



## **Academic activity gap and first year student's achievement in mathematics algebra course in Rivers state Nigeria**

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### **Abstract**

This study investigated effect of academic activity gap on first year students' achievement in Mathematics Algebra course. The study was conducted in Rivers State Nigeria. The pre test post test one group intact class non-equivalent quasi-experimental research design was employed. A sample of 105 BSc/Ed (Chemistry, Mathematics & Physics) students of the Faculty of Natural and Applied Sciences of Ignatius Ajuru University of Education were selected purposively. A validated and reliable ( $r = 0.73$ ) instrument titled Mathematics Activity Gap Achievement Test (MAGAT) was used to collect the data. The experimental group were students who engaged in extended academic programme during activity gap while the students that did not engage in extended academic programme during activity gap were grouped into control. The findings of the study revealed that the students in the experimental group (i.e. students who engaged in extended academic programme during activity gap) had a higher achievement mean score in MTH 114 (Basic Mathematics) than those in the control group (i.e. students who did not engage in extended academic programme during academic gap). The study also showed that there was a significant difference in students' achievement mean score for the two groups and no significant difference in students' achievement mean score by gender. It was recommended among others that those students who experienced academic gap should engage in extended academic activities to sustain their mathematical skills for higher academic pursuit in Mathematics.

**Keywords:** achievement, activity gap, first year students, algebra course, mathematics

### **Introduction**

Education is a lifelong process which begins at birth and only ends at death. This process has no vacuum as it is related to life's experiences. The more an individual lives, the more experiences teach him/her the lessons of existentialism and the features of survival. These shape the individual's instincts in applying projections and corrections in the various affectations of life. Indeed, the imbibing of societal values as taught by parents and the significant others also do not cease at any time. Education in its formal sense is institutionalized. Schools are the official learning arena where education is defined (Emereonye, 2014) [3]. The schooling process is stratified. There are classes or categories of programmes designed for easy impartation of learning to various ages, grades or other criteria for groups of students in the learning process. Luzer (2015) [7] asserted that researchers have written extensively on various types of gaps such as funding, grades, disciplines, graduation, college attendance, reading and mathematics scores and the socio-economic.

Nigerian schools are divided into categories like day-care, toddler, nursery, primary, secondary and tertiary institutions or classes. The academic programmes are planned by educational administrators in line with the pedagogic needs of each stratum (NPE, 2013) [8]. Adewumi (2012) [1] asserted that usually, the academic programmes involve measurements and evaluation to know when a student can move from one class to another. These are done in form of tests and examinations. The school process is also divided into sessions and terms (semesters) which are time periods for the teaching and learning activity. The students complete each time period, are evaluated for promotion through

examination and have a period of rest also known as school breaks or holidays before entering the next period of academic activity. This cessation is an approved academic activity gap (Dayal & Abdullahi, 2009) [2]. The approved academic activity gap or holiday periods hardly pose any problems to the academic process. Students only have to wait for the resumption of the next official period to go back to school to either engage in further academic process or repeat the previous process which was not satisfactorily executed.

However, the academic activity gap which comes between the end of secondary education and the entrance into tertiary education is most curious. This is an academic activity gap which usually affect students in their academic pursuits. This is inevitably foisted on the student and can, to a great extent retard the pace of progress in the students' achievement trait if not checked. The matter is made even more complex when the gap is extended. This happens if the student spends more than one academic session trying to secure admission into tertiary institution. Fargo (2014) [4] posited that the free library is a place that can aid students gain academic information during end of programme activity gap. Students engaging in extra-mural lessons can also boost their academic prowess during activity gap. This engagement according to Uruala (2011) [12] bridges the academic gap.

Furthermore, students who get into universities immediately after secondary education have less activity gap than students who spend extra year grappling with incomplete ordinary level requirements, matriculation examination and other entrance examinations. What differences would there be between these students in their achievement levels when

they are faced with the same learning paraphernalia? There is an angle to the process of education that is worthy of study. The learning process is not cast on marbles where it remains even when the person becomes stagnant and engages in zero academic activity. Jamadi (2013) <sup>[5]</sup> posited that the student who is not doing any form of research and development or reading to update knowledge can actually forget some rudimentary knowledge especially in the subject area of Mathematics. Many of the fields of study require unceasing knowledge update to remain in the standards. It is therefore expected that, the more time is spent on zero academic activity, the more likely the student falls below previously attained standards.

