STIMULATING STUDENTS' INTEREST IN BASIC SCIENCE USING SCIENCE, TECHNOLOGY, SOCIETY-APPROACH IN ANKPA LOCAL GOVERNMENT AREA OF KOGI STATE

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Abstract
The study focuses on stimulating students' interest in basic science using Science, Technology, Society (STS)-approach in Ankpa Local Government Area of Kogi State. Two research questions and two hypotheses guided the study. The design of the study was a quasi-experimental design. The population of the study comprises all Junior Secondary School II students in 15 co-educational schools in the area of the study. Three hundred and twenty (320) students were sampled by stratified random sampling technique from schools in urban and rural locations in the area of the study. Basic Science Interest Inventory (BIS) was used as the instrument for the study. The research questions were answered using mean and standard deviation. Analysis of Covariance was used to test the hypothesis at 0.05 level of significance. The findings of this study revealed that interest was enhanced among students in basic science when taught using STS-approach than conventional teaching method. It is therefore recommended among other things that basic science teachers should use inquiry based approaches like STS-approach to stimulate students' interest in basic science.

Keywords: Science, Technology, Society-approach, interest, Basic science

Introduction
Science and technology can be used to provide man's basic needs such as food, clean water, shelter, energy, health care, clothing, and education. While stressing the roles of science and technology, Nwosu and Nnabuenyi (2005) opined that the level of technological know-how of a nation determines her developmental level and viability. Nigeria and other developing nations of Africa have begun to lay more emphasis on Science and Technology Education (STE) because of their vital roles in national development.

Webster (2018) defined science as the study of natural phenomena and is characterised by the possibility of making precise which are susceptible to some sort of check or proof. On the other hand, technology is a systematic knowledge and action usually of industrial process but applicable to any recurrent activity. Society is a group of human beings bound together for self-maintenance and self-perpetuation and sharing their own institutions and culture. In view of the foregoing definitions of science, technology and society, science deals with the natural world while technology deals with production of goods and services for the society. In other words, while the product of science is knowledge, the products of technology are goods and services for human beings in the society. The relationship between science, technology and society can be represented diagrammatically as shown in Figure 1 by Teetito (1999).
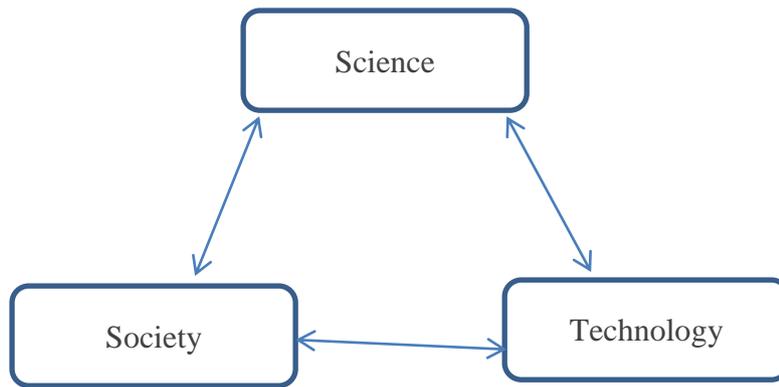
Fig. 1: The relationship between science, technology, and society

Thus, the inter-relationship portrays the general view of technology as the hand maid of science in the service of the society. To achieve one of the objectives of Science and Technology Education (STE), science educators (Samba, Achor & Ogbeba, 2010) have called for the use of innovative teaching strategies in science teaching. Such teaching techniques like concept mapping, co-operative learning, constructivist instructional strategy and Science, Technology, Society (STS)-approach among others, are aimed at enhancing students' interest in science subjects.

According to Yager (1992), STS-approach entails involving learners in learning activities such as questioning and discussion, among other things, on issues that deals with developing decision making and problem solving skills. It attempts to integrate the different discipline of science and to improve on the drawbacks of the conventional approach in science teaching.

