

## EFFECTS OF GENDER ON THE ACADEMIC PERFORMANCE OF PUBLIC-SCHOOL BIOLOGY STUDENTS PARTICIPATING IN SCHOOL ORGANISED EXTRA-MURAL CLASSES

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### Abstract

*This study investigated the effects of gender on the academic performance of biology students who attend extra-mural classes in public senior secondary schools.*

*This study adopted the descriptive survey method. The population of the study consisted of the biology students in the thirteen (13) government's owned schools in Esan Central Local Government Area, Edo State. A sample size of one hundred and eighty (180) students was drawn from the population. The population of the study was stratified into two groups, the first group comprised of public senior secondary schools that conduct biology EMCs while the second group comprised of public senior secondary schools that do not conduct biology EMCs. Data for this study were obtained using a structured achievement test with a reliability co-efficient of 0.83. Research questions 1 – 3 were answered using frequency counts, means and percentages while the research hypothesis was tested at 0.05 level of significance using ANOVA. The results showed that extra-mural classes for biology students are not prevalent (15.38%). The study showed that students attending biology EMCs performed better than their counterparts who don't attend such classes. It was also revealed that there is a significant statistical difference ( $p < 0.05$ ) in the performance of male biology students who attend EMCs and female students who do attend biology EMCs; with male students performing better. It is therefore recommended that government and all stake holders in education should encourage the practice of extra mural classes for students, supervise EMCs to avoid its abuse/misuse and encourage female students to exhibit more positive attitudes and enthusiasm toward science subjects as well as improve their self- efficacy.*

**Keywords:** Effects, Gender, Academic Performance, Biology Students, EMCs.

### Introduction

Extra-mural classes (EMCs) are classes in academic subjects beyond the hours of mainstream formal schooling for financial gain, enhanced teaching and learning or otherwise. EMCs are characterized by usually by undefined teaching duration, the teaching duration varies with factors such as needs of the learner, availability of the teacher and learner, goal of the institution, finance, etc. (Kwok, 2004). EMCs could be inform of after school hours' classes, private home classes, outside school lessons or even break time lessons and may take place within or outside the school premises. These classes serve as a form of supplementary education to meet the needs of students (Glewwe and Kremer, 2005) and are usually arranged

by the school authority or parents(s) in agreement with the participating teachers and often involve clientele of a formal school (Kwok, 2004). Around the world, extra-mural classes are a fast-growing trend commonly referred to by those who practice it as evening lessons, after-school classes, tutorials and holiday lessons. Its rapid popularity spans from the increasing need for parents, guardians, teachers and school management to see their children, wards or students attain academic excellence (Kariuki, 2011). Another possible cause for the increasing societal support for and students' participation in EMCs is the urgency and importance to revive falling academic performance of student (Glewwe and Kremer, 2005).

In schools, EMCs are organized to enhance students' academic performance in a regulated learning environment (Bray, 1999; Yoo and Donthu, 2002). They are organized to serve as a means of providing extra instruction for students who lag behind academically and stand the risk of failing to meet academic standards. Students who intend to increase their achievement of excellence in examinations especially external terminal competitive examinations such as First School Leaving Certificate Examination, West African Senior School Certificate Examination, etc. are also expected to be beneficiaries of EMCs organized by schools (Noorwati and Zaharah, 2003). EMCs aid in improving students' academic performance by increasing permanence in learning (Oden, 2016), increasing time for student-teacher interaction, enhanced teacher-student relationships, creation of more learning experience and building students' confidence in preparation for external examination, gives time for revision of topics previously taught, identification of individual needs of students and engaging learners in constructive academic activity during extra or free time. However, extramural classes can also be considered to be a form of corruption especially in some developing countries (such as in Nigeria) as a result of the weak or absent monitoring systems. A commonly observed case of EMC abuse is the use of EMC to generate salary supplement for poorly paid teachers in some schools. In such situations it has been observed that teachers usually in collaboration with school management ask students to compulsorily pay for and attend extramural classes but do not effectively use the extra-hours purposefully. Students' are thought little or nothing the EMCs but the monies paid by them serve as a supplement for teachers' monthly income (Biswal, 2007). Another case of EMC abuse is the use of it by parents to keep children busy in school till the close of work daily when they are available to pick them not minding whether the students are taught or not (Kariuki, 2011). A major problem that arises from the practice of EMCs in today's society is its ability to cause discrepancy in learning among students. The discrepancy is as a result of this financial requirement attached to EMCs; those who are able to pay for these classes have more access to high quality of education while those who can't are forced to sit out while having to face the same academic assessment as their peers thus causing discrimination in access to education across the country (Santhi, 2011). Several factors exist that affect the outcome of extra-mural classes creating a disparity in its effectiveness across board. These factors include teaching method, teachers' qualification and experience, students' interest, perception of extra mural classes by students, teachers and parents, method of syllabus implementation and students' gender.

