Mathematics Club: A Panacea of Students' Interest and Performance in Mathematics in Yenagoa Education Zone of Bayelsa State, Nigeria

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Abstract

The study examined the influence of mathematics club on Junior Secondary II Students' interest and academic performance. Three research questions and hypotheses formulated guided the study. The expost-facto design was used for the study. The sample consisted of 450 students from fifteen schools randomly selected. The instrument used for data collection was the Mathematics Performance Test (MPT) and an interest questionnaire. The data collected were analysed using mean, standard deviation and the t-test statistical analysis. Results showed that students who were members of mathematics club had significantly better interest than those who were not. Students who were members of mathematics club performed significantly better than those who were not. A non significant difference existed between the performance of male and female students who were members of mathematics club. It was concluded that membership of mathematics club enhanced and sustained students' interest and academic performance in Mathematics.

Keywords*:* Mathematics club, Gender, Student interest, Academic performance

1. Introduction

Every nation currently craves for sustainable development through qualitative and functional education. This can be achieved if there exist in the basic and post basic schools a group of students who from grassroots manifest a keen interest in mathematics. This is because mathematics is seen as the language of science and the key to technological development. It is also intimately connected to daily life and everybody's life-long planning (Umameh, 2011). Hence, mathematics is a subject that education and human life cannot function effectively without it. Contrary to our expectations, majority of students at junior and senior secondary schools level of education dread the subject and anything connected to it.

The dreadfulness of the subject is evidenced by the poor attendance during mathematics classes as well as poor academic performance at examination. Peter and Olaoye (2014) observed that mathematics often recorded dismal performances of students at both internal and external examinations at all levels of Nigeria educational system.. The root of the problem lies in poor approach of teaching mathematics at the foundational primary school level. The poor performance of students at that level reflected the poor teaching because the students lack the ability of having an idea of the practical utility of mathematic.

The development of any nation lies in her dexterity for strategies that can arouse the interest of the younger generation (the students) to love and embrace mathematics, science and technology. This interest that could lead to high achievement in mathematics can be arouse by getting students belong to and actually participate in college clubs especially mathematics and science related clubs (Duyilemi & Oluwatelure 2012). Secondary school clubs are student based school organization functioning with myriads of tasks with varied specific objective in respect of each club. Such clubs are composed of students with one or two teachers as advisers and may be responsible in terms of manipulating the functionality of the club. It can be defined as an organization based at a particular school and intended to provide opportunities for students outside the classroom and interact with the natural environment. A mathematics club offers students the opportunity to practically study mathematical principles and theorems. It promotes mathematical discussion and debate among the students and aims to be a platform for people to communicate their mathematical interests so that others, too, might share their excitement.

A typical mathematics club meeting, according to Washington Student Mathematics Association (2009) is fun and has competitive activities that any student can participate in. It is a great way for students to develop intuitive thinking skills and learn new ways of tackling mathematics problems.

Students will not only learn new ways, but will apply their previous knowledge from school to solve challenging problems. Furthermore, they will learn to view mathematics not as a set of rules or guidelines, but as an art. Mathematics is a subject full of creativity and opportunity that many students enjoy. Besides the academic benefits, mathematics club is also a great way to meet new people and develop teamwork skills.

Mathematics club activities, according to Awortwi (2007), should last for about 45 minutes, during which members could complete a challenge, a plan, a mathematical project or receive a lecture from a professional. However, there are occasions that may require the students to meet after school hours for about one and half hour. Other activities that members could engage in during mathematics clubs include organizing mathematical competitions, organizing recreational activities in mathematics, preparing mathematical aids and illustrations, organizing mathematical exhibitions or fairs, mathematical articles for the school magazine, organizing seminars and career courses relating to Mathematics (Naidu, 2013).

The activities of mathematics club could help students develop interest, attitude of hard work and love for mathematics; as the saying goes: Success comes through talent, hard work and what one does, passionately. This is why Nwankwo and Okoye (2015) opined that the importance of clubs and societies 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 overemphasized. College clubs when functional in schools can motivate students in developing their interest in school and could make choice for science, mathematics and related subjects. Clubs, through interactions, can provide opportunities for students to share knowledge and experiences, discuss problems, go on excursions, and take part in exhibitions and quiz competitions. This fact has been tightly stressed by Awortwi (2007), when he said that reactivating science and mathematics clubs will aid the teaching and learning of mathematics, physics, chemistry, biology and science in general as well as remove the phobia students attach to sciences and mathematics.

