
**EFFECTS OF CLASS SIZE ON PERFORMANCE AND ATTITUDE IN
ECOLOGY AMONG SENIOR SECONDARY STUDENTS IN SABON-
TASHA, KADUNA STATE, NIGERIA**

SALOMI KENNEDY GWAMNA

Kaduna State Scholarship Board,
Kaduna State

ALEXANDER JATAU

Kaduna State Ministry of Education,
Kaduna State

LOUIS UGWU

Department of science education,
AhmaduBelloUniversity Zaria

ABSTRACT

This study investigated the effects of class size on performance and attitude in ecology among secondary schools students in Sabon-Tasha Education Zone, Kaduna State, Nigeria. The targeted populations were all the 1,183 second-year senior secondary Biology students. The sample size was 101 SS II students selected from the population using the purposive sampling technique. The research design was a descriptive survey design of the ex-post facto type. The instruments used were; Ecology Performance Test (EPT), and the Students' Attitude Questionnaire (SATQ). The reliability coefficient of the instruments were; EPT = 0.78 and SATQ = 0.77. Two research questions (RQ) were raised to guide the study, one of which was "Is there any difference between the mean scores of students in large class size and those in small class size?" two hypotheses (Ho) were postulated to guide the study and tested at 0.05 level of significance. One of the hypotheses was as follows: "There is no significant difference between the mean scores of students in large class size and those in small class size in ecology concepts" descriptive statistics of mean and standard deviation were used to answer research questions while Independent sampled t-test and Mann-Witney test was used to test the hypotheses. The major findings showed that; significant difference exists between the academic performance of students in large class size and small class size. On the basis of these finding, the following recommendation was made: The Federal and State Governments should build enough classrooms in schools with adequate facilities needed for effective classroom teaching and learning

1.0 INTRODUCTION

Ecology is a branch of Biology, dealing with the scientific analysis and study of interactions among organisms and the environment. The teaching of the ecology concept at secondary school level improves students' understanding of the ecosystem. It also enables students to understand how biodiversity (a variety of species of organisms) affects ecological function.

Furthermore, ecology concepts seek to explain: life processes, interactions and adaptations; the movement of materials and energy through living communities; the successional development of ecosystems and the abundance and distribution of organisms and biodiversity in the context of the environment. However, teaching ecology at the secondary school level seems to face more challenges than other concepts in Biology (Achor&Amadu, 2015) which could be attributed to ecology being an outdoor study that requires taking the students outside the normal classroom to the field. Teaching ecology outside the classroom could face a lot of challenges among which includes class size. Class size is one of the school variables that determine how effectively students learn. Studies (Owoeye&Yara, 2015; Eboatu&Ehirim, 2019) reported that school population, large class sizes and teaching methods are among the school factors that impact on students' academic performance. According to Adimonyemma, Akachukwu and Igboabuchi (2018) class size refers to the actual number of learners taught by a teacher at a particular time. Omwirhiren and Anderson (2018) explained class size as the number of learners to whom a teacher is primarily responsible during a school year. The class size could be large or small. Izibegbalawo (2019) noted that class can be said to be large when the student number is more than 30. Studies (Omwirhiren& Anderson, 2018; Taofeek, Onifade& Bello, 2019) have shown that class size is an important factor that affects student's performance and attitude in science. Attitude can be defined as the predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and responses to challenges, incentives, and rewards (together called stimuli). Taofeek, Onifade and Bello (2019) stated that there is a close association between a student's attitude and academic performance.

Attitude towards ecology denotes interest or feeling towards the study of ecology concepts. It is the students' disposition towards like or dislike of ecology. The development of student's positive attitudes towards science is one of the major responsibilities of every science teacher (Omwirhiren& Anderson, 2018). The way a student perceives ecology influence his or her attitude towards it, and this attitude to ecology determines his or her performance. Once the attitudes of students are known, suitable instructional methods can be devised to meet the interest of the student. According to Yusuf, Onifade and Bello (2018), class size has a great impact on learners' attitude as it plays a role in learners' positive or negative evaluation of an object or concept and also influences learners' behavior towards that object or concept in a favourable or unfavourable manner. It is expected that large classes reduce effective classroom control thereby, encourage distraction and disruptive behaviours among learners. (Adimonyemma, Akachukwu&Igboabuchi, 2018) reported that students in small classes display less disruptive behavior or negative attitude than those in large classes.