Students' gender has been found to be a major factor enhancing difference in the academic performance of secondary school students in Edo State, Nigeria. (Fabunmi, 2004). Several other studies carried out in the past two decades have similarly revealed a difference in the

average academic performance of male and female students in different subject areas as well as contributory factors to this observed difference. O'Connor (2001) found that the academic achievement of boys in mathematics was superior to that of girls. Onekutu (2002) asserted in a similar manner that the academic performance of male students in mathematics and sciences was superior to that of their female counterparts and related the observed superiority to the way mathematics and sciences are traditionally taught as competitive endeavors rather than a comparative group activity. He stated that girls perform better when subjects are taught in cooperative small groups (Onekutu, 2002). Helena *et al.* in a study carried out in 2006 concluded that although girls performed better than boys in reading tests, subject areas such as mathematics and sciences remained dominated by boys. Wilberg and Lynn (1999) in a study of history classes and history tests found that girls outperform boys, given the ability for females to work more conscientiously on word fluency contributing to better course work as the reason behind the superior performance of girls. Jegede and Inyang (2010) in their study discovered that male students tend to score higher marks than females do in integrated science at the junior secondary school level. An examination of differences in academic performances of male and female secondary school science students by Ireogbu (2012) revealed that boys performed significantly better than girls. He posited that the difference in academic performance may be as a result of activities done during the learning process which has different effects on the understanding of girls and boys differently (Ireogbu, 2012). Adigwe (2013) in a research that investigated gender differences in chemical problem solving among Nigeria secondary school chemistry students stated that male students scored higher than their female counterparts did. Scrimgeour (2013) in his study evaluated boys and girls on seven different areas; lesson core, class administration, questions asked of, questions asked by, tasks allocated to, discipline of, and other transactions. He concluded that boys scored higher on all of these levels than girls did and added that classroom environment was responsible for observed differences among academic performance of both genders (Scrimgeour, 2013). A study to find out the impact of gender difference on the students' academic performance in Ndumberi Division, Kiambu County was carried out by Wangu in 2014 using five secondary schools. Findings from this study revealed that at subject level girls outperformed boys in the languages, the boys led the girls in the sciences but by overall performance, male students performed much better as compared to their female counterparts (Wangu 2014). These observed differences have sparked the interest of researchers in unravelling and understanding the causes of differences in the academic performance of male and female students. Reasons given for the differences between academic performance of boys and girls in past studies include; exhibition of more positive attitudes and enthusiasm toward science as a subject by males than females (Kahle, 2004), dislike for mathematics followed by sciences shown by female students (Aghenta, 2009), classroom environment (Scrimgeour, 2013), ability of girls to score higher on verbal items and boys on quantities and spatial items in both intelligence and achievement tests, lower self- efficacy exhibited by girls (Stipek and Gralenski, 2011), difference in teachers' attitudes and behavior towards male and female students (Kahle, 2004; Swills, 2012; Bettinger *et al.*, 2015), school facilities (Williams, 2017), students' ability, students' attitude and interest (Williams, 2017). Other factors such as longer reading hours for males at home, inadequate school facilities, teachers' dissatisfaction and lack of motivation in girls, irregular attendance to school by girls, low persistence for long study hours and inferiority complex by girls have also been claimed to be contributors to the

difference in the academic performance observed among students in selected schools (Wangu, 2014). Shortness of teacher's attention span for female students (AAUW, 2012), parental attributes (Campbell, 2012), under-estimation of self by females (Ireogbu, 2012) and gender discrimination in classrooms (Quaisie, 2016) have also been implicated. Betz (2014) in his study posited that issues such as gender role stereotypes, occupational stereotypes, gender bias in education, career counseling, low self-esteem, weak expectation for success represent barriers to female participation in Mathematics and science courses.