Invariably, Mathematics as a subject matter has been the bane of many students immediate transition from secondary schools to universities (Kaluul, 2010) <sup>[6]</sup>. During activity gap, students are not expected to get themselves disconnected /disengaged from the study of Mathematics, rather they should engage themselves in programmes that will develop their academic skills and career advancement. Academic performance is boosted when students engage meaningfully during activity gap. Small & O'Connor (2008) <sup>[10]</sup> reported that research had shown that effective utilization of academic activity gap help to prevent juvenile delinquency. This is because when students effectively get themselves involved in academic or skill development programmes during academic activity gap, there wouldn't be any time to indulge in activities that lead to juvenile delinquent practices. To this end Roekel (n.d.) in a study reported that programmes that focused on personal and social development had a positive impact on students. Dayal & Abdullahi (2009) <sup>[2]</sup> indicated that the activities that students get themselves involved in during an academic activity gap may help raise their educational attainment. This means that there is need to bridge any academic divide among students.

Tanner *et al.* (2015) <sup>[11]</sup> in their study reported six categories on how students engage themselves during activity gap. The six categories are:

1. Those that spent a lot of time with friends and do less of academics.
2. Those that did a variety of activities in their hobbies.
3. Those that spent their time on sports and with grannies.
4. Those that spent time on extra tuition in a school subject
5. Those that spent time attending breakfast and after school clubs.
6. Those that did a lot of after school activities including extra tuition.

Wong (2015) <sup>[13]</sup> carried out a study which examined trends in extracurricular participation among students and found out that socio economic background/class have effect on students achievement. The unequal access of students to after school programme is creating a gap in academics to the disadvantaged students. With the inclusion of the subject as a requirement in the ordinary level certificate examination to most courses in the Nigerian university outline, many students have had to stay back to re-sit the examination over and over. Students who left the secondary level and spend extra year getting into the universities also have the herculean task of remaining abreast with the Mathematics standards and contending with contemporaries who may have entered directly after secondary education. It is against this background that this study sought to investigate the effects of academic activity gap on first year students'

achievement in Algebra course in Rivers State Nigeria.

### The Problem

The researcher of this study who is one of the course lecturers of first year Algebra course has observed with dismay the low level of first year students' knowledge in basic Mathematics which constitutes the Algebra course. The course content of the Algebra course (MTH 114) is made up of General Mathematics and Further Mathematics topics that students are expected to have learnt in the secondary schools. It is mandatory for Nigerian students seeking admission into any tertiary institution to study Mathematics or any Mathematics related course to enrol for, write and pass the O'level Mathematics, UTME (other subjects inclusive of Mathematics) and the institution post UTME test. The Algebra course group comprises of a mix of students that experienced academic activity gap and those that did not experience it before gaining admission into higher school to study Mathematics education. It is assumed that the year one students met the undergraduate admission requirements for them to study Mathematics. Why then do students perform poorly in the Algebra course? This is a problem. One then asks, does academic activity gap have any impact on first year students' academic achievement in Algebra course?

### Aim and Objectives of the Study

The purpose of this study was to explore the effect of academic activity gap on first year students' achievement in Algebra course. Specifically, the study sought to:

1. Find out whether students engage in extended academic programme during academic activity gap.
2. Determine if any difference exists in the Algebra (MTH 114) achievement mean scores of first year students who engaged in extended academic programme and those who did not during academic activity gap.
3. Analyse the effect of gender on the Algebra (MTH 114) achievement mean scores of the first year students who engaged in extended academic programme and those who did not during academic activity gap.

### Research Questions

The following three research questions guided this study.

1. To what extent do students engage in extended academic programme during academic activity gap?
2. What difference exists in the Algebra (MTH 114) achievement mean scores of first year students who engaged in extended academic programme and those who did not during academic activity gap?
3. How can we describe the difference in the Algebra (MTH 114) achievement mean scores of the male and female first year students who engaged in extended academic programme and those who did not during academic activity gap?

### Hypotheses

Two null hypotheses were tested at .05 significant level.

**H<sub>01</sub>:** There is no significant difference in the Algebra (MTH 114) achievement mean scores of first year students who engaged in extended academic programme and those who did not during academic activity gap.

**H<sub>02</sub>:** No significant difference exist in the Algebra (MTH 114) achievement mean scores of the male and the female first year students who engaged in extended

academic programme and those who did not during academic gap activity

**Research Methodology**

The study used the pretest-posttest one group intact class non-equivalent quasi-experimental research design. The target population was all 2017/2018 B.Sc/Ed first year students of the Faculty of Natural and Applied Sciences (Biology, Chemistry, Computer, Mathematics and Physics) in Ignatius Ajuru University of Education Port Harcourt, Rivers State Nigeria.

