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HOME RELATED SCIENCE ACTIVITIES AND ITS ENHANCEMENT OF STUDENTS' ACADEMIC PERFORMANCE IN BASIC SCIENCE IN RIVERS STATE, NIGERIA.

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Abstract

The study investigated the home related science activities, its enhancement in of students' academic performance in Basic science concepts. The concepts considered were heat energy, ecology and mixtures. The sample consisted of two hundred and forty (240) Basic Junior Secondary School Two (JSS 2) students drawn from a population of five thousand and seventy-six (5,076) students in two Local Government Areas of Rivers State. A quasi-experimental design with a pretest, post-test and control group design were adopted. The data was analyzed using means, standard deviations, t-test and analysis of variance (ANOVA). The results showed that home related science activities enhanced students' academic performance in Basic Science concepts better than utilizing only school science or classroom activities. It was also revealed that gender and the interaction between gender and approach were not significant. It was recommended among others that teachers while teaching science should domesticate their teaching of science by citing relevant examples from the home background of the students to enhance performance.

Keywords: Home Related Science activities, enhancement, academic performance, Basic Science.

INTRODUCTION

Science remains the bedrock upon which technological development is built. Its importance cannot be overemphasized as it permeates in all 'nooks and crannies' of our daily lives and activities. According to Jegede (1983), the development of science and technology have so greatly affected the lives of every human being as such to be ignorant of this basic knowledge is to live an empty, meaningless and probably an unrealistic life'.

In another vain, Simpson and Anderson (1981: p5) painted a picture of how science influences our lives by saying that:

> *Science influences every aspect of our lives, what we eat and what we wear, what we do as work and what we do as play; what we think and what we feel, even how we are born and how we die, few moments in our lives are untouched by the products of and processes of science.*

While Brown and Sarentiz (1991) in Akpan (2008) emphasized that those nations at the forefront of modern development, are those that have invested enormous resources over a considerable time in three major areas as follows:

1. Establishment and nurturing of a very stable and well supported science and technology system.
2. Promotion of mission-oriented research in Basic Sciences, backed up with a long term strategy for technological development.

3. Building institutions where well-articulated programs are in place for the education of a large scientifically and technologically literate workforce.

It is in recognition of this indispensable role of science to national development that the Federal Government of Nigeria in its (1999) constitution stated in clear terms that, government shall promote 'science and technology' in all its ramification.

Among other measures taken by government to promote science and technology include: the establishment of special schools of science across the country and a body to promote science and mathematics in secondary schools. In addition to this, most science education researchers according to Ahiakwo (2006) are also working tirelessly in finding ways of making science students learn various science disciplines meaningfully. Similarly, Inyang and Mkpanang (2004) in their study of science education trend in Nigeria reported that between the years (1982 and 2003), the focus of Science Teachers Association of Nigeria (STAN) journal articles and conference proceedings had been in the areas of science teaching and learning methods. All these were added impetus to Government's effort at promoting the development of science and technology.

National Policy on Education (2014) reported that the admission into technology and business courses should be weighed in the ratio of 70:30, jamb scores 3:4 while scholarship of students should be 40:60 from the on-going deliberation it could be

gathered that the educational system of this country, science and technology is given upper hand in all form of ramification because of its importance.

The constructivist principle provides a frame-work of learning in which the learner constructs meaning based on previous experiences. It is according to Okebukola (2002), a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in. Learning therefore is simply a process of adjusting our mental models to accommodate new experiences.

Incidentally, there are various practices which are carried out in the homes where children live and many of which have some scientific and technological implications that will fast track the teaching and learning of school science and technology. Ahiakwo (2006) called them home sciences which are students' construct which come from their homes and environmental experiences. Therefore, science should not be presented as an abstraction but be made concrete between what is experienced at home and what is learned in the schools.