### **Statement of the problem**

Education is a tool and process of transformation. It involves all senses being exposed to a series of stimulants which will enhance and grow the mental activity of someone, to achieve a set of, or a specific objective. Education in sciences such as biology is very important in today's world. This is because biology is the study of living things with focus on evolutionary relationships among organisms and the diversity of life on Earth. Biology draws on the sciences of chemistry and physics for its foundations and applies the laws of these disciplines to living things making man's stay on earth easier. It consists of many sub-disciplines and special areas resulting in its' wide syllabus, complicated nature and difficult concepts. To aid students' cover their syllabus, have more time to carry out practical work associated with biology, and enhance their overall academic performance, it is important for students to attend EMCs in biology. However, situations of abuse and misuse of EMCs exists where they are used as a means of generating income for teachers or as a way of occupying students till their parents close from work without teachers seriously teaching during this period, students are sometimes left to play without teaching. Several factors capable of influencing the academic performance of students who attend biology EMCs also exist. These factors include teaching method, teachers' qualification and experience, students' interest, perception of extra mural classes by students, teachers and parents, method of syllabus implementation and students' gender affect the outcome of EMCs. Research has also shown that there are differences in the academic performance of boys and girls. The researcher therefore examines the effect of biology EMCs on students' academic performance and the effect of gender on the academic performance of students who attend biology EMCs in Esan Central Local Government Area of Edo State.

### **Purpose of the study**

The purpose of this study is to determine the effects of gender on the academic performance of public-school biology students participating in school organized extra-mural classes. Specifically, the study sought to;

- 1.) Ascertain the prevalence of biology EMCs in public schools in Esan Central Local Government Area, Edo State
- 2.) Determine the effect of extra mural lessons on biology students' academic performance.
- 3.) Examine the effect of gender on the academic performance of biology students attending EMCs.

## Research questions

The following research questions guided this study;

- 1.) How prevalent are EMCs in public schools in Esan Central Local Government Area, Edo State?
- 2.) What is the effect of EMCs on biology students' academic performance?
- 3.) What effect does gender have on the academic performance of biology students attending EMCs?

**Research hypothesis:** There is no significant difference between the academic performance of male and female students who attend biology extra-mural classes. It was tested at 0.05 significance.

## Methodology

Descriptive survey design was used for this study. The target population of this study included senior secondary school biology teachers and students in the 13-government owned (public) schools in Esan Central Local Government Area, Edo State. The population was stratified into two, one stratum comprised of biology students and teachers in public schools that conduct EMCs while the second stratum comprised of biology students and teachers in public schools that do not conduct EMCs. Purposive sampling was used to pick a male and female school from each of the strata. Simple random sampling was used to select which of the classes in the senior secondary section would serve as the sample. The sample of the study comprised 180 SSS 2 students from 4 senior secondary schools named A, B, C and D for the purpose of this study. Data for this study was collected by self-administration of a structured achievement test to students. The biology-based achievement test was the instrument used in this study; it consisted of 2 sections; section 1 consisted of 2 items, one seeking the gender and the other the student's participation in EMCs. Section 2 consisted of 20 objective questions drawn from third term SS2 biology syllabus, it was used to measure the academic performance of senior secondary school two biology students. Face and content validity of the instrument was ensured in consultation with research experts while reliability of the test instrument was measured using the test-retest reliability method and the Pearson's Product Moment Correlation Co-efficient statistics was used to correlate the results of the two administrations of the test instrument. The Pearson's Product Moment Correlation Co-efficient value ( $r$ ) obtained was 0.83. research questions 1 to 3 were answered using frequency counts, percentages and means while the research hypothesis was tested at 0.05 level of significance using Analysis of Variance (ANOVA).

