

Influence of College Clubs in Increasing Students' Interest and Achievement in Nigerian Post-Primary Schools as Perceived by Science Students.

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Abstract

The perceived influence of college club in increasing students' interest and achievement in Nigerian post-primary schools in Anambra State was studied using a survey research design. The population of the study comprised all senior secondary school science students in Anambra State totaling 9322 as at 2007. From this population, a sample of 140 senior secondary two (SS 11) science students was purposively drawn from those that participated at the Anambra State branch of Science Teachers Association of Nigeria (STAN) 2007 science quiz and exhibition competition. A 31-item validated researcher-developed questionnaire arranged in 3 clusters of 14, 10 & 7 was used to collect data. A reliability coefficient of 0.81 was established for the instrument using cronbach-alpha. The result of the study revealed that senior secondary students in Anambra State testified that science clubs exist and is functional in most secondary schools in the state and has positive influence in increasing students' interest and achievement in science subjects as well as science and technology related careers. It was therefore recommended among others that every effort on the part of government, school head and students should be made to establish and sustain a functional science club in secondary schools in Anambra state.

Keywords: Influence, College, Clubs, Interest, Achievement, Post-Primary Schools, Students

1. Introduction

Every nation currently craves for sustainable development through qualitative and functional education in general, but science and technology education in particular. This can be achieved if there exist in the basic and post basic schools a group of students who from the grass root manifest a keen interest in science and science related subjects. But contrary to our expectations, majority of students at this level of education dread science and anything connected with it because they see it as very difficult and unattainable. It is perceived that one of the ways for any nation to attain some measures of sustainable development is for her to craft strategies to arouse the interest of the younger generation (the students) to love and embrace science and technology. One of the ways that has been proposed to get students manifest such interest and achieve high in science and technology is by getting them belong to and actively participate in college clubs especially science-related clubs like the Junior Engineers, Technicians and Scientists (JETS) club (Adegoke, 2009; Duyilemi & Oluwature, 2012).

High school (or college) clubs are student-based school organizations, consisting of administration-approved organizations functioning with myriads of tasks with varied specific objectives in respects of each club. Such clubs are composed of students with adults as advising figures, to maintain the functionality of the clubs (Wikipedia, 2007).

More specifically, science clubs are means of getting outside the classroom and interacting with the natural environment. It is further defined in Orbitville as organizations based at a particular school and intended to provide opportunities for students to explore science. It is therefore an out-of-school-hours club that offers children the chance to do science-related activities that extend and enhance the science they experience in the classroom. A science club offers most students the opportunity to explore areas of science not covered by the curriculum and gives the club members plenty of opportunities to practically study sciences.

Awortwi (2007) asserted, a typical science club meeting should last for about 45 minutes, during which members could complete a challenge, plan a science project, receive a lecture from a professional or host a scientific visitor. Other activities that members could engage in during science club include expanding science to other parts of the school e.g. set up and maintain an aquarium or flower garden, construct a solar drier, cooker or concentrator, spearhead the school's recycle project for waste disposal, create videos in which senior students demonstrate and explain science concepts to the junior ones, organize field trips to places of scientific interests like drug-manufacturing industries, breweries, car assembling factories.

Science club members can also prepare members to participate in such competitions as science Olympiads, Odysseys of the mind, National Solar Energy Society of Nigeria science competition for science students, Mobil competitions organized by the Science Teachers Association of Nigeria (STAN), JETS competitions and others. All these help students develop interest, attitude of hard work and love for science as the saying goes: success comes through talent, hard work and love for what one does.

1.2. Benefits of Science Clubs

A lot of benefits are derived from belonging to school science club. Some of the benefits include giving the students or members opportunity to:

- Come together and find solution to common problems
- Practice at the process skill needed in science
- Develop and practice critical thinking
- Experience a wider range of science topics, hence broadening their enthusiasm for science.
- Be introduced to the principles, techniques and practices of engineering and be equipped with a broad range of engineering skills that will be essential in their future academic work.
- Build up their ability to analyze and solve scientific and technological problems.
- Acquire practical skills which will be of value to their future employers (culled from http://eiso.org/eis_library.php)

Teachers, on their own part can benefit since it will create opportunity for them to learn about new topics, try out new ideas in a less pressured environment and appreciate the impact of technology to overall development of a nation and citizens.