Obviously in Nigeria, there are as a matter of fact, profound indicators that performance of our country's students echo a dismal message of lack luster performance in scientific, technological, engineering and mathematical (STEM) disciplines, underscoring therefore, a tremendous lack of understanding and appreciation about the importance of strengthening scientific, technological, engineering and mathematical (STEM) concepts and skills by our policy makers.

1.1 Statement of Problem

Apparently, students' poor performances in the sciences have been attributed to the teaching method adopted by teachers. Studies have shown that majority of science teachers use the traditional lecture method (Shaibu and Usman 2004, Usman, 2000, Ali 1997). The traditional lecture method according to Ali (1997), involves the teacher telling his students what he thinks they need to know and the students listening and copying what they think the teacher needs them to know Gbamanja (1991), re-echoed that there is hierarchy of activities which some teacher normally refer to as teaching. These activities are:

1. cheating
2. telling
3. informing
4. instructing teaching
5. inspiring

it is said that:

> *a non-teacher cheats a poor teacher tells, an average*
> *or mediocre teacher informs a good teacher*
> *teaches an excellent teacher inspires.*

Gbamanja (1991) continues that if a science teacher goes to class unprepared and without an organized note of lesson and he uses the entire period telling irrelevant

stories to the students, he is cheating if the teacher dispenses facts to the learners instead of exposing them to problem-solving and inquiry, he is telling.

If the teacher communicates not only knowledge of specific facts but he also gives knowledge of ways and means of dealing with the specific facts, then he is informing the learners. Some science teachers go beyond knowledge to their comprehension translation, interpretation and extrapolation. This is teaching. But a few excellent science teachers will still do more than just teaching. They will proceed to the levels of application, analysis synthesis and evaluation of knowledge with inspiration.

From the above citation, it could be noted that the three categories of activity, science teachers do is not the real teaching and cannot drive the home related science activities to the school science teaching as to enhance students' performance in Basic science. These cheating, telling, informing teachers are mostly found in the primary and post primary schools where a good foundation should have been laid for the growth of science and technology development which the home related science activities should enhance school science learning.

Similarly, Oyedeji (2010), had lamented that Nigeria remains an underdeveloped economy principally because of the unsatisfactory status of her science education especially in the primary and junior secondary schools. He further asserts that relevant statistical details on primary science show that there is crisis in the area of science teaching. For instance, Oloruntegbe and Ikpe (2008), found out that the poor performance of students in chemistry was due to the inability of students to relate

chemistry concepts learnt in school to daily home activities and the inability of teachers to cite relevant home examples and illustration while teaching. Hence a gap exists between science lessons in the school and home activities. And so the pressing need for high-quality teaching and learning demands a vigorous response that would emphasize domestication of science curriculum content to learner's environment.

1.2 Purpose of Research

The purpose of this study therefore, is to explore and utilize scientific activities in Nigerian homes in teaching some basic and environmental science concepts.

1.3 Research Questions

The following research questions were posed.

1) To what extent do home science activities influence students' performances on the concepts of heat, ecology and

mixtures?

2) What difference exists between boys and girls in their performances on the concepts, heat, ecology and mixtures when home related science activities are utilized?

1.4 Hypotheses

The following hypotheses were tested at 0.05 level of significance.

HO_1: There is no significant influence of home related science activities on students' performance on the concepts heat energy, ecology and mixtures compared with those taught with school science activities.

HO_2: There is no significant difference in the performance of boys and girls taught the concepts of heat energy, ecology and mixture utilizing home related science activities and school science activities.

2. Research Methodology/Design

The study was a quasi-experimental research with pretest, posttest and control group design.

2.1 Population of the Study

The population of this study comprised all the five thousand and seventy- six (5,076) Junior Secondary School students (JSS11) in two Local Government Areas in Rivers State. The two Local Government Areas are Etche and Omuma that are geographically contiguous.