## Participants

The participants in this study were 180 SSS 2 students from 4 senior secondary schools. Their demography is shown in Table 1.

Table 1: Demography of participants.

| School Categories            | Gender of Students | Population |
|------------------------------|--------------------|------------|
| Schools with biology EMCs    | Male               | 48         |
|                              | Female             | 32         |
| Schools without biology EMCs | Male               | 54         |
|                              | Female             | 46         |

## Result and Findings

**Research Question one: How prevalent are EMCs in public schools in Esan Central Local Government Area, Edo State?**

**Table 2: Prevalence of EMCs in Public Senior Secondary Schools**

| Senior Secondary Schools Conducting Extra-Mural Classes for its Biology Students | Number of Schools (Frequency) | Percentage (%) |
|----------------------------------------------------------------------------------|-------------------------------|----------------|
| Schools that conduct biology extra-mural classes                                 | 2                             | 15.38          |
| Schools that do not conduct biology extra-mural classes                          | 11                            | 84.62          |
| <b>Total</b>                                                                     | <b>13</b>                     | <b>100.00</b>  |

Table 2 showed that out of the thirteen public senior secondary schools in Esan Central Local Government Area, Edo State, only 2 of them (15.38%) hold extra-mural classes in biology while the other 11 schools (84.62%) do not.

**Research question two: What is the effect of EMCs on biology students' academic performance?**

**Table 3: Effect of EMCs on Biology Students Academic performance.**

| Student categories                             | Number of Students (n) | Mean Test Score (over 20) | Mean Percentage Test Score |
|------------------------------------------------|------------------------|---------------------------|----------------------------|
| Students who attend biology EMCs               | 80                     | 8.94                      | 44.70                      |
| Biology students who don't attend biology EMCs | 100                    | 5.88                      | 29.40                      |

Table 3 showed that students from schools A and C who attend extra-mural classes had a mean achievement test score of 8.94 (44.70%) while students from schools B and D who do not attend extra-mural classes had an achievement test score of 5.88 (29.40%).

**Research Question three: What effect does gender have on the academic performance of biology students attending EMCs?**

**Table 4: Effect of gender on the academic performance of biology students attending EMCs**

| Student categories           | Number of students (n) | Mean test score (over 20) | Mean Percentage Test Score (%) | Standard Deviation (SD) | Standard Error of Mean (SEM) |
|------------------------------|------------------------|---------------------------|--------------------------------|-------------------------|------------------------------|
| Boys attending biology EMCs  | 48                     | 9.54                      | 47.70                          | 3.3578                  | 0.4847                       |
| Girls attending biology EMCs | 32                     | 8.03                      | 40.15                          | 3.2477                  | 0.5741                       |

Table 4 showed that male students who attend biology EMCs had a mean achievement test score of 9.54 (47.70%) with standard deviation and standard error of mean of 3.36 and 0.48 respectively while female students who also attend biology EMCs had a mean achievement

test score of 8.03 (40.15%) with standard deviation and standard error of mean of 3.25 and 0.57 respectively.

**Research Hypothesis:** There is no significant difference between the academic performance of male and female students who attend biology extra-mural classes.

**Table 5: ANOVA analysis of the academic performance of male and female students who attend biology extra-mural classes.**

| ANOVA SUMMARY  |                        |                     |                  |         |                                         |
|----------------|------------------------|---------------------|------------------|---------|-----------------------------------------|
| Source         | Degree of Freedom (DF) | Sum of Squares (SS) | Mean Square (MS) | P-Value | Remark                                  |
| Between Groups | 1                      | 43.8011             | 43.8011          | 0.02418 | Null hypothesis rejected ( $p > 0.05$ ) |
| Within Groups  | 78                     | 856.8908            | 10.9858          |         |                                         |
| <b>TOTAL</b>   | <b>79</b>              | <b>1273.6384</b>    |                  |         |                                         |

Table 5 showed that the P-value is 0.02418. This P-value is less than the significance level of 0.05, the null hypothesis is rejected. This means that there is a significant difference in the academic performance of male and female senior secondary school biology students who attend extra-mural classes.