The state of the world today is the emphasis of technological and scientific development. Mathematics could provide an opportunity for students to try their hands on activities that could aid outside their mathematics classes, thus bridging the gap between theory and practice. This could lead students to appreciate the impact of technological and scientific development to the overall development of a nation and citizens. By participation in the club activities due to its practical nature engenders effective learning, thereby resulting in better performances and interest of students.

Central to any successful endeavour in life is ones interest. According to Imoko and Agwagah (2006), interest is a subjective feeling of concentration of persisting tendency to pay attention and enjoy some activities or contents. A learner therefore, learns better if interest is sustained. He/she 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 and Okeke, 2011). The activities of the club can equally develop the interest of both male and female students. This is because the activities of club are not gender sensitive. It gives both male and female students the opportunity to develop their mathematical ability. Hence, the study, influence of mathematics club on Junior Secondary Mathematics Students' Interest and Academic Performance in Yenagoa Educational Zone of Bayelsa State, Nigeria.

1.1 Statement of the Problem

Students' lack of interest in mathematics has been identified as one of the major problem leading to the poor performance in external examination and even in the school internal examination. Students find it difficult to make meaning in the learning of mathematics which they see as abstract, difficult and uninteresting to crack. The persistent poor performances in mathematics in Junior Secondary Certificate Examination (JSCE) by junior secondary school students have been of concern among mathematics teachers, school administrators, parents and the general public because science , mathematics and technology are the wheels of a progressive society. It is perceived that one of the ways for any nation to attain some measures of sustainable development is to craft strategies to assure the interest of the students to live thereby enhancing their performances. The necessity therefore arises to ask the question "does mathematics club enhance students' interest and performance?"

1.2 Purpose of the Study

The purpose of this study is aimed at investigating the influence of mathematics club on students' interest and academic performance in mathematics. Specifically, the study is designed to:
1) Assess the influence of membership in mathematics club on students' interest in Mathematics.

2) Examine the influence of membership in mathematics club on students' academic performance in mathematics.

3) Determine the performance of male and female students in mathematics club.

1.3 Research Questions

On completion of this study, this research will provide answer to the following questions:-

1) What is the influence of membership in mathematics club on students' interest in Mathematics?

2) What influence does membership of mathematics club have on students' academic performance in Mathematics?

3) What difference exist between the academic performance of male and female students in mathematics club?

1.4 Research Hypotheses

The following research hypotheses were formulated to guide this study:

1) Membership in mathematics club does not significantly influence students' interest in Mathematics.

2) Membership in mathematics club does not significantly influence students' academic performance in Mathematics.

3) There is no significant difference between the academic performance of male and female students in mathematics club.

2. Research Method

This study adopted the ex-post facto design. This design permits the investigation of possible cause-and-effect relationship between dependent and independent variables. The design is where the researcher has no direct control over the independent variable(s). This design is used because the researcher had no control over the selection of members of the mathematics club.

2.1 Population of Study

The population of this study consisted of all thirty three Public Junior Secondary School Two (JSS 2) Mathematics students in Yenagoa Education Zone, Bayelsa State for the 2016/2017 session and the population was 3123 students.

Sample and Sampling Technique

The sample used for the study consisted of 450 Junior Secondary School Two (JSS 2) students from fifteen public schools. The random sampling technique was used to select fifteen schools from the thirty three schools. This arrived at six schools having mathematics club and nine not having. Thirty students were randomly selected from each school giving the sample size of the study.

2.2 Research Instrument

The instruments used for obtaining data were researcher developed Mathematics Performance Test (MPT) and Mathematics Interest Questionnaire (MIQ). The MPT comprised of two sections: Section A and Section B. Section A contained the personal information of the student and a column to indicate whether the student was a member of mathematics club while section B consisted of forty multiple choice questions in mathematics lettered A – D. Any correct option was scored 1 mark while a wrong option was scored 0 mark. The MIQ comprised of two sections. Section A contained the personal information of the student a column to indicate whether the student was a member of mathematics while section B contained twenty (20) structured items on a rating scale of Strongly Agree (SA)-4, Agree (A)-3, Disagree (D)-2 and Strongly Disagree (SD)-1. The MIQ was to determine the interest of the student in mathematics.