Stephens, Hamedani and Destin (2017) asserted that class size significantly affects the level of students' cognitive skills in the classroom. Small classes improved both the students' performance and learning behaviour as well as it yields fewer classroom disruptions and discipline problem. The relationship between class size and academic performance has been a perplexing one for educators. According to Mokobia and Okoye, (2018) poor performance is a performance that is adjudged by the examinees as falling below an expected standard. The interpretation of this expected or the desired standard is better appreciated by the perpetual cognitive ability of the evaluator of the performance. Babatunde (2019) described the poor academic performance as any performance that falls below the desired standard. Although, several scholars have proposed various factors responsible for the poor performance of

students, such as the economic background of the learner, poor attitude to ecology concepts and lately increase in class size. Studies have shown that a positive attitude towards a subject can lead to higher performance (Taofeek, Onifade& Bello, 2019). There is therefore the need to adopt efficient teaching and learning strategies that will enhance better performance and attitude of the subject matter by students.

Researches (Adimonyemma, Akachukwu&Igboabuchi, 2018; Mokobia& Okoye, 2018) have suggested that smaller classes are usually preferred by both instructors and students. Babatunde (2019) advised an educational policy of class sizes less than 30 while the National Policy on Education (FRN, 2013) recommended the teacher-student ratio of 1:40. Class size affects the level of understanding of the learners because the teacher has no full attention on every learner in the classroom. This unpleasant trend in educational development has in turn affected teaching and learning in schools today. Overpopulated classrooms have increased the possibilities of learners to lose interest in school and do poorly in test. Learners do not get individuals' attention, low reading scores, frustration and stress felt by the teachers and the inability of students to concentrate or stay on task while in the class. This has been attributed to the fact that teachers are unable to give individual attention to learners. Teachers' aides are not always available and sometimes learners have to share textbooks. Large class size is a serious problem in many schools systems, particularly in the inner cities where space for new construction is limited. As a result, learners find themselves trying to learn while jammed into spaces never intended as classrooms, such as libraries, gymnasiums, laboratories, lunchrooms and even closets. Musa (2019) reported that large class size negatively affects both classroom activities and instructional technologies making it difficult for students to concentrate on their lessons. Furthermore, the amount of time teachers spend on innovative teaching methods such as cooperative learning, field-trip and group work in teaching ecology concepts is increased.

2.0 THEORETICAL FRAMEWORK

The theoretical framework, on which this study is hinged on, is Piaget's developmental theory of learning (1952) which explains that a learner should be able to explore the environment for effective learning. The central component of Piaget's developmental theory of learning and thinking is involving the participation of the learner. This means that knowledge is not merely transmitted verbally but must be constructed and reconstructed by the learner. Therefore, this study focuses on the use of small and large class size to ascertain the active participation of learners, in the teaching and learning process of ecology concepts.

3.0 STATEMENT OF THE PROBLEM

Despite the importance placed on Biology, students' performance in the subject at both internal (terminal school examination) and external (WASSCE and NECO) examinations have been repeatedly reported to be poor (Adewale, 2016; Ajaja, 2016; Agboghroma, 2019). The poor performance of students in Biology becomes more evident, looking at the records of the West African Examination Council (WAEC) results over the years, which reveals that Biology, has a high number of students' enrolment yearly in the Senior School Certificate Examination but records fluctuating performances over the years. The consistent fluctuating performances have become a major concern to science educators, parents and other

stakeholders in science education. The West Africa Examination Council (WAEC, 2010) listed among others; a poor grasp of ecological concepts and large class sizes as contributing factors for the low performances in Biology. The large class size of science students in senior secondary schools is not encouraging (Omwirhiren& Anderson, 2016). Musa (2018) observes that most students in large class size classrooms do not copy notes or summary of the lesson given by the teacher. Large class size is usually characterized by noise-making, difficulties in setting up activities for the learners and limited resources. This makes the students be unserious with their studies.

Aim

To determine the effects of class size on performance and attitude in ecology among secondary schools students in Sabon-Tasha Education Zone, Kaduna State, Nigeria.