### Discussion of findings

Education is a tool and process of transformation. As a result of the overwhelming importance of education, efforts such as the introduction of extra-mural classes have been made to revive the falling standard of education. However, in spite of the growing acceptance and practice of EMCs in several educational institutions this study has revealed that the level of prevalence of biology EMCs in Esan Central Local Government Area of Edo State is low. The study showed that 2 of the 13 (15.38%) senior secondary schools conduct extra-mural classes while 11 (84.62%) do not. This prevalence level is low when compared to findings of other studies such as that of Nzomo *et al.* (2001) and Wanyama and Njeru (2003) where prevalence of extra-mural classes in senior secondary school ranged from 68.6% to 74.4%. It was found out that the low prevalence level of extra-mural classes in the Esan Central Local Government Area of Edo State is as a result of the educational policies of the Edo State government that clearly does not support extra-mural classes in schools. The two schools organizing extra-mural classes for their senior secondary school students do so because of the Parents Association formerly known as Parents Teachers Association till 2012 when Teachers involvement in the activities of the association was stopped by the government. The approval and support of extra-mural classes by Parents Association (PA) in these schools shows the acceptance of extra-mural classes by parents as stated also by Kwok (2004). This also reflects the need of parents to see their children excel in their academics and examinations, as a way of attaining upward social mobility as also found out by Hon (2010). The activity of Parents Association (PA) shows the participatory role parents can play in the development of school policies that help to enhance their children or wards' academic performance. Similar involvement of

parents in formation of school policies have been observed in a study by Zhao and Akiba (2009), where parents in the sampled schools made conscious effort to contribute to the formation of policies and decision making in schools where their children or wards attended in a bid to ensure their improved academic performance. Inability of teachers to complete the students' syllabus with just lessons held during school hours was stated as the major reason behind the decision of parents that extra-mural classes be conducted for their wards at senior secondary school level. Parents' enrolling their children in these classes can be said to do so with the belief that their children's academic performance in examination will improve tremendously.

Although written tests do not necessarily express the level of understanding of a subject, they are still highly valued as a measure of content assimilation and academic performance (Opateye, 2018). In this study the results of the objective written achievement test administered to students revealed that there is a difference in the academic performance of biology students who attend extra-mural classes and biology students who do not attend extra-mural classes. The students who attended extra mural classes performed better than those who did not attend extra mural classes. This result is in agreement with studies carried out by Linver *et al.*, 2009; Shulruf, 2010 and Oden, 2016. The better academic performance of biology students who attend extra-mural classes is likely to be as a result of the fact that extra mural classes have been shown to help students to overcome deficiencies in learning especially in subjects that are often regarded as tough and requiring higher study efforts and concentration to understand (Hallack and Poisson, 2007). Extra mural classes have also been said to help to bring on board slow learners enabling them to compete favorably with the fast learners for grades that will enable them compete for the limited university places. These classes serve as an intervention strategy to address the weakness portrayed by candidates before they take national or promotion examinations (KSSHA, 2012). The laudable ability of extra-mural classes to help students' overcome knowledge or skills deficiency, build learners' confidence and create more learning experience also reflects in the academic performance of students who attend these classes. (Nyagosia *et al*, 2013). During these extra classes, even students considered to be academically strong also get the opportunity to perform even better in examinations because of the extra questions provided for revision (Mboi and Nyambedha, 2013). Students who attend extra-mural classes have also been shown to be properly engaged and make good use of their extra time while permanence of learning is enhanced (Oden, 2016). During extra mural classes, biology teachers also make use of discussion method; a student centered teaching method that sustains students interest in the topic being taught and enhances permanence of learning (Oden, 2016). Other benefits resulting from students' participation in extra-mural classes as stated by the teachers' include enhanced teacher-student relationships, creation of more learning experience and building students' confidence in preparation for external examination. For these reasons, stated above and evident in the academic performance of biology students attending extra-mural classes, a strong case for promoting participation of not just biology students but all students in extra-mural classes is established. Researches conducted by Zamboanga *et al.*, (2012) and Linver *et al.* (2009) also have findings that strongly agree with the finding of this study which showed that biology students who attend extra-mural classes perform better in their academics than their counterparts who do not attend such classes. Their findings showed not only that there exists

a relationship between extra-mural participation and success in school, but also that a positive relationship existed between success in terms of test results and children's attitudes towards school work (Linveret *et al.*, 2009; Zamboanga *et al.*, 2012).

