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## Effect of Class Size on the Academic Achievement of Students in Basic Science and Technology in Gwagwalada Area Council FCT Abuja

<sup>1</sup>Mohammed Ibrahim Abba, <sup>1</sup>Uche S. Anaduaka & <sup>2</sup>Kasim Mohammed Saad

<sup>1</sup>Department of Science and Environmental Education, University of Abuja

<sup>2</sup>Registry Department, General Administration and Council Affairs, Usmanu Danfodiyo University

**Email:** [bonga2004@hotmail.com](mailto:bonga2004@hotmail.com), [sanaduaka@yahoo.com](mailto:sanaduaka@yahoo.com),

[alkasim.saad@gmail.com](mailto:alkasim.saad@gmail.com)

**Corresponding Author:** Mohammed Ibrahim Abba

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### ABSTRACT

The study was carried out to investigate the Effect of Class Size on the Academic Achievement of Students in Basic Science and Technology in Gwagwalada Area Council FCT Abuja, Nigeria. The study had 2 specific objectives, 2 research questions and 2 null hypotheses. Quasi experimental research design was used. The population of the study comprised of the JSS 3 students of all the Junior Secondary Schools in Gwagwalada Area Council, FCT Abuja. A sample of 109 students was drawn from Junior Secondary School Old Kutunku in Gwagwalada, Abuja. Purposive sampling was used to select two intact classes from the selected school. The students were divided into two groups (experimental and control group). The instruments used for the study was a self-formulated Basic Science and Technology Achievement Test (BSTAT), designed by the researchers. It consists of a 50-item multiple choice achievement test with options A-D. It was validated by two experts in the field of test and measurement, Faculty of Education, University of Abuja. Pilot test was conducted in a different school using the test re-test method, and a reliability co-efficient of 0.82 was obtained using Pearson Product Moment co-efficient, indicating that the instrument is highly reliable. Data collected was analyzed using mean, standard deviation and t-test statistics. The findings revealed that students in the small class performed better than those in the large class. Also there is no significant difference in the mean achievement scores of male and female students. The null hypothesis tested at 0.05 level of significance indicated that there is a significant difference between the achievement scores of those in the small class and those in the large class. It was therefore concluded that large population in our classes has a negative impact on students' academic performance. The study recommended, among others, that the correct ratio of one teacher per 35 students should be encouraged, as stipulated by the national policy on education. This will enable teachers to teach well and to ensure good classroom management without much difficulties and challenges. Also, large population in classes should be avoided because it has effect on student's performance. The study also recommended that public address system and a conducive environment should be provided to enable effective communication especially in large classroom.

**Keywords:** Class Size, Academic Achievement, Basic Science and Technology, Secondary School Students

## INTRODUCTION

Basic Science and Technology is a subject taught at the junior secondary school level of education in Nigeria. It is part of a broad field curriculum that prepares students for a life in the Science field. It comprises of core science subjects like Chemistry, Biology and Physics. This is to enable the students to be well grounded in science subjects at the senior level. Some of the objectives of Basic Science and Technology curriculum, as observed by Awoniyi (2007), include:

1. Developing interest in science and technology.
2. Acquiring basic skills in science and technology.
3. Application of scientific and technological knowledge and skills to meet societal needs.
4. Take advantage of the numerous career opportunities offered by science and technology
5. Become prepared for further studies in science and technology

Basic Science and Technology is one of the bedrocks of growth and development in any nation as it trains students for the purpose of initiating, facilitating, and implementing technical development and also creating the awareness of technical literacy (Uwaifo, 2009). Additionally, Olugbade, Adekomi, and Sofowora (2016) observed that Basic Science and Technology has a more direct impact on national life and development as they contribute visibly in the areas of automobile technology, electrical and electronics, woodwork technology and other scientific advancement. Advanced countries have been able to achieve most of their feats as a result of advancement in science and technology. This view was corroborated by Goldenberg (1998) that the United States of America, some countries in Western Europe, Japan, and China were all able to develop massively because they have developed their science and technology education. In addition, they have utilized, and are still utilizing, the products of their well-developed science education programs. Basic Science and Technology is a very important subject to national development in Nigeria. Therefore the need to boost the academic achievement of students in Basic Science and Technology for national development needs not to be overemphasized.