From the foregoing, it is clear as opined by Adegoke (2009) that the importance of clubs and societies (when they are viable in schools) in arousing and re-awakening the interest of students in the study of the basic core subjects such as Mathematics, practical-oriented science and vocational subjects cannot be over-emphasized. According to data from Lagos State Ministry of Education Report, (2008), college clubs in general and science clubs in particular when functional in schools can motivate more students to develop interest in schooling and make choice of science subjects. Through interaction which science clubs in particular engender, students are provided opportunities to share knowledge and experiences, discuss problems, go on excursions, take part in exhibitions and quiz competitions. This fact has been rightly stressed by Awortwi (2007) when he said, "reactivating science club will aid the teaching and learning of physics (science in general) as well as remove the phobia most students attach to sciences". He went further to say that the establishment of science clubs was the secret of many industrialized countries and therefore appealed to stakeholders to support their establishment in basic and second cycle institutions. A similar view was held by Tyagi, (2003) while commenting on the need for a comprehensive networking of club in India. In this awareness, Federal Republic of Nigeria (FRN, 2004) courtesy of Federal Ministry of Education (FME) had established JETS club in secondary schools in Nigeria in the year 1984. Duyilemi and Oluwatelure (2012) defined JETS as an out-of-school scientific activity which provides an opportunity for enthusiastic science students to try their hands on activities outside their science classes, thus bridging the gap between theory and practice. By participation in JETS club students are aided further to appreciate the impact of technological and scientific development to the overall development of a nation and citizens.

1.3. The Objectives of JETS Club in Nigeria:

- To produce young technicians, engineers and scientists who are able to deal with local technological and scientific issues.
- To explain the underlying causes of some environmental problems and offer possible solution to a range of scientific and technological perspectives.
- To produce young technicians, engineers and scientists who are able to deal with local technological and scientific issues
- To explain the underlying causes of some environmental problems and offer possible solutions from a range of scientific and technological perspectives
- To introduce students to the principles, techniques and practices of engineering
- To equip students with a broad range of engineering skills that will be essential in their future academic work
- To assist students in building up their ability to analyze and solve scientific and technological problems.
- To teach students to acquire practical skills which will be of value to their future employers (EIS, 2006)?

1.4. Review of Literature

Yearly Reports (FME, JETS Reports 2003-2007), shows that JETS club exists but not effective in some schools. In schools where it exists, is effective or functional, the students' enrolment and achievement in science in external examinations are higher compared to schools where JETS club do not exist or are not functional. Duyilemi and Oluwatelure (2012) affirmed that active participation in JETS activities due to its practical nature engenders effective learning, thereby resulting in better performance. In the view of Okebukola (1993), JETS is useful in popularizing science and technology among students. It provides an avenue for students with extraordinary abilities in Mathematics, science and technical subjects to think, concentrate and construct simple tools. It is thus obvious that through JETS' exciting activities, a country can groom future Isaac Newton,

Michael Faraday, Graham Bell, Thomas Edison and students with much more interest among many other students (Amao, 2012).



Electro-Fuel-less Seed Planting Machine (under construction)

A project by JETS club students

exhibited at STAN conference in Uyo, Akwa-Ibom state, Nigeria in August, 2013.



Electro-Fuel-less Seed Planting Machine (completed project)

Central to any successful endeavour in life is ones interest. Interest according to Imoko and Agwagah (2006) is a subjective feeling of concentration or persisting tendency to pay attention and enjoy some activities or contents. Granted that there is something called natural intelligence, if a learner's interest is not stimulated, no meaningful learning will take place. A learner, therefore, learns better if interest is sustained and guaranteed in him/her. He develops a type of consciousness which accompanies and stimulates attention and causes it to be focused on object, event or process of interest for improved academic achievement (Okigbo & Okeke, 2011).

Academic achievement is defined in Wikipedia as the outcome of education-the extent to which a student, teacher or institution has achieved their academic goals. It is measured by examination or continuous assessments but there is no general agreement on how it is best assessed. Achievement could be in terms of procedural knowledge such as skills or declarative knowledge such as facts. And it can be affected by intelligence and personality, effort and motivation, academic status and socialization of parents, student's locus of control and some other factors. It can also be affected by mental curiosity for science education as measured by typical intellectual engagements (Wikipedia, 2014).