3.1 Objectives of the Study

The objectives of this study are to:

1. determine the effect of class size on students' performance in ecology
2. determine the effect of class size on students' attitude towards ecology

3.2 Research Questions

The following research questions are formulated to guide the study:

1. Is there any difference between the mean scores of students in large class size and those in small class size in ecology?
2. What is the difference between the attitude of students in large class size and those in small class size taught ecology concepts?

3.3 Null Hypotheses

The following null hypotheses were formulated based on the research questions and tested at a 0.05 level of significance:

Ho1 There is no significant difference between the mean scores of students in large class size and those in small class size in ecology

Ho2 There is no significant difference between the attitude of students towards ecology in large class size and those in small class size

4.0 SIGNIFICANCE OF THE STUDY

The findings of this study would hopefully benefit the following:

Students: Encourage Biology students to avail themselves during ecology lessons which can enhance better performance and attitude towards learning ecology concepts.

Teachers: To have a wider view on how to organize a classroom sitting arrangement to ensure effective participation of learners and better classroom management and instruction.

Curriculum Planners: To use the variable class size, as a road map in designing a curriculum that will put into consideration the instructional strategies that will cater for small, medium and large class sizes.

Government: Help to see the need to build more classrooms that will accommodate the ever-increasing students' population in secondary schools.

4.1 Research Design

The research design for this study is a descriptive survey design of the ex-post facto type. This is because the researchers will not be able to manipulate the variables for simple reason that they have already occurred.

4.2 The population of the Study

The research respondents for this study were 1,183 SS II Biology students from forty (40) co-educational schools in Sabon-Tasha Education Zone Kaduna State, Nigeria.

4.3 Sample and Sampling Techniques

From the population of forty co-educational schools, two schools were selected using a purposive sampling technique based on the number of students in each class. The first school selected had a total number of seven two (72) students in the class representing a large class size. While the second school had a total number of twenty-nine (29) students representing a small class size. The total number of the students selected for the study was one hundred and one (101) which constituted the sample size.

4.4 Instrumentation and Validity of the Instruments

The instruments used were; Ecology Performance Test (EPT) and Students' Attitude Questionnaire (SATQ). The instruments were validated by three Senior lecturers from the Department of Science Education, Ahmadu Bello University, Zaria with a minimum qualification of Ph.D.

4.5 Pilot Testing and Reliability of the instruments

The instruments were pilot tested in one of the schools which constituted the population but was not part of the study. The reliability coefficient of the instruments were; EPT = 0.78 and SATQ = 0.77.

4.6 Data Collection Procedure

The two groups (large Class Size and Small Class Size) were taught ecology concepts for a period of six weeks by the researcher. After which they were given a test from the EPT and Students' Attitude Questionnaire to fill.

4.7 Procedure for Data Analysis

Research questions were analysed using descriptive statistics of means scores, standard deviation and non-parametric test Mann-Witney mean ranking. Null hypotheses were analysed using Independent sampled t-test statistics and non-parametric test of Mann-Whitney statistics

5.0 RESULTS AND DISCUSSION

a. Answering Research Questions

Research Question 1: Is there any difference between the mean scores of students in large class size when compared with those in small class size?

To answer Research Question 1a, descriptive statistics of mean and standard deviation were used. The summary of the test is presented in Table 1.

Table 1: Mean Statistics on Differences in the Performance of Students of Large Class and Small Class in Ecology

Variable	Class size	N	Mean	STD	Mean Diff	Remarks
Performance	Large	72	34.26	12.99	14.4	Students in small class performed higher than those in large class
	Small	29	48.41	13.24		

Table 1 shows differences in the mean performance of students in large class size and small class size. The mean academic performance of students taught ecology concepts in large class size and small class sizes are 34.26 and 48.41 respectively with a mean difference of 14.40 in favour of the students in small class size. The higher mean score obtained by the small class size is a clear indication that small class size has greater positive effects on students' performance in ecology concepts than large class size. However, the statistical validity of this statement is left for the test of the related hypothesis of the study.

Research Question 2: What is the difference between the attitudes of students in large class size and those in small class size towards ecology?

To answer Research Question 2, a Mean ranking test was used. The summary of the statistics is presented in Table 2.