However, over the years, there have been a lot of challenges in teaching and learning Basic Science and Technology due to, mostly, the influence of class

size. Most classes in Nigeria are over populated which does not allow teachers to teach well, carryout practicals effectively and for the limited resources to reach all and sundry, as a result of large class size. The National Policy on Education (1981) recommends that the teacher-pupils ratio should be 1:35. Teaching and learning effectively takes place when there is a moderate number of students in a class. Basic Science and Technology, as a subject in secondary school, requires the teacher to carefully and critically explain concepts vividly for thorough understanding of concepts.

The size of class varies from one level of education to the other. The National Policy on Education (NPE) recommends a class size of 20 pupils in pre-primary level; 30 students at the primary level and 35 students in secondary school level (Nnaji, 2009:17). Babatunde (2003), nonetheless, opined that adequate class size should be around 40 students to one teacher in the secondary level. Class size directly affects classroom instruction due to the fact that larger classes require teachers to use class time for management tasks rather than teaching and learning.

According to Anderson and Omwirhiren (2016), class size refers to the actual number of pupils taught by a teacher at a particular time. Babatunde (2003) sees class size as an educational tool that is used to describe the average number of students per class in a school. Hoffman (1980) describes class size as the number of students per teacher in the class. The National Policy on Education (1981) recommends that the teacher-pupils ratio should be 1:35. Teaching and learning effectively takes place when there is a moderate number of students in a class. A small class affords the teacher the opportunity to interact well, explain concepts, demonstrate concrete ideas and ensure adequate classroom activity. However, a large class size does not give teachers such opportunities. The class, as a result of having too much population, becomes boring; teachers do not usually have time to carryout adequate classroom activity and interact well. The size of class varies from one level of education to the other.

In Nigeria, it is quite alarming to see large number of students learning in a classroom meant for small students. As a result of the huge expansion in school enrolment rate in the country, most classes become overpopulated. Basic Science, as a subject in secondary school, requires the teacher to carefully and

critically explain concepts vividly for thorough understanding of concepts. The importance of Basic Science needs not to be overemphasized because it is part of the broad-field curriculum that prepares the students for life in the science field both at the secondary and tertiary school level. In a situation where classes are overpopulated, lesson becomes boring, thereby affecting the academic achievement of students. Teachers spend most of their time managing noise and distraction, than teaching effectively. This made Babatunde (2003) to observe that large class size poses some teaching challenges like delayed feedback, result inefficiency, poor quality of students, and reduction in teaching effectiveness. All the aforementioned problems have led to a serious decline in class activities and, in the long run, students' performance. It is against this backdrop that this study intends to check the effect of class size on the academic achievement of students in Basic Science and Technology in Gwagwalada Area Council of the FCT.

## REVIEW OF RELATED LITERATURE

There are many literatures about the concept of class size and the academic achievement of students. Nnaji (2009) investigated the effect of class size on senior secondary school students' performance in English writing and reported that students in small class perform better than those in larger class. The result of the study also revealed that gender does not have any significant effect as far as class size is concerned. Also, citing studies conducted by Coleman (1989); Glass (1989); and LoCastro (1989), Nnaji (2009) observed that large class size is a strong impediment to achieving effective classroom integration, thereby suggesting that small class tend to bring about high academic achievement.

Babatunde (2003) conducted a study on the effect of class size on students' performance in Kaduna State, Nigeria. Findings from the study revealed that there is a significant difference in the performance of students, with large class performing better than small class. She, however, added that academic excellence is due to interest but recommended that small class size should be adopted. Anderson and Omwirhiren (2016) investigated the effect of class size on students' academic achievement in Chemistry and found that students in small class size performed better because large class size forms an impediment to students' performance. They observed that male students performed better than female in the small class.

Another study by Yusuf, Onifade, and Bello (2016) on the impacts of class size on student's academic achievement revealed that students in small class had a higher mean and that large class has a negative effect on the achievement of students. Similarly, Alebiosu (2000), in Yusuf et al (2016) reported, based on the outcome of his study that students in small class performed better than those in larger classes.