JETS club members Produce Lemon Juice, Potato Batteries

•Used Them to Power Wall Clock (Courtesy: Lead City High School, Ibadan, Oyo State)

Science Education is the acquisition of a body of knowledge about nature. It also encompasses the utilization of such knowledge in solving the myriads of problem that faces mankind (Anaekwe, 2002). It is a discipline that is concerned with sharing science content and processes with individuals that are considered as part of the scientific community. It aims at helping the learner to acquire the appropriate skills, abilities and competencies which prepare him /her for improving his/her own life and enables him/her cope with increasingly technological world (Osisioma, 2012).

The Federal Republic of Nigeria (FRN, 2004) stressed that science Education should emphasize the teaching and learning of science process and principles. This will lead to fundamental and applied research in the sciences at all levels of education. Intensified researches have been going on to see how best to get younger ones acquire the scientific principles and processes. Several strategies have been proposed and tried out, but to the best of the researchers' knowledge, none has been able to remove completely the phobia younger ones have for science and science-related courses. This is therefore what motivated the authors to carry out this study aimed at investigating the perceived effect of college club on academic achievement of secondary school students.

1.5. Problem of the study

Students' lack of interest in sciences has been identified as one of the major problems leading to their poor performance in external examinations. They find it difficult to make meaning in the learning of science which they see as very abstract, difficult, uninteresting and a nut too hard to crack. This is why an attempt is made in this research to see how involvement in college clubs can assist in making these science concepts learner-friendly, enjoyable and lively to the students.

1.6. Purpose of the Study

The purpose of this study is to find out the role college clubs play in nurturing students' interest in the choice of science and science-based subjects and their achievement in external examinations. Specifically, this study is designed to find out:

- The state of science clubs in Secondary Schools in Anambra State of Nigeria.
- The influence of science club in increasing students' interest in science subjects and technology careers.
- The perceived effect of science clubs in improving students' academic achievement in science subjects.
- The interaction effect of gender, interest and science club on students' achievement in science subjects.

1.7. Research Questions

This study was guided by the following research questions:

1. What is the state of science clubs in Secondary Schools in Anambra State of Nigeria?
2. How does membership in science club influence students' interest in science and technology careers?
3. What is the effect of science club membership on students' achievement in science subjects?

1.8. Hypotheses

The following hypotheses have been formulated for this research and will be tested at 0.05 level of probability ($p < 0.05$)

HO₁: Membership in science club does not have influence on students' interest in science subjects and technological careers.

HO₂: Membership in science club does not have effect on students' achievement in science subjects.

HO₃: There is no interactive effect of gender, interest and club membership on students' achievement in science subjects.

2.0. Methods

A survey research design was used for this study. The population, 9,332 comprised all senior secondary school students in Anambra state of Nigeria as at 2007 (source: school census report, 2007). The sample consisted of 140 students who were purposively selected across the state from science students who participated in Science Teachers Association of Nigeria (STAN) secondary school science exhibition organized by the state branch of STAN to select those that will represent the state at the national STAN science quiz and exhibition competitions. The instrument used for this study was a researcher-developed questionnaire tagged science club participation questionnaire (SCPQ). The SCPQ consisted of two sections, 1 and 2. Section 1 was designed to collect demographic data from the respondents while section 2 was divided into three clusters in relation to the research questions and the hypotheses. Cluster A was a 14-item statement which seeks to gather information concerning the state of science club in schools in Anambra State, Nigeria. Cluster B seeks information on the influence of science club membership on students' interest in science and technology careers. It consists of 10 items. Finally, cluster C was a 7-item statements used to collect data on the perceived effects of science club on students' achievement in science subjects. The instrument was validated by two experts, one from vocational education and the other from measurement and evaluation. The reliability of the instrument was established as 0.81 using Cronbach Alpha. This shows that the instrument was both valid and reliable. The researcher distributed the questionnaire to the respondents with the help of the students' teachers who accompanied the students to the exhibition center. The completed questionnaires were collected back on the spot ensuring 100% return. Data collected was analyzed using mean and standard deviation in relation to the research questions and z-test was used to test the hypotheses. A 5 point Likert scale rating of strongly agree (SA-5), agree (A-4), undecided (U-3), Disagree (D-2) and strongly disagree (SD-1) was used to elicit response and a criterion mean of 3.00 obtained. Hence, any item with mean rating of 3.00 and above was considered as accepted while any item with mean rating of less than 3.00 was regarded as rejected.