Basic science was earlier taught as integrated science in the 1960s to 1990s in junior secondary schools in Nigeria. The formal adoption of the integrated science curriculum came up in 1970s after the West Africa Examination Council mandated the Science Teachers Association of Nigeria (STAN) to produce a comprehensive syllabus for the integrated science as a subject. The modification of the Nigeria educational programme from 6-3-3-4 to 9-3-4 led to some changes in some subjects' curricula. Notably among others is the integrated science programme which translated into basic science to cover a period of nine years. The need to make basic science education relevant towards achieving Nigeria's science and technology educational objectives necessitated the review of basic science curriculum objective. This is to make the subject not only functional but suitable for the Nigeria setting. Despite the fact that basic science is being recognized and taught at the junior secondary school level, failure rate has remained high and interest in the subject has been poor among students in Nigeria. This has been attributed to factors like inadequate instructional facilities and teachers' use of inappropriate teaching methods for teaching the subject among other things (Akinloye, 2002; Anthony, 2010; Alexander, 2012; Isah, 2007). This calls for the use of inquiry based strategy like STS-approach in basic science lessons in secondary schools.

Isah (2007) opined that teaching method correlates with students' interest. Ryder (2010) defined interest as arousing or inducing the attention or curiosity in a person. Interest of students, whether good or poor is among the determinants of the success or failure of an academic programme. Mbajiorgu (2003) opined that students' interest in biology had been due to factors such as teachers' use of inappropriate teaching method, lack of facilities and poor socio-economic background among other things. There is enough evidence to show that students' interest in Senior School Certificate Examination (SSCE) in biology has not been encouraging (West African Examination Council, Chief Examiner's report, 2016-2017). Hence,

the need to find out whether STS-approach will foster the interest of students or not in biology in secondary schools. The effect of a teaching method should not only be considered in relation to students' interest but gender. Webster (2010) defined gender as many socially and culturally constructed characteristics, qualities, behaviours and roles which different societies ascribe to females and males.

An issue of concern in education is the possible influence of gender on learning outcomes like students' interest. In recent times, educators have expressed diverse views about interest of male and female students in science subjects like biology. While Njoku (2002) is of the view that males do better than females. Okeke (2001) disagreed with this view but, argued that interest is a learning outcome that is dependent on several factors such as socio-economic background, teaching method and attitude.

The report by the West African Examination Council's Senior School Certificate Examination (2018-2019), statistics of results in Nigeria by subject, grade and sex revealed low enrolment and interest of girls for science subjects. Nzewi (2000) found in-significant differences between male and female students' interest in science subjects. Thus, against this backdrop, there is the need to find out whether STS-approach will stimulate interest of students in basic science with respect to gender in senior secondary schools in Ankpa Local Government Area of Kogi.

Research Questions
The following research questions guided the study.
(i) What is the mean interest scores of students taught basic science using STS-approach and conventional method?
(ii) What is the difference in the mean interest scores of male and female students taught basic science using STS-approach?

Hypotheses
The following null hypotheses were tested at 0.05 level of significance.

Ho_1: There is no significant difference in the mean interest test scores of students taught using STS-approach and conventional method.

Ho_2: There is no significant difference in mean interest scores of male and female students taught basic science using STS-approach.

Methodology
The study adopted a quasi-experimental design. Specifically, non-equivalent control group design was used. The population of the study was all students from the 64 co-educational schools in Ankpa Local Government area for 2016/2017 academic session. Simple random sampling technique was used to select 320 students (164 males and 156 females from 2 urban and 2 rural schools' location. Two experimental schools (one in urban and one in rural location) and two control schools (one in urban and one rural location).

The instrument, the Basic Science Interest Scale (BSIS) was adapted from views-on-science-technology-society (VOSTS) as adopted by Aikenhead, Ryan and Flemming (1989). The BSIS is a 20 VOSTS items on STS related topics in basic science in JSS II. The VOSTS items were made up of 10 positively cue statements and 10 negatively cue statements. The BSIS items were drawn by the researcher from topics in different proportion in the following ratio: balanced diet (7 items), excretion (4 items), pollution (6 items) and erosion (3 items). The BSIS is expected to elicit response on the views of the students on assigned point of 4,3,2, and 1 on four category theme: strongly agree (SA), agree (A), disagree (SD) and disagree

(D). Thus, a maximum of 80 scores and a minimum of 20 scores can be obtained on response to interest inventory.