### **STATEMENT OF THE PROBLEM**

The expansion in the school enrollment rate in Nigeria has enabled all and sundry to pick up interest in education. As a result, there are huge numbers of students in classes meant for small students. A small class affords the teacher the opportunity to interact well, explain concepts, demonstrate concrete ideas and ensure adequate classroom activity. However, a large class size does not give teachers such opportunities. The class, as a result of having too much population, becomes boring; teachers do not usually have time to carryout adequate classroom activity and interact well. Teachers therefore spend more time on classroom management and elimination of distractions, than on actual teaching and learning, and no enough time is spent on practicals because the facilities would not get to everyone as a result of over population. In a situation where classes are overpopulated, lesson becomes boring, thereby affecting the academic achievement of students. This prompted Babatunde (2003) to observe that large class size poses some teaching challenges like delayed feedback, result inefficiency, poor quality of students, and reduction in teaching effectiveness. All the aforementioned problems have the potentialities of affecting the academic achievement of students in Basic Science and Technology in schools. Therefore, it is against these problems that the study intends to investigate the effect of class size on the academic achievement of students in Basic Science and Technology in Gwagwalada Area Council.

### **Purpose of the Study**

The main purpose of the study is to investigate the effect of class size on the academic achievement of students in Basic Science and Technology in Gwagwalada, Abuja.

Specifically, the study seeks to:

1. Determine the mean difference in the academic achievement of students taught Basic Science and Technology in small and large class.
2. Ascertain the mean difference in the academic achievement of male and female students taught Basic Science and Technology in small class.

### **Research Questions**

The following research questions were posed to guide the study:

1. What is the mean difference in the academic achievement of students taught Basic Science and Technology in small and large class?
2. What is the mean difference in the academic achievement of male and female students taught Basic Science and Technology in small class?

### **Research Hypotheses**

The following null hypotheses were formulated for the study:

1. There is no significant difference in the mean academic achievement of students taught Basic Science and Technology in small and large class.
2. There is no significant difference in the mean academic achievement of male and female students taught Basic Science and Technology in small class.

## **METHODOLOGY**

The study adopted a quasi-experimental design because it is aimed at establishing a relationship between two variables in order to determine a cause and effect relationship. The population of the study comprised of the JSS 3 students of all the Junior Secondary Schools in Gwagwalada Area Council, FCT Abuja. A sample of 109 students was drawn from Junior Secondary School Old Kutunku in Gwagwalada, Abuja. Purposive sampling was used to select two intact classes from the selected school. The researchers used balloting to assign the students into experimental and control groups. The students in small class made up the experimental group while those in large class made up the control group. As a result, 76 students were therefore assigned into control group while 33 students (15 boys and 18 girls) fell in the experimental group. The instruments used for the study was a self-formulated Basic Science and Technology Achievement Test (BSTAT), designed by the researchers. It consists of a 50-item multiple choice achievement test with options A-D. The instrument was validated by two experts in the field of test and measurement, Faculty of

Education, University of Abuja. In order to determine its reliability, a pilot test was conducted in a different school using the test re-test method, and a reliability co-efficient of 0.82 was obtained using Pearson Product Moment co-efficient. Therefore the instrument is very reliable. The instrument was administered by the researchers after successfully teaching the students. The test lasted for one hour twenty minutes, making it one minute and thirty seconds per question since the multiple choice questions are 50. The researchers collected all the booklets after the test for final analysis. The statistical tools used were mean and standard deviation meant to answer the research questions; while t-test analysis was used to test the null hypotheses at 0.05 level of significance.

## RESULTS

### Research Question One

What is the mean difference in the academic achievement of students taught Basic Science and Technology in small and large class?

**Table 1: Descriptive Statistics showing the Mean and Standard Deviation of Basic Science and Technology Students Taught in Small Class (Experimental Group) and Large Class (Control Group)**

Group	Number	Mean	Standard Deviation
Experiment (Small Class)	33	14.302	1.370
Control (Large Class)	76	10.892	4.943
<b>Total</b>	109		

Table 1 above revealed the mean achievement scores of Basic Science and Technology students taught in small class and those taught in a large class. From the result, the mean achievement scores of experimental group and control group was 14.302 and 10.892 respectively; while the standard deviation was 1.370 and 4.943 respectively. The experimental group, with a higher mean, therefore performed better than the control group. This means that students in the small class performed better than those in the large class.