The sample of the study was all the one hundred and five 2017/2018 B.Sc/Ed first year students of the Faculty of Natural and Applied Sciences (Chemistry Mathematics and Physics) who offer Algebra Course (MTH 114) as a group. The purposive sampling technique was used to select this group of students. This group of students are in the Departments of Chemistry, Mathematics and Physics. This group of first year students was selected based on the criterion that Mathematics is a major component of their discipline.

The name of the instrument used for the collection of data was Algebra Activity Gap Achievement Test (AAGAT). The instrument was constructed by the researcher based on the first semester content of the course with course code MTH 114. The course content of MTH 114 included Real number system, indices, Logarithms, Surds, Theory of quadratic equation and Polynomials. AAGAT was of two-part, namely AAGAT 1 and AAGAT 2. The first part called AAGAT 1 elicited students bio data which included serial number, sex, department, year of O’level, year of admission into tertiary institution and type of academic programme engaged in while not admitted into tertiary institution. The second part called AAGAT 2 constituted fifty objective test (fill in the gap) items. Each correct answer to the test item was scored two points, otherwise, was scored zero point. The scoring of the test items gave no room for any subjective answer. The instrument was validated by two lecturers in the Department of Mathematics/Statistics. The

contributions keyed in by the experts were utilized to develop the final copy of the instrument before administering them to the sample. The split half method was employed to establish a reliability coefficient of 0.79.

All the first-year students that did not experience activity gap were screened out for the study using the first part of AAGAT (AAGAT 1). In this study, it is assumed that a student is said to experience activity gap if he/she had no admission into tertiary institution for three years after graduation from senior secondary three. The first part of AAGAT (AAGAT 1) was also used to group the first year students into two groups (those that engaged in extended academic programme during activity gap and those that did not engage in extended academic programme during activity gap). A simple random sampling technique was used to assign students that engaged in extended academic programme during activity gap into experimental group and the students that did not engage in extended academic programme during activity gap into control group. A pretest of AAGAT 2 was then administered to all the students, after which the two groups were treated by teaching the selected MTH 114 course contents. The teaching was carried out for four weeks (4 hours/week). The posttest of the same AAGAT 2 was re-administered to the groups after the treatment. The teaching was carried out by the researchers who happen to be course lecturers of the course, MTH 114. The pretest and posttest scripts were collected from the students and marked by the lecturers. Each test was marked over hundred.

The simple percentage and mean gain were used to answer the research questions while the Analysis of Covariance (ANOVA) was used to test the hypotheses at .05 significant level.

**Findings**

**Research Question 1:** To what extent do students engage in extended academic programme during academic activity gap?

**Table 1:** Percentage of students’ engagement during academic activity gap.

Group	N	Group f (%)	Gender	Gender f(%)
Students that engaged in academic programmes during academic activity gap.	105	57(54%)	Female	31(54%)
			Male	26(46%)
Students that did not engage in academic programmes during academic activity gap.		48(46%)	Female	34(71%)
			Male	14(29%)

Table 1 showed that 57(54%) of the students engaged in extended academic programmes during activity gap while 48(46%) of the students did not engage in extended academic programmes during activity gap. The result in table 1 also showed that 31(54%) of the female and 26(46%) of the male engaged in extended programmes during activity gap respectively while 34(71%) of the

female and 14(29%) of the male did not engage in extended academic programmes during activity gap.

**Research Question 2:** What difference exists in the Algebra (MTH 114) achievement mean scores of first year students who engaged in extended academic programme and those who did not during academic gap activity?

**Table 2:** Mean gain scores of students who engaged in extended academic programme and those who did not during academic gap activity in MTH 114.

Group	N	Pretest Mean	SD	Posttest Mean	SD	Mean Gain	SD
Experimental	57	30.68	9.50	69.60	12.69	38.91	18.02
Control	48	32.22	7.27	51.42	10.12	19.20	13.71

Table 2 showed that the mean gain score of students in the experimental group (i.e. students who engaged in extended academic programme during activity gap) was 38.91(SD=

18.02) and those in the control group (i.e. who did not engage in extended academic programme during academic gap activity) had a mean gain score of 19.20 (SD= 13.71).

**Research Question 3:** How can we describe the difference in the Algebra (MTH 114) achievement mean scores of the male and female first year students who engaged in

extended academic programme and those who did not during academic gap activity?

**Table 3:** Mean gain score of the female and the male students who engaged in extended academic programme and those who did not during academic gap activity in MTH 114.