Table 2: Mean Ranking Statistics on the Difference in the Attitude of Students in Large Class and Small Class towards Ecology

Ranks	Class Size	N	Mean Rank	Sum of Ranks	Mean Rank Diffs.	Remarks
Attitude	Large	72	37.72	2716	46	Students in small class size has higher mean rank than those in large class size
	Small	29	83.97	3435		
	Total	101				

The outcome of the mean ranking statistics on the difference in the attitude of students presented in Table 2 shows that difference exists in the attitude score of students of large class size and small class size. The mean Rank attitude of students of large and small class sizes are 37.72 and 83.97 respectively with a mean rank difference of 46. Also, the attitude sum of ranks by students in large and small class sizes are 2716.0 and 3435.0 respectively. This shows that students in small class size have a higher level of attitude towards ecology than those in large class size. However, the statistical validity of this statement is left for the test of the related hypothesis of the study.

a. Testing of Null Hypotheses

Null Hypothesis 1: there is no significant difference in the academic performance of students of large class size and small class size in ecology

To test Null Hypothesis 1, Independent sampled t-test statistics were used. The summary of the analysis is presented in Table 3.

Table 3: Independent Sampled t-test Statistics on the difference in the Performance of Students of Large Class and Small Class in Ecology

Variable	class size	N	Mean	Std	Df	p-value	Remarks
Performance	Large class	72	34.26	12.99	99	0.001	Significant
	Small class	29	48.41	13.24			

The outcome of the Independent sampled t-test statistics in Table 3 shows a significant difference in the academic performance of students of large class size and small class size when taught ecology concepts. Reasons being that the calculated p-value of 0.001 is lower than the 0.05 alpha level of at df 99. Therefore, the null hypothesis which states that “There is no significant difference in the academic performance of students of large class size and small class size in ecology is hereby rejected.

Null Hypothesis 2: there is no significant difference between the attitude of students towards ecology in large class size and those in small class size

To test Null Hypothesis 2, Mann-Whitney statistics were used. The summary of the analysis is presented in Table 4.

Table 4: Mann-Whitney Test on the difference in the performance of students taught Ecology in Large and Small Class Sizes

Ranks			Mean	Sum of	Mann-Witney	
	Class Size	N	Rank	Ranks	U	p
Attitude	Large	72	37.72	2716	88.0	0.000
	Small	29	83.97	3435		
	Total	101				

The outcome of the Mann-Whitney test presented in Table 4 shows a significant difference in the attitude score of students of large class size and small class size. This is because the calculated p-value of 0.000 is lower than the 0.05 alpha level of significance. Therefore, the null hypothesis which states that “there is no significant difference between the attitude of students towards ecology in large class size and those in small class size” is thereby rejected.

6.0 DISCUSSION OF FINDINGS

A significant difference existed in the mean performance of students in large class size and small class size in ecology in favour of the small class size. This suggests a greater positive influence of small class size over large class size in relation to the academic performance of students. This could be attributed to the relationship between class sizes and learning outcomes in which, students’ learning decreases as class sizes increases. Also, considering the fact that ecology is better taught in the field than in the confines of a classroom. A small class size is easier to control and managed in the field than large class size which could make the small class size perform better. This study is in conformity with the findings of Adimonyemma, Akachukwu and Igboabuchi (2018) who stated that, the higher the total number of students in a class, the lower the level of concentration of the students which leads to poor performance. Similarly, Hamedani and Destin (2017) reported that class size significantly affects the level of students’ cognitive skills in the classroom and that small classes improve both the students’ performance and learning behavior.

Significant difference exists between the attitude of students in large class size and small class size towards ecology. The significant difference between the attitudes of students in favour of the small class size suggests a greater impact of small class size over large class size in increasing the attitude of students towards ecology. This could be attributed to large classes being too boring, noisy and rowdy which may constitute discouragement. On the other hand, the small class size being less congested and may encourage staying in the classrooms. This study agrees with the findings of Yusuf, Onifade and Bello (2018) who reported that class size has a great impact on learners’ attitude as it plays a role in learners’ positive or negative evaluation of an object or concept and also influences learners’

behavior towards that object or concept in a favourable or unfavourable manner. Here, the Null Hypothesis was rejected.

7.0 CONCLUSIONS

The study can be concluded that, small class size have positive effect on performance and attitude in ecology among secondary schools students in Sabon-Tasha Education Zone, Kaduna State, Nigeria.