### Research Question Two

What is the mean difference in the academic achievement of male and female students taught Basic Science and Technology in small class?

**Table 2: Descriptive Statistics Showing the Mean and Standard Deviation of Male and Female Students taught Basic Science and Technology in Small Class**

Gender	Number	Means	Standard Deviation
Male	15	12.546	3.987
Female	18	12.469	4.018
<b>Total</b>	<b>33</b>		

Table 2 above shows the mean achievement scores and standard deviation of male and female students in the small class. The mean achievement scores of male and female students were 12.546 and 12.469 respectively and their standard deviation was 3.987 and 4.018 respectively. This indicates that there is no much difference between mean scores of male and female students.

## TESTING OF HYPOTHESIS

### Hypothesis One

There is no significant difference in the mean academic achievement of students taught Basic Science and Technology in small and large class.

**Table 3: t-test Summary on the Mean Achievement of students taught Basic Science and Technology Students in Small Class (Experimental Group) and those in the Large Class (Control Group)**

Variables	N	Mean	Std.	Df	t-cal	t-crit.	Sig.	Decision
Experimental	33	14.302	1.370	107	1.206	1.96	.872	Rejected
Control	76	10.892	4.943					
<b>Total</b>	<b>109</b>							

Table 3 shows the t-test analysis of the difference between the mean achievement scores of students in small class and those in the large class. Results on the table revealed that calculated t-value (1.206), at 107 degree of freedom and at 0.05% level of significance, is greater than t-critical value (1.96). Therefore, the null hypothesis was rejected. This means that a significant difference exists in the mean scores of students taught in small class and those in the large class.



**Hypothesis Two:**

There is no significant difference in the mean academic achievement of male and female students taught Basic Science and Technology in small class.

**Table 4: t-test Summary and Difference in the Mean Achievement of Male and Female students Basic Science and Technology Students in Small Class (Experimental Group)**

Variables	N	Mean	Std.	Df	t-cal	t-crit.	Sig.	Decision
Male	15	15.3025	1.8126	31	1.421	1.96	.872	Accepted
Female	18	10.7626	4.4425					
<b>Total</b>	<b>33</b>							

Table 4 shows the t-test analysis of difference in the mean achievement scores of male female Basic Science and Technology students in small class. Results on the table revealed that calculated t-value (1.421), at 31 degree of freedom and at 0.05% level of significance, is less than t-critical value (1.96). Therefore, the null hypothesis was accepted. This means that there is no significant difference in the mean scores of male and female Basic Science and Technology students in small class.

**DISCUSSION OF MAJOR FINDINGS**

The first finding of the study revealed that students in small class performed better than those in the large class. This finding was presented on table 1 by answering research question one, where the experimental group performed better than the control group. The t-test analysis used to test null hypothesis 1, as presented on table 3, revealed that a significant difference exists in the mean scores of students taught in small class and those taught in the large class. This finding is in line with the work of Yusuf, Onifade, and Bello (2016) who found out that there was a remarkable difference in the achievement scores of students taught in small class and those in the large class; this is because the students in small class had a higher mean, showing that large class has a negative effect on the achievement of students. The result is also in agreement with the findings of Alebiosu (2000) who found that students in small class performed better than those in large class. The finding is equally in line with the view of Nnaji (2009) who observed that large class size is a strong

impediment to achieving effective classroom integration, thereby suggesting that small class tends to bring about high academic achievement. This finding is also in agreement with the studies of Coleman (1989); Glass (1989); and Lo Castro (1989) who revealed that students in small class perform better because large class size is a strong impediment to achieving effective classroom integration. The result is however not in agreement with the findings of Babatunde (2003) who found that students in large class performed better than those in small class.