2.2 Sample and Sampling Technique

The sample consisted of two hundred and forty (240) Junior Secondary School students (JSS 11) from four intact classes drawn from four schools from the two local government areas (Etche and Omuma) selected for the study. A criterion sampling

technique was adopted in selecting the four secondary schools among the five hundred and eight-nine (589) Junior Secondary School students in the study area, based on the conditions that the schools must be coeducational and must have at least two streams of not less than thirty students each. For the local government area that has more than one representative, school random sampling which involves balloting. In each school, there was an experimental group as well as a control group made through randomization.

2.3 Instrumentation

The instrument for data collection was a Home Science Performance Test (HSPT) developed by the researcher. HSPT comprised of forty -five items on the concepts heat energy, mixtures and ecology. The instrument contains three sections; A, B and C with each section having ten multiple choice items and five essay questions. Lesson packages on each of the concepts consisting of procedural steps for teaching were also developed by the researcher.

The face and content validity of the instruments was done by experts in measurement and evaluation and Basic science teachers. A reliability coefficient of 0.70 was obtained through split-half method and calculation with Spearman rank order correlation coefficient.

2.4 Research Procedure

Home science performance test was administered to both experimental and control groups as pretest. The regular Basic Science teachers in the schools were used as research assistants. They were trained on the uses of the lesson packages for a duration of two weeks.

The experimental groups were exposed to the use of home science related activities while teaching the concepts. This was done through citing relevant examples from home and use of analogies relating home related science concepts to school science. The control group was also exposed to the same content. The teaching in this group involve the use of school science activities without the application of home related science activities that have direct bearing on the environment of the respondents. The teaching lasted for four weeks at which HSPT was reshuffled and administered as post- test to both groups.

2.5 Data Analysis

The research questions were analyzed using means and standard deviations while the hypotheses were tested at 0.05 level of significance using t-test and analysis of variance (ANOVA).

3. Results

Table 1. Pretest and posttest mean and standard deviation scores of experimental and control groups on the concepts.

Group	Test	N	Mean	SD	Gain score

Experimental	Pre test	120	24.92	13.300	33.45
	Post test	120	58.37	11.946	
Control	Pre test	120	22.42	10.432	20.88
	Post test	120	43.30	9.275	
Total		240			

Table 2. Comparison of the posttest mean scores of boys and girls on the concepts for the control and experimental groups.

Group	Gender	N	Mean	SD
Experimental	Boys	60	58.02	11.527
	Girls	60	58.71	12.374
	Total	120	58.37	11.946
Control	Boys	60	43.88	8.450
	Girls	60	42.72	10.022
	Total	120	43.30	9.275
Total	Male	120	50.95	12.328
	Female	120	50.72	13.803
	Total	240	50.83	13.078

Table 3. t-test comparison of achievement scores of students according to treatments

Group	N	Mean	SD	df	t	Sig.

Experimental	120	58.37	11.946	248	22.831	.000 *
Control	120	43.30	9.275			

Sig. at 0.05: - Significant; * = significant

Table 4. A-2-way analysis of variance on the effect of gender on achievement scores by treatments.

Source	Sum of squares	df	Mean square	F-ratio	Sig
Corrected model	41009.782	3	13669.927	119.427	.000
Intercept	1860601.668	1	1860601.668	16255.041	.000
Group	40845.735	1	40845.735	356.846	.000 *
Gender	10.035	1	10.035	.088	.767 ns
Group & Gender	154.013	1	154.013	1.346	.246 ns
Error	81955.550	716	114.463		
Total	1983567.000	720			
Corrected Total	1222965.332	719			

Significant at 0.05; NS-Not significant; * - Significant

Research Question 1: To what extent do home science activities influence students' performances on the concepts of heat, ecology and mixtures?

The result from Table 1shows that after treatments, there was improvement in performances for both the control and experimental groups. However, the experimental group had a higher mean of 58.37 and a gain score of 33.45 than the control group with a mean of 43.30 and gain score of 20.88 respectively.