Three experts in science education validated the instruments. A pilot test was conducted in two schools outside the area of study and a reliability index of 0.83 was obtained for BSIS instrument using Cronbach Alpha formular (Cronbach, 1951).

The researcher under-took a training workshop using a training instructional guide for the four research assistants who were graduate and are basic science teachers in each selected school for two days. On the first day of the workshop, the researcher instructed the four research assistants for control schools to conduct rehearsal on the use of lesson plans on conventional method in teaching selected topics in biology. While the second day of the workshop was used to train the other four research assistants for experimental schools on the use of lesson plans on STS-approach in teaching selected topics in basic science. Secondly, all students that were involved in the study were pre-tested using BSIS instrument. There was no prior lesson taught to treatment and control groups before the pre-testing. The results of the pre-BSIS scores were collated before the actual treatment began. The third phase involved teaching selected topics in biology with STS-approach to the treatment groups. The same topics were taught with conventional approach to the control groups. Both treatment and control groups were taught with different modes of lesson plans for four weeks. Both treatment and control groups were post-tested using BSIS instrument after four weeks of teaching. The post-BSIS scores were collated like those of pre- BSIS scores. These were then subjected to statistical analysis. Mean and standard deviation were used to answer the research question while analysis of covariance was to test the hypotheses at 0.05 level of significance.

Results
The data are presented and analysed in Tables 1 to 4 according to the research questions and hypotheses of the study.

Research Question one: What is the mean interest scores of students taught basic science using STS-approach and conventional method?

Data answering research question one is presented in Table.

Table 1: Mean and Standard Deviation of Pre-test and Post-test Interest scores for Conventional and STS-approach groups

Group		Pre-test	Post-test	Mean difference
STS-approach	N	80	80	
	$\overline{X}$	2.85	3.02	0.17
	SD	0.90	0.81	
Conventional group	N	80	80	
	$\overline{X}$	2.83	3.00	0.14
	SD	0.86	0.85	
Mean difference				0.03

Table 1 shows that the students in the STS-approach group had a mean interest score of 3.02 while those in the conventional group had a mean interest score of 3.00. This shows that the students in the STS-approach group scored higher than their counterparts in the

conventional group with a mean difference of 0.03. Therefore, students' interest was enhanced when taught basic science using STS-approach than those taught basic science with conventional method.

Research Question two: What is the mean interest scores of male and female students taught STS-approach basic science? Data answering research question two is presented in Table 2

Table 2: Mean and Standard Deviation of Pre-test and Post-test Interest scores of Male and Female Students taught using STS-approach

Sex		Pre-test	Post-test	Mean difference
Male	N	41	41	
	$\overline{X}$	2.76	2.94	0.18
	SD	0.95	0.85	
Female	N	39	39	
	$\overline{X}$	2.92	3.11	0.17
	SD	0.84	0.76	
Mean difference				0.01

Table 3 shows that male students taught using STS-approach had a mean interest score of 2.94, while female students had a mean interest score of 3.11. This shows that the male students scored higher than female students with a difference of 0.01. Thus, STS-approach enhanced interest in basic science slightly in male than female students.

Test of Null Hypotheses
Analysis of Covariance (ANCOVA) was used to test the significance of the differences between the mean scores of hypotheses 1 and 2 at 0.05 level of significance. ANCOVA was used because it is one of the appropriate statically tools that can be used to control extraneous variables of non-equivalent subjects.

Hypothesis One: There is no significant difference in the mean interest test scores of students taught basic science using STS-approach and those taught using conventional method.

The test of hypothesis one is presented in Table 3

Table 3: ANCOVA of Mean Interest Scores of Students Exposed to STS-approach and Conventional method

Source	Type III Sum of Square	df	Mean Square	F-ratio	Sig
Corrected Model Significant	5272.76	1	5272.76	164.20	.05
Post-test (S)	610.33	1	610.33	1.42	.05
Intercept	81.96	1	81.96	2.60	.05
Method	606.45	1	606.45	18.90	.05
Total	5010.33	156			

Table 3 shows that the calculated F (1.42) is significant at P<0.05. Therefore, the null hypothesis is not rejected. Hence, there is no significant difference between the mean

interest scores of students taught basic science using STS-approach and those of conventional method. Thus, interest was enhanced for students taught basic science using STS-approach than those taught using conventional method but with minimal difference.