2.3 Validity and Reliability of the Instrument

The instruments used were validated by an expert in measurement and evaluation from the University of Uyo, a mathematics educator and a teacher in the secondary school. Their corrections and comments were taken into consideration in the final completion of the instruments. The reliability of the instruments were obtained by administering them once to twenty (20) Junior Secondary School Two (JSS 2) students who were from the population but did not take part in the study. The data obtained from MPT were analyzed using Kuder Richardson formula-20 and a reliability co-efficient of 0.76 was obtained. The data obtained from MIQ were analyzed using Cronbach Alpha and a reliability co-efficient of 0.82 was obtained.

2.4 Research Procedure

The researcher visited the schools in the area that were selected for the study. The researcher administered the questionnaire and the test to the students in the schools after dully obtaining permission from the principals. The administration was done with the aid of the subject teachers. The questionnaires were responded to and the test was also taken by the students. The test was timed while the questionnaire was not. The scripts were collected and graded. The data collected were analysed.

2.5 Method of Data Analysis

The data were analysed using mean, standard deviation and independent t-test at .05 level of significance.

3. Results

3.1 Research Question One

What is the influence of membership in mathematics club on students' interest in Mathematics?

Table 1: Mean and Standard Deviation of Students' Interest Based on Membership of Mathematics Clubs

Mathematics Club	N	$\bar{X}$	SD
Members	180	45.58	6.81
Non-members	270	42.76	6.92

 Foot Note: Data collected during the research

As shown in table 1, the mean interest of members of mathematics club is 45.58 while that of non-members is 55.38. This indicated that members of mathematics club had more interest in mathematics than the non-members. Table 1 also showed that the standard deviation of students who are members of mathematics is 6.81 while that of those who are non members of mathematics club is 6.92. The standard deviations of the two groups showed that the scattering of interest points were higher for non members of mathematics club. This indicates that a greater part of the students who were non members of mathematics club could not benefit from the teaching of mathematics when compared to those who were members. The standard deviations also confirm that the mean interest of members of mathematics club is greater than that of non-members.

3.2 Research Question Two

What influence does membership of mathematics club have on students' academic performance in Mathematics?

Table 2: Mean and Standard Deviation of Students' Academic Performance Based on Membership of Mathematics Clubs

Mathematics Club	N	$\bar{X}$	SD
Members	180	25.70	6.99
Non-members	270	23.11	8.25

As shown in table 2, the mean performance of members of mathematics club is 25.70 while that of non-members is 23.11. This indicated that members of mathematics club performed better in mathematics than non-members. Table 2 also showed that the standard deviation of students who are members of mathematics is 6.99 while that of those who are non members of mathematics club is 8.25. The standard deviations of the two groups showed that the scattering of scores were higher for non members of mathematics club. This indicates that a greater part of the students who were non members of mathematics club could not benefit from the teaching of mathematics when compared to those who were members. The standard deviations also confirm that the mean score of members of mathematics club is greater than that of non-members.

3.3Research Question Three

What difference exists between the academic performance of male and female students in mathematics club?

Table 3: Mean and Standard Deviation of Members of Mathematics Club Performance Based on Gender

Gender	N	$\bar{X}$	SD
Male	92	25.63	6.69
Female	88	25.77	7.33

As shown in table 3, the mean performance of male members of mathematics club is 25.63 while that of female members is 25.77. This indicated that female members of mathematics club performed better than male members. Table 3 also showed that the standard deviation of male students who are members of mathematics is 6.69 while that of their female counterparts is 7.33.

The standard deviations of the two groups showed that the scattering of scores were higher for female students who were members of mathematics club. This indicates that a greater part of the male students who were members of mathematics club benefited more from the teaching of mathematics when compared to their male counterparts.

4. Hypotheses Testing

The hypotheses were tested using t-test analysis.

4.1 Hypothesis One

Membership in mathematics club does not significantly influence students' interest in Mathematics.

Table 4 Independent t-test Analysis of Students' Interest Based on Membership of Mathematics Clubs

Mathematics Club	N	$\dot{X}$	SD	df	t_{cal}	Sign at P<.05
Members	180	45.58	6.81			
				448	4.27*	.000
Non-members	270	42.76	6.92			

* = Significance at .05 level of significance

As presented in table 4, the calculated P-value (.000) is less than the alpha level (.05). Therefore. the null hypothesis is rejected. This indicated that membership in mathematics club significantly influence students' interest in Mathematics.

4.2 Hypothesis Two

Membership in mathematics club does not significantly influence students' academic performance in Mathematics.