3.0 Results

Research Question 1

3.1. What is the state of science clubs in Secondary Schools in Anambra state?

Data in relation to this research question were collected and presented in table 1. The statistical mean (X) was used to give answer to the research question, the standard deviation (SD) to show the harmony in opinion of the respondents.

Table 1: Mean and standard deviation of students' responses on the state of science clubs in secondary schools in Anambra State.

S/N	State of science clubs in secondary schools in Anambra State	N	X	SD	Decision
1	A functional science club exists in my school	140	4.11	.99	Agree
2	my science club has regular weekly meetings	140	3.82	1.20	Agree
3	in my school, students like attending science meetings	140	3.66	1.19	Agree
4	science clubs is taken seriously in my school	140	3.69	1.27	Agree
5	our science club members regularly go on excursion	140	3.10	1.34	Agree
6	my school has a committed staff adviser inspiring students to science club	140	4.05	.83	Agree
7	students find science club meeting very boring	140	2.13	1.19	Disagree
8	students show nonchalant attitude towards science club meetings	140	2.25	1.23	Disagree
9	during our science club meetings, science learning is made very interesting by the use of drama and other innovative methods	140	3.85	1.18	Agree

My club takes active part in the following

10	JETS competitions	140	3.97	1.20	Agree
11	mathematics Olympiad	140	3.70	1.34	Agree
12	STAN science quiz competitions	140	4.20	.98	Agree
13	STAN science exhibitions	140	4.08	1.07	Agree
14	inter-school science quiz/exhibitions	140	4.15	.95	Agree

As shown by the mean scores across the 14 items describing the possible status of science club, students perceived science club in their schools are operational and active. Specifically, they agree that functional science club exist in their schools (mean = 4.11), students like attending science club meetings (mean = 3.82), students take the club serious (mean = 3.69), members of the club regularly go on excursion (mean = 3.10), clubs have staff advisers that inspire students (mean = 4.05), club meetings are made interesting by the use of drama and other innovative methods (mean = 3.85), clubs take part in JETS competitions (mean = 3.97), mathematics Olympiads (mean = 3.70), STAN science quiz competitions (mean = 4.20), STAN science exhibitions (mean = 4.08), and inter-school science quiz/exhibitions (mean = 4.15). On the other hand, respondents disagree with the statement that; science clubs' meeting are boring (mean = 2.13) and that students are nonchalant about science clubs (mean = 2,254.08).

3.2. Research Question 2

To what extent does membership of science club influence students' interest in science and technology?

Table 2: Mean and standard deviation of the influence of membership in science club on students' interest in science and technology career

S/N	Students' interest and involvement in science club	N	X	SD	Decision
	As a member of science club,				
1.	I am now more committed to science oriented careers	140	4.17	.81	Agree
2.	I usually shelve my commitments any day my club holds its meeting	140	3.73	1.25	Agree
3.	My club activities have made me so busy that I no longer spend my time playing away	140	3.68	1.18	Agree
4.	I now enjoy surfing the internet for relevant information on the latest development in sciences.	140	4.00	1.02	Agree
5.	I am now very much exposed to team reading in a study group	140	4.04	1.06	Agree
6.	My club activities have made me see science as a fun to be enjoyed and not a threat to be dreaded	140	4.20	1.02	Agree
7.	my involvement in science club activities has made me develop attitude of hard work in science and science related subjects	140	4.26	.95	Agree
8.	I have learnt in the science club to be optimistic and determined to persevere	140	4.22	.98	Agree
9.	I have learnt to dig deeper into science subjects	140	4.21	1.01	Agree
10.	I am usually excited as a result of my science club activities	140	4.20	.74	Agree

Table 2 shows that, to large extent students' membership of science influence their interest in science and technology careers. This is shown by the mean responses on the 10 clustered items of students' interest inventory in science and technology shown in table 2 which ranged from 3.68 to 4.26. Therefore, the respondents agree that their membership of science club influence their interest in science and technology careers.