8.0 RECOMMENDATIONS

On the basis of the findings from this study, the following recommendations are made:

1. The Federal and State Governments should build enough classrooms in schools with adequate facilities needed to avoid overcrowding of students for effective teaching and learning outcomes.
2. School Authorities should stick to the 1:40 teacher-students ratio as stipulated by the National Policy on education. As class management and control is easier to achieve in a smaller class which goes a long way to determine the outcome of the learning experience and students' attitude.

REFERENCES

- Achor, E.E. and Amadu, S.O. (2015). An examination of the extent to which school outdoor Activities could enhance senior secondary two students' achievement in ecology. *Journal of Education and e-Learning Research*, **2**(3):35-41.
- Adewale, A.M. (2016). Academic Performance in Biology at Secondary School Certificate Examination (SSCE) and the Influencing Factors among Students in Owerri Municipal of Imo State, Nigeria. *International Journal of Education and Evaluation*, **2**(1):1-10.
- Adimonyemma, N.R., Akachukwu, E.E. and Igboabuchi, N.A. (2018). Impact of class size on students' academic performance in Biology in Idemili North Local Government Area of Anambra State. *International Journal of Education and Evaluation*, **4**(8):22-32.
- Agboghoroma, T.E. (2019). Evaluating Effect of Students' Academic Achievement on Identified Difficult Concepts in Senior Secondary School Biology in Delta State. *Journal of Education and Practice*, **6**(30):117-125.
- Ajaja, O.P., (2016). Effect of field studies on learning outcome in Biology. *Journal of Human Ecology*, **31**(3):171-177. Available from <http://www.krepublishers.com>.
- Babatunde, A.M. (2019). Influence of class size, teacher variables and school location on academic performance among senior secondary school students in Kaduna State, Nigeria. An unpublished master's dissertation. Department of Educational Psychology and Counseling, ABU, Zaria.

- Eboatu, V.N. and Ehirim, J.U. (2019). Perceived effect of class size on academic achievement of junior secondary school students in Awka North Local Government Area of Anambra State, Nigeria. *International Journal of Research and Innovation in Social Science*, **2**(7):150-155.
- Izibegbalawo, W.G. (2019). Perceived influence of class size on students' academic performance in Awka South Local Government Area of Anambra State. An unpublished thesis, Nnamdi Azikikwe University, Awka.
- Mokobia M.O. and Okoye, N.S. (2018). Effect of class size on the teaching and learning of in secondary schools in Delta state, Nigeria. *Journal of Education and Policy*, **3**(1):1-7.
- Musa, P. (2019). Effects of class-size and field trip on academic performance of agricultural science students in senior secondary schools in Kaduna State, Nigeria. M. Ed. Unpublished dissertations, Department of Vocational and Technical Education, Ahmadu Bello University, Zaria Nigeria.
- National Policy on Education. (2013). Federal Republic of Nigeria. Available on <https://educatetolead.files.wordpress.com>. Retrieved on February 10th, 2018.
- Omwirhiren, E.M. and Anderson, F.E. (2018). Effect of class size and students' attitude on academic performance in chemistry at demonstration secondary school, Ahmadu Bello University, Zaria, Nigeria. *Journal of Research & Method in Education*, **6**(1):1-6.
- Owoeye, J.S. and Yara, P.O. (2015). Class Size and Academic Achievement of Secondary School in Ekiti State, Nigeria. *Asian Social Science*, **7**(6):184-189.
- Piaget, J. (1952). *The Language and Thought of the Child* (Vol. 5). Chicago: Psychology Press.
- Stephens, N.M., Hamedani, M.G. and Destin, M. (2017). Closing the social-class achievement gap: A difference-education intervention improves first-generation students' academic performance and all students' college transition. *Psychological Science*, **25**(4):943-953.
- Taofeek, A.Y., Onifade, C.A. and Bello, O.S. (2019). Impact of class size on learning, behavioral and general attitudes of students in secondary schools in Abeokuta, Ogun State, Nigeria. *Journal of Research Initiatives*, **2**(1):1-16.
- Yusuf, T.A., Onifade, C.A. and Bello, (2018). Impact of class size on learning, behavioural and general attitudes of students in secondary schools in Abeokuta, Ogun State, Nigeria. *Journal of Research Initiatives*, **2**(1):1-16.