Table 5 Independent t-test Analysis of Students' Academic Performance Based on Membership of Mathematics Club

Mathematics Club	N	$\dot{X}$	SD	df	t_{cal}	Sign at P<.05
Members	180	25.70	6.99			
				448	3.47*	.001
Non-members	270	23.11	8.25			

* = Significance at .05 level of significance

As presented in table 5, the calculated P-value (.001) is less than the alpha level (.05). Therefore, the null hypothesis is rejected. This implies that membership in mathematics club significantly influence students' academic performance in Mathematics.

4.3 Hypothesis Three

There is no significant difference between the performance of male and female students in mathematics club.

Table 6 Independent t-test Analysis of Members of Mathematics Club Performance Based on Gender

Gender	N	$\dot{X}$	SD	df	t_{cal}	Sign at P<.05
Male	92	25.63	6.69			
				178	0.14	.892
Female	88	25.77	7.33			

* = Significance at .05 level of significance

As presented in table 6, the calculated P-value (.892) is greater than the alpha level (.05). Therefore, the null hypothesis is retained. This implies that there exists no significant difference between the academic performance of male and female students in mathematics club.

5. *Discussion of Results*

The findings from the result on membership in mathematics club influencing students' interest in Mathematics showed a significant influence of students' membership on their interest. The findings also showed that students' who were members of mathematics club had more interest than those who were not.

The result may be due to the club activities proving opportunities for students to have an idea of the practical utility of mathematics in addition to creating the elements of novelty, usefulness and sheer intellectual curiosity. The interest in mathematics may have also been aroused by the club's numerous special devices and activities. The students may have come across things which are new or exciting, for which they can perceive practical values and which involves puzzle elements or elements of mystery. The result of the findings is in agreement with that of Nwankwo and Okoye (2015), who found 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 on students' interest and achievement in science subjects as well as science and technology related careers. The result of the findings is also in line with that of Duyilemi and Oluwatelure (2012), who observed that JETS club is very useful in influencing the interest on students in Basic Science and Technology.

Findings from the result on membership of mathematics club influencing students' performance in mathematics indicated that students who were members of mathematics club performed significantly better than those who were not. The findings from the results may have been due to the participation in mathematics club activities and their exposure to mathematically related works that resulted to mathematical theorems, axioms, principles and others. These activities may have made students take-home activities, games and worksheets which extended the time learners engaged with mathematics thereby promote mathematical learning outside of the club and classroom. The engagement of students into these activities may have sharpened their reasoning towards the solving of mathematical problems.

The better performance of students in mathematics club could be attributed to the lots of experience gained from the collaborative problem solving activities in the club and in some cases first coming across ways of recovering early numeracy concepts, testing theories, frameworks and assessments before sharing them with a whole class of learners. The findings of the study is in line with that of Okpobiri and Charles-Ogan (2014), who found that the experimental group (students involved in mathematics classroom activities then mathematics club activities) improved in their mathematics achievement more than their counterparts in the control group (students involved in only mathematics classroom activities). The findings of the study is also in agreement with that of Awortwi (2007) and Anderson (2008) that mathematics club and other science related clubs when available in schools and students enroll and participate actively in them provide fertile ground for stimulating and nurturing students' academic performance in mathematics.

Findings from the result on the difference between the academic performance of male and female students in mathematics club indicated a non-significant difference between their performances. The findings from the results may have been due to the equal participation of male and female students in the activities of the club. The findings of the study is in agreement with that of Arhin and Offoe (2015), who found that PA-driven instruction improved students' problem-solving abilities and showed no bias among gender. The findings of the study is also in line with that Ajai and Imoko (2015), who found that male and female students taught algebra using PBL did not significantly differ in achievement and retention scores, thereby revealing that male and female students are capable of competing and collaborating in mathematics.

6. Conclusion

It could be concluded from the findings that mathematics club enhanced and sustained students' interest and academic performance in Mathematics. Mathematics club afforded both male and female students equal opportunity for the development of their mathematical ability thereby resulting to a non significant difference their academic performance.

7. Recommendations

Based on the findings of the study, the following recommendation was made.

1. School heads should strive to establish or revive and sustain functional Mathematics club in their schools.
2. Junior Secondary School Students should be encouraged to enroll and actively participate in Mathematics club.
3. Policy makers in school matters should enforce school management to set up and maintain the functionality of mathematics club in their schools.
4. School heads should create a permanent time on the timetable for Mathematics club activities.

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