3.3. Research Question 3

What is the effect of science club membership on students' achievement in science subjects?

Table 3: mean and standard deviation of the effect of science club membership on students' achievement in science subjects.

S/N	Effect of science club on students' achievement in science subjects	N	X	SD	Decision
Belonging to science club has helped me to					
1.	Perform better in science subjects	140	4.28	1.01	Agree
2.	Develop the courage to face and solve challenging problems in science subjects	140	4.20	0.99	Agree
3.	Obtain progressively better grades in science subjects	140	4.12	1.01	Agree
4.	Overcome the phobia I had for science and Mathematics in the past and so perform better in them now	140	4.06	1.07	Agree
5.	Acquire analytical skills which help me perform better in science and mathematics	140	3.95	1.05	Agree
6.	Achieve better in science subjects through working in groups	140	4.18	1.07	Agree
7.	Think critically, thus I can now attempt solving complex problems in science subjects	140	4.12	.93	Agree

Table 3 shows mean response on effect of science club membership on students' achievement in science subjects. The high mean rating ranging from 3.95 to 4.28 shows that the respondents agree that they achieve more in science subjects when they participate actively in science club.

3.4. Hypothesis 1.

Male and female students will not differ significantly on their mean rating of the effect of membership of science club on their interest in science

Table 4. Summary of z-test analysis of students' mean rating of effect of membership of science club on interest in science and technology career by gender.

S/N	Students' interest and involvement Decision in science club	Gender	N	X	SD	df	t-cal	t-crit
As a member of science club,								
1.	I am now more committed to science subjects Accepted	male	68	4.40	.79	138	-.22	1.96
		female	72	4.43	.83			
2.	I usually shelve my commitments any day my club holds its meeting Accepted	male	68	3.71	1.22	138	.09	1.96
		female	72	3.69	1.29			
3.	My club activities have made me so busy that I no longer spend my time playing away Accepted	male	68	3.63	1.12	138	-1.15	1.96
		female	72	3.88	1.11			
4.	I now enjoy surfing the internet for relevant information on the latest development in sciences. Accepted	male	68	4.13	.82	138	-1.31	1.96
		female	72	4.33	.77			
5.	I am now very much exposed to team reading in a study group Accepted	male	68	4.25	.79	138	.09	1.96
		female	72	4.24	.86			
6.	My club activities have made me see science as fun to be enjoyed and not a threat to be dreaded Accepted	male	68	4.31	.66	138	-1.35	1.96
		female	72	4.51	.78			
7.	my involvement in science club activities has made me develop attitude of hard work in science and science related subjects Accepted	male	68	4.42	.54	138	-.25	1.96
		female	72	4.45	.78			
8.	I have learnt in the science club to be optimistic and determined to persevere Accepted	male	68	4.33	.66	138	-1.86	1.96
		female	72	4.59	.70			
9.	I have learnt to dig deeper into science subjects Accepted	male	68	4.23	.63	138	-.75	1.96
		female	72	4.35	.98			
10.	I am usually excited as a result of my science club activities Accepted	male	68	4.31	.66	138	-1.33	1.96
		female	72	4.51	.81			

Using independent sample's t-test, there was no statistically significant difference between male and female students' mean rating of the effect of membership of science club on students' interest in science and technology career. The calculated t-values (ranging from .09 to 1.86) were less than the critical t-value (1.96). The null hypothesis of significant difference was accepted. Male students' mean ratings of the effect of membership of science club on interest in science and technology career were therefore not significantly less than that of the female students.