In addition to the above points, it was also observed from this study that there is a significant difference ( $p = 0.05$ ) in the academic performance of male and female biology students who attend EMCs with the male biology students performing better than their female counterparts. The female biology students who attend extra-mural classes had an average score of 8.03 which is less than the average score of 9.54 recorded by the male biology students who attend extra-mural classes. This finding is in agreement with studies of O'Connor (2001), Onekutu (2002), Helena *et al.*, 2006. This observed difference in the academic performance of male and female biology students could be due to the fact that biology is taught as a competitive endeavor rather than in comparative small groups. This method of teaching favours male students as stated by (Onekutu, 2002). Bettinger *et al.* (2015) also documented that boys more responses to more questions and that teachers responded to their questions with more details. Quaisie (2016) stated that the few number of female mathematics and science teachers, teachers' behavior, level of attendance and method of teaching greatly influenced the participation of girls in the classroom. Wangu, (2014) observed that female students find it more difficult to cope with long study hours. Extra-mural classes tremendously increase the academic pressure on students and cause them to be exhausted as a result of the long study hours as ascertained in a study carried out by Bray (2009). This exhaustion and its' effects are more pronounced in female students because they usually have less physical stamina and are able to withstand less hardship such as the long hours they are required to remain in school for extra-mural classes (Wangu, 2014). Girls have also been shown to underestimate their capabilities and attribute their failure to personal factors. They see their success as a result of luck and not their personal effort (Swill, 2012). This underestimation of capability by females has a negative effect on their ability to learn verbal, spatial and attitude skills (Bestworth, 2017) and has a subsequent negative effect on their academic performance. The negative attitude of parents and the society towards a girl's education especially in low income areas also affects the academic performance of the girl child negatively (Davison, 2013). The choice of biology as the subject with which the academic performance of students was assessed in this study is also a possible reason for the observed better performance of males when compared to females. Biology is a science subject, several studies have shown that boys perform better at mathematics and sciences than girls while girls perform better than boys in languages and history because girls tend to work more conscientiously on word fluency (O'Connor, 2001; Jegede and Inyang 2010; Ireogbu, 2012; Wangu, 2014).

## **Conclusion**

Considering the findings obtained in this study, the following conclusions are made. The findings showed that biology EMC prevalence in public schools in Esan Central Local Government Area, Edo State is low. The results show that EMC greatly help in improving the academic performance of biology students. It is thus a matter of urgency and importance that all students be allowed to access them in order to improve their academic performance. The results also show that male students who attend biology EMCs perform have a better academic performance than female students who attend similar classes. Efforts should be

made to resolve the difference in the academic performance of male and female students who have access to these classes.

## Recommendations

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

- 1.) Government should encourage the practice of extra mural classes for students.
- 2.) To avoid abuse/misuse of EMCs, government parastatals in charge of education supervision and school management staff must supervise EMCs, ensuring that classes in all subject areas are organized and implemented using best educational recognized and recommended practices insisting on accountability of teachers during EMCs.
- 3.) During EMCs, emphasis should be placed on the individual strengths and weaknesses of the students.
- 4.) Female students should be encouraged to exhibit more positive attitudes and enthusiasm toward science subjects and improve their self- efficacy.
- 5.) Teachers attitude and attention span for females should be improved upon, the use of teaching methods that are not gender biased should also be prioritized.
- 6.) Training in gender sensitive techniques through workshops for teachers to change their attitudes and behavior.
- 7.) Parents/guardians should encourage their daughters to engage in long reading hours and attend school regularly.
- 8.) Schools must provide adequate toilet facilities.
- 9.) Societal factors such as gender role stereotypes, occupational stereotypes, gender bias in education and weak expectation for success must be eliminated.

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