Group	Gender	N	Pre test Mean	SD	Post test Mean	SD	Mean Gain	SD
Experimental	Female	31	30.40	7.27	71.70	11.01	41.30	14.86
	Male	26	31.07	12.14	66.80	14.56	35.73	21.68
Control	Female	34	31.22	7.10	49.22	6.44	18.00	9.05
	Male	14	33.29	7.51	53.75	12.75	20.47	17.58

Table 3 showed that the female students in the experimental group who engaged in extended academic programme during gap activity had a mean gain of 41.30 (SD= 14.86) while their male counterpart had a mean gain of 35.73(21.68). The female students in the control group who did not engage in extended academic programme during gap activity had a mean gain of 18.00 (SD= 9.05) while their

male counterpart had a mean gain of 20.47(SD=17.58).

**Ho1:** There is no significant difference in the Algebra (MTH 114) achievement mean scores of first year students who engaged in extended academic programme and those who did not during academic gap activity.

**Table 4:** Summary of ANCOVA on the difference between the students’ mean score in MTH 114

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6513.13 <sup>a</sup>	3	2171.04	11.95	.000
Intercept	27845.11	1	27845.11	153.20	.000
Pretest	17.74	1	17.74	.10	.755
Approach	6508.83	2	3254.42	17.91	.000
Error	18357.12	101	181.76		
Total	433216.00	105			
Corrected Total	24870.23	104			

a. R Squared = .253 (Adjusted R Squared = .250)

Table 4 showed that there was a significant difference between the mean score of the students who engaged in extended academic programme and those who did not engage in extended academic programme during academic gap activity (F2, 101=17.91, p<.05). The hypothesis one was therefore rejected.

**Ho2:** No significant difference exist in the Algebra (MTH 114) achievement mean scores of the male and female first year students who engaged in extended academic programme and those who did not during academic gap activity.

**Table 5:** Summary of ANCOVA on the difference between the male and female students’ mean score in MTH 114

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6905.67 <sup>a</sup>	6	1150.95	6.28	.00
Intercept	27775.15	1	27775.15	151.52	.00
Pre test	23.07	1	23.07	.13	.72
Approach	6250.46	2	3125.23	17.05	.00
Gender	.85	1	.85	.01	.95
Approach * Gender	391.90	2	195.95	1.07	.35
Error	17964.58	98	183.31		
Total	433216.00	105			
Corrected Total	24870.29	104			

a. R Squared = .278 (Adjusted R Squared = .233)

Table 5 showed that there was no significant difference between mean score of the male and female students’ who engaged in extended academic programme and those who did not engage in extended academic programme during academic gap activity (F1, 98=1.07, p>.05). Hypothesis two was therefore retained.

**Discussion of Findings**

From the findings of this study, one can see that there is actually the existence of academic gap activity when students transit from secondary school to tertiary institution. Though this academic gap is not experienced by every student. The study also reveals that students that experience

a gap activity during this transition and engage themselves in extended academic programme achieve higher in Mathematics than students who do not engage themselves in extended academic programme. Mathematics is a subject that demands constant and continuous problem-solving practice. Students that bridge the gap during academic gap by engaging in extended academic programme stand the chance of enhancing their mathematical prowess. This is in agreement with the findings of Dayal & Abdullahi (2009) [2] who found out that the activities that students get themselves involved in during an academic activity gap may help raise their educational attainment

Table 4 showed that there was a significant difference

between the mean score of the students who engaged in extended academic programme and those who did not engage in extended academic programme during academic gap activity ( $F_{2, 101} = 17.91, p < .05$ ). The hypothesis one was therefore rejected and the alternative hypotheses upheld.

The study also reveals that there was no significant difference between mean score of the male and female students' who engaged in extended academic programme and those who did not engage in extended academic programme during academic gap activity. It is therefore very important that both the male and female students who experience a gap in academic activity should endeavour to close the gap.

### Conclusion

The study therefore concluded that the academic activity gap experienced by students devoid of extended academic activity poses a threat to the students' achievement in Algebra when they eventually gain admission into tertiary institution to study Mathematics or a Mathematics related courses.

### Recommendations

Based on the result, it was recommended that:

1. Secondary school students should be encouraged to study harder so as to succeed in all the external examinations that qualify them to gain admission into Nigerian tertiary institution. By so doing students will not experience academic gap on transition from secondary education to tertiary education.
2. Those students that experience academic activity gap should engage in extended academic programmes to sustain their mathematical skills for higher academic pursuit.

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