State, Nigeria?

2.   How does teaching method influence students' academic performance in Basic science in Calabar South Local Government Area Cross River State, Nigeria?

Research hypotheses

1.   There is no significant influence of teacher-students' relationship on students' academic performance in Basic science in Calabar South Local Government Area Cross River State, Nigeria

2.   There is no significant influence of teacher's teaching method on students' academic performance in Basic science in Calabar South Local Government Area Cross River State, Nigeria

Presentation of result

The data in both variables wear analysed using One-way Analyses of Variance (ANOVA), at .05 significant level and 2 and 147 degrees of freedom

Hypothesis 1 There is no significant influence of teacher-students' relationship on students' academic performance in basic science in Calabar South Local Government Area Cross River State, Nigeria. Result presented in Table 2.

Table 2: ANOVA analysis on influence of teacher-students' relationship on basic science performance

S/N	Teacher-Students' Relationship	N	$\overline{X}$	Sd	
	Variable				
	Low	39	7.11	2.93	
	Average	53	8.42	3.85	
	High	58	6.32	2.63	
	Total	150	5.62	3.14	
	Source of Var	SS	Df	Ms	F-cal
	B/W Group	683763	2	418.82	
	Within Group	368002.10	147	160.45	4.62*
	Total	1051765.1	149		

*Significance of groups at p<05, df=2 and 147, crit f=3.20

From table 2, it could be observed that the calculated F-value of 4.62 is higher than the critical f- value of 3.20, required for significance at 0.05 level with 2 and 147 degree of freedom. The null hypothesis is therefore rejected. Implying that teacher-students' relationship does not influence students' academic performance in basic science in Calabar South Local Government Area of Cross River State, Nigeria.

Hypothesis 2: There is no significant influence of teacher's teaching method on students' academic performance in basic science in Calabar South Local Government Area Cross River State, Nigeria

The independent variable in this hypothesis is teacher teaching method. The dependent variable in this hypothesis is students' academic performance in basic science. One way analysis of variance (ANOVA) was the statistical tool used for this data analysis. Result of the analysis is presented in Table 3.

TABLE 3: One-way analysis of variance of the influence of teachers' teaching method on students' performance in basic science

S/N	Teachers Teaching Methods	N	$\bar{\text{X}}$	Sd	
	Variable				
	Poor	35	7.11	2.93	
	Fair	65	8.42	3.85	
	Good	50	6.32	2.63	
	Total	150	5.62	3.14	
	Source of Var	SS	Df	Ms	F-cal
	FRCP b/w Group	683763	2	418.82	
	Within Group	368002.10	147	160.45	4.53*
	Total	1051765.1	149		

*Significance of groups at p<05, df=2 and 147, crit f=2.30

From Table 3 above, it could be observed that the calculated F-value of 4.53 is higher than the critical F-value of 3.20, required at 2 and 147 degree of freedom respectively. The null hypothesis is therefore rejected. Implying that, there is a significant influence of teachers' teaching method on students' academic performance in basic science.

DISCUSSION OF FINDINGS
• **Teacher-students' relationship and students' academic performance in basic science**
The result of hypothesis one show that there is indeed a significant influence of teacher-students relationship on students' performance in integrated science. The conclusion was sequel to the fact that F-calculated value of 4.62 is higher than F-crit. of 3.20 tested at .05 sig. level and 2 and 147 df. Thus the null hypothesis was rejected and the alternate hypothesis retained meaning that there is a significant influence of teacher-students relationship on students' performance in integrated science.
This finding is in line with Asuquo (2010), who explains that clear understanding of the behavior of teacher and students towards one another will certainly improve their interactions and ultimately teaching and learning activities. This is because relationship with students is an important feature of a teacher's life and may exert a considerable influence on their classroom behavior. Although most research regarding teacher-student relationships investigate the elementary years of schooling, teachers have the unique opportunity to support students' academic and social development at all levels of schooling (Baker et al., 2008).
• **Teacher teaching methods and students' academic performance in Basic science**
The result of hypothesis one show that there is indeed a significant influence of teachers teaching method on students' performance in basic science. The conclusion was sequel to the fact that F-calculated value of 4.53 is higher than F-crit. of 3.20 tested at .05 sig. level and 2 and 147 df. Thus the null hypothesis was rejected and the alternate hypothesis retained meaning that there is a significant influence of teachers teaching method on students' performance in basic science.

This finding is in line with American Association for Advancement of Science (1989) argued that, an understanding of science concepts and principles is crucial to developing scientific literacy and meaningful, productive careers which require people who have the ability to learn, reason, think, make decisions, and solve problems as well as engage in scientific discourse. These views have been echoed by National Research Council (1996) which indicates that, scientific literate persons are those who can think, ask questions, and provide logical and coherent answers to any situation in everyday experiences.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:
1.   Teacher-students relationship should be more cordial to give every student equal opportunities to learn.
2.   The teacher should be given on job training through compulsory seminar/workshops on the new improve methods of teaching sciences to enhance their teaching and promote students understanding of science concepts.
3.   Parents should be more concerned about their children educational welfare and be ready to advise them and solve their finances problem
4.   Finally, the government should make science education free to motivate people to go into sciences discipline.

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