Hypothesis 2: There is no significant difference in mean interest scores of male and female students taught basic science using STS-approach.
The test of hypothesis two is presented in Table 4

Table 4: ANCOVA of Mean interest scores of Male and Female Students Exposed to STS-approach

Source	Type III Sum of Square	df	Mean Square	F-ratio	Sig.
Corrected Model	2773.02	1	2773.02	25.78	.05 (S)
Post Test	63.02	1	63.02	0.58	.05
Intercept	13.60	1	13.60	0.13	.05
Gender	52.05	1	52.05	0.50	.05
Total	8175.95	76			
Corrected Total	110250.05	79			

Table 4 shows that the calculated F-ratio is not significant, F= 0.58, P<0.05 is greater than the critical value at 0.05 level of significance. Therefore, the null hypothesis is rejected. There is no significant difference between the mean interest scores of male and female students taught basic science using STS-of approach. Hence, interest was enhanced in both male and female students taught basic science using STS-approach.
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Discussion
The paper focuses on stimulating students' interest in basic science using STS-approach in junior secondary schools. Tables 1 and 3 provided answers for research questions 1 and hypothesis 1 respectively. Table 1 shows that experimental group post-test score (3.02) was greater than control group post-test (3.00). This shows that there is no significant difference between the mean interest test scores students taught with STS-approach and those taught with conventional method in basic science. Table 3 shows that the null hypothesis is rejected, as the F-calculated value (1.42) is greater than the critical value (0.05) at 0.05 level of significance. This shows that STS-approach strategy enhanced interest than conventional approach in basic science. This finding is in agreement findings in previous study by Mbagiorgu (2003) that students taught with inquiry approach did better in interest than those taught with conventional approach in basic science. STS-approach enhanced interest than conventional approach because students' were involved in activities like discussion, investigation among other things which ensured their understanding of basic science concepts.

Table 2 shows that the observed mean difference in interest scores between male (2.94) and female (3.11) students taught biology using STS-approach is 1.70. Table 4 shows that at F= 0.58, P>0.05, there is no significant difference in interest scores between male and female students taught basic science using STS-approach. This finding is in agreement with the finding in a study by Mbajiorgu (2003) that inquiry based strategy enhanced interest among male and female in basic science. Although interest was enhanced by STS-approach in both male and female students in basic science, the result shows that the difference in the mean interest scores between male and female students is insignificant. This finding agrees with similar finding by Okeke (2001) that found no significant difference between male and female interest in physics. Implying that students will do well in basic science

whether male or female provided an appropriate teaching strategy is used. Basic science teachers should therefore involve students during lessons in small group work and discussion without gender bias. This will among other things build confidence among students irrespective of gender, encourage interaction and make positive impact on their interest in basic science. Hence, interest was enhanced for male and female students taught basic science using STS-approach.

Conclusion
Basic science is one of the subjects taught in junior secondary schools in Nigeria. The subject is relevant to several disciplines such as agriculture and medicine. In spite of the importance of the subject to other discipline, students' interest in basic science has been poor. As such, there is the need to use appropriate teaching strategies like STS-approach for basic science teaching. Thus, this study investigated the effects of STS-approach on the interest of students in junior secondary schools basic science in Ankpa Local Government Area of Kogi state. The findings in this study revealed that STS-approach did not significantly enhanced students' interest when compared to conventional method in basic science. STS-approach enhanced interest in male and female students in basic science.

Recommendations
On the basis of the findings in this study, the following recommendations were made.
1. Basic science teachers should intensify the use of inquiry based methods of teaching such as STS-approach to promote students' interest in basic science.
2. There is need to infuse female gender friendly materials and methods like STS-approach into basic science curriculum to enhance female participation in basic science lessons. This, it is hoped will also enhance learning among females in basic science.

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