Research question 2: What difference exists between boys and girls in their performances on the concepts of heat, ecology and mixtures when home related science activities are utilized?

Table 2 shows that girls in the experimental group had slightly higher mean scores than the boys. However, the mean difference was very small, being (0.64). For the control group, the difference was the case as boys had higher mean scores than the girls with a mean score difference of 1.16 in their favour.

H_{O1}: There is no significant effect of home related science activities on students' performances on the concepts of heat,

energy, mixtures and ecology compared with those taught with school science activities.

Result from the table shows that the experimental group performed better than the control group as reflected in their mean scores with the experimental group having a mean score of 58.37 and the control group 43.30 respectively. The t-test value obtained 22.831 was found to be significant. Therefore, the H_{O1} was rejected.

H_{O2}: There is no significant difference in the performance of boys and girls taught the concepts of heat energy; ecology and mixtures utilizing home related science activities and school science activities.

Result from Table 4 revealed that the performance of boys and girls did not differ significantly perform as the value of .088 was not significant. Therefore, the null hypothesis was upheld. The interaction between group and concept was also not significant.

4. Discussion of Findings

Evidence from the findings of this study shows that teaching Basic Science through the use of home science related activities; a process referred to as "domestication" of science curriculum content enhanced students' academic performance better than teaching classroom science activities without reference to students' local/domestic experiential background. It therefore supports Olomintegbe and Ikpe (2008) earlier findings that home activities can provide a veritable source of meaningful learning and teaching of science. It also laid credence to Ukwungu (2002) stance that western science is alien in nature, but the incorporation of ideas, objects and materials within the child's immediate environment into its instructional process and the use of such ideas in the clarification of scientific process will invariably boost interest in science. And accordingly, contradicts Adegbite, (1953), Levy-Bruhl and Clare, (1992) in Abonyi (2002) views that indigenous knowledge is primitive and therefore generates more conflict in learners when they are incorporated into science instruction.

The findings also revealed that the effect of gender on students' performance was not significant. Meaning that gender as a single factor did not produce large variation in the performances of students in agreement with Abonyi (2002, Ukwungu, 2002, Akinsola, 2002) findings. However, as indicated in Table 2 the girls had a slight higher performance than the boys in the experimental group, while the boys had a higher mean score than the girls in the control group in line with Spindler (1983) cited by Abonyi (2002) that females will benefit more from instruction that incorporates culture and totality of the environment.

Table 3 shows that there was no significant interaction between gender and teaching approach on students' performances on the concepts. This gives an indication that teaching basic science concepts using home related science activities is superior to teaching through science classroom activities at the two levels of gender in enhancing students' performances. This also supports Abonyi (2002) findings. If home science related activities are utilized in science teaching both boys and girls will compete favorably.

What do you suggest

1. I suggest that basic science teachers should domesticate their teaching
2. More of experimental method and play way method should be used to teach them hence this enhances their understanding

3. Teachers of basic science should encourage their students to bring local materials from their home as these will accelerate, relate their previous knowledge and the new knowledge

5. Conclusion

The results showed that home related science activities enhanced students' performance in basic science concepts better than utilizing only school science or classroom activities. It was also revealed that gender and the interaction between gender and approach were not significant. It was recommended among others that teachers while teaching science should domesticate their teaching of science by citing relevant examples from the home background of the students to enhance performance.

Recommendation

Teaching basic science concepts using home related science activities improves performance for both boys and girls.

The findings of this study have far reaching implication for various stake holders in education industry. It is therefore recommended that:

1. Parents should encourage their children to engage in domestic chores.
2. Teachers should teach science citing relevant examples from home experiences.
3. Indigenous authors should include in their texts, examples tailored to the home background of students.

4. Curriculum planners should select learning experiences directly from the home context of the learners in line with the principles of content domestication.
5. Teacher of Basic Science should be trained and retrained on the use of home related science activities to school science teaching in most of her seminars/conferences.

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