The second finding of the study shows that there is no much difference between the mean scores of male and female students taught in the small class. This finding was presented on table 2, by answering research question 2. The t-test analysis used to test null hypothesis 2, as presented on table 4, revealed that there is no significant difference in the mean achievement scores of male and female students in small class. This finding is in congruent with the findings of Nnaji (2009) who revealed that there is no significant gender difference in the mean achievement of male and female students when it comes to class size. It can be deduced that gender plays no effect on the achievement of students in small class. This shows that academic achievement of male and female students has to do with interest and individual differences. On the contrary, the finding also disagrees with Anderson and Omwirhiren (2016) who found, in their study, that male students performed better than female students in small class.

## CONCLUSION

From the findings of the study, it was concluded that students in small class performed better than those in the large class. This indicates that students learn and perform better when they are small in class because small class gives the teacher and students the ample opportunity to interact well, explain concepts, demonstrate concrete ideas and ensure adequate classroom activity thereby improving their academic performances.

## RECOMMENDATION

Based on the outcome of this study, the following recommendations are hereby made:

1. The correct ratio of one teacher per 35 students is hereby encouraged, as stipulated by the national policy on education. This will enable teachers to teach well and to ensure good classroom management without much difficulties and challenges.
2. The government should provide all the necessary facilities like effective instructional resources needed to ensure effective teaching and learning in schools. This will enable teaching and learning to be interesting, simplified and to reach everyone.
3. Public addressing system and a conducive environment should be provided to enable effective communication especially in large classroom.

## REFERENCES

- Adeniyi, E.O. (2007). 9-Year Basic Science and Technology Curriculum. Curriculum Development Centre, NERDC, Abuja.
- Alebiosu, K.A. (2000). Effect of Two Instructional Methods on Senior Secondary School Students' Perception of the Difficulty in Learning some Science Concepts and their Achievement Gains. *Journal of Educational Foundations and Management*, 1(1): 57-63.
- Anderson, F.E., Omwirhiren, E.M. (2016). Effect of Class Size and Students' Attitude on Academic Performance in Chemistry at Demonstration Secondary School, Ahmadu Bello University Zaria, Nigeria. *IOSR Journal of Research & Methods in Education*, 6: 01-06.
- Babatunde, A.M. (2003). Influence of Class Size, Teacher Variables and School Location on Academic Performance among Senior Secondary School Students in Kaduna State, Nigeria. Unpublished Master's Thesis Submitted to the Department of Educational Psychology and Counseling, Ahmadu Bello University, Zaria.
- Coleman, H. (1989). Large Classes in Nigeria. Lancaster-Leeds Language Learning in Large Classes Research Project Report No. 6.

- Federal Republic of Nigeria (1981). *National Policy on Education*. Lagos: NERDC Press.
- Glass, G.V., Cahen. L., Smith, M.L., Filby, N. (1989). *School Class Size: Research and Policy*. Beverley Hills, CA: Sage.
- Goldenberg, J. (1998). What is the Role of Science in Developing Countries? *Science*, 279 : 1140- 1141.
- Hoffman, D.W. (1980). *Class Size and Instruction*. New York: Longman Press.
- Lo Castro, V. (1989). Large Classes: The Situation in Japan (Project Report No. 5), Leeds, England: Lancaster-Leeds Language Learning in Larger Classes Research Project. *Niger Journal of Educational Research*, 4 (1).
- Nnaji, A.I. (2009). Effects of Class Size on Senior Secondary School Students' Performance in Essay Writing in English Language. Unpublished Masters Thesis Submitted to the Department of Art Education, University of Nigeria, Nsuka.
- Olugbade, D., Adekomi, A., Sofowora, A.O. (2016). Enhancing Students' Performance in Basic Science and Technology in Nigeria Using Moodle LMS. *International Journal of Social, Behavioural, Educational, Economic, Business and Industrial Engineering*, 10 (5).
- Uwaifo, V.O. (2009). Integration of Basic Science and Technology as a Pre-Vocational Subject. *Niger Journal of Educational Research*, 4(1).
- Yusuf, T.A., Onifade, C.A., Bello, S.O. (2016). Impact of Class Size on Learning, Behaviour and General Attitudes of Students in Secondary Schools in Abeokuta, Ogun State, Nigeria. *Journal of Research Initiatives*, 2 (1). Available online at <http://digitalcommons.uncfsu.edu/jri>