3.5. Hypothesis 2

Male and female students will not differ significantly on their mean rating of their achievement as a result of their membership of science club

S/N	Effect of science club on students' achievement in science subjects	Gender	N	X	SD	df	t-cal	t-crit
Decision								
Belonging to science club has helped me to:								
1.	Perform better in science subjects	male	68	4.33	.81	138	-.70	1.96
		female	72	4.45	.86			
Accepted								
2.	Develop the courage to face and solve challenging problems in science subjects	male	68	4.29	.80	138	-.87	1.96
		female	72	4.43	.81			
Accepted								
3.	Obtain progressively better grades in science subjects	male	68	4.19	.70	138	-.32	1.96
		female	72	4.24	.79			
Accepted								
4.	Overcome the phobia I had for science and mathematics in the past and so perform better in them now	male	68	4.06	1.02	138	-.86	1.96
		female	72	4.24	.99			
Accepted								
5.	Acquire analytical skills which helps me perform better in science and mathematics	male	68	4.04	.99	138	-.52	1.96
		female	72	4.14	.83			
Accepted								
6.	Achieve better in science subjects through working in groups	male	68	4.04	.65	138	-.96	1.96
		female	72	4.20	.92			
Accepted								
7.	Think critically, thus I can now attempt solving complex problems in science subjects	male	68	4.38	.82	138	.92	1.96
		female	72	4.27	.92			
Accepted								

Table 5 shows that the mean rating of male and female students regarding their achievement in science subjects resulting from their membership of science club were not statistically significant, t-value (-.70, -.87, -.32, -.86, -.52, -.96 and .92). The null hypothesis of no significant difference was therefore accepted. It was concluded that female students' mean ratings of achievement in sciences shown in table 5 above were not significantly greater than that of the male students.

4.0. Discussion

Research question 1 seeks information on the state of science club in secondary schools in Anambra State of Nigeria. The sampled students all agreed that functional science clubs exist in their schools. They also testify from their responses that the members are actively involved in its activities. This result is contrary to federal ministry of education report (FME, 2007) on JETS club which states that although JETS club exist in most schools, it is only in name. However, the evidence of STAN and other NGOs activities with JETS club testifies to the finding of this study

Research question 2 was directed to generate data on the influence of membership of science club on students' interest in science and technology careers. The result of the data presented in table 2 indicates a consensus among all respondents that active membership in science club has great positive influence on students' in science and technology related careers. This result gives further empirical support to the findings of some other researchers like Okebukola (1993), Duyilemi & Oluwatelure (2012) among others who observed that JETS program is more useful than other conventional methods of teaching in popularizing science and technology among students.

Research question 3 was posed to gather information on perceived effect of membership of science club on students' academic achievement. On table 3 is presented the result which indicates that all respondents agreed

that active participation in science club has helped them to register better achievement in their academic endeavours, since every item on the questionnaire has a mean greater than 3.00. This result is in consonance with the findings of Tyagi (2003), Awortwi (2007) and Anderson (2008) that science clubs and societies when available in schools and students enroll and participate actively in them provide fertile ground for stimulating and nurturing students' interest (and of course improving their achievement) in science subjects.

Hypothesis 1: Male and female students will not differ significantly on their mean rating of the effect of membership of science club on their interest in science.

Hypothesis 2: Male and female students will not differ significantly on their mean rating of their achievement as a result of their membership of science club.

The results of the data on tables 4 and 5 show that male students who participate in science club neither manifest higher interest nor register greater achievement than their female counterparts in S& T careers. This finding gave credence to the findings of Ivowi (1983), Hyde & Linn (1988) and Inyang and Jegede (1991) who reported that gender has no significant main effect on students' (interest and) achievement in science. However, it is at variance with Anyogu & Nworgu (1999) who holds that males perform better than females in physics achievement test (PAT).

5.0. Conclusion

The result of this study shows that participation in college clubs especially those of science increase students' interest, enrolment and achievement in science and technology-related courses and careers. The result also shows that, in Anambra state, these clubs are in existence and in many schools, functional.

6.0. Recommendations

This study recommends that

1. In order to sustain students' interest in sciences, it is important that school heads should strive to establish or revive and sustain functional science clubs and societies in their schools.
2. More so, all students in all secondary schools especially in Anambra state should be encouraged to enroll and actively participate in at least one college club.
3. Policy makers in school matters should enforce school management to set up and maintain the functionality of college (especially science) clubs in their schools
4. School heads should create a permanent time on the time table for club activities in their schools and assign a committed teacher to oversee their activities.
5. School heads and teachers should strive to remove gender disparity in their schools
6. Federal and state ministries of education should encourage and financially support those clubs.

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