

Analysis of Gender Disparity in Students' Performance in Mathematics and Physics in West African Senior School Certificate Examination

Elejere, Ugochukwu Christian & Omeke, Ngozi E.

Department of Physics, School of Sciences, Federal College of Education, Eha-Amufu, Enugu State, Nigeria

&

Eze, Chikwere C.

Department of Chemistry, School of Sciences, Federal College of Education, Eha-Amufu, Enugu State, Nigeria

Abstract

This study analysed students' performance in West African Senior School Certificate Examinations in Mathematics and Physics in Nsukka Local Government Area based on gender. Two research questions and two null hypotheses guided the study. Ex-post facto research design was adopted for the study. All the public secondary school students who sat for WASSCE in 2014-2016 in Nsukka Local Government Area formed the population of the study while a sample of 1060 students was used for the study. Students' Academic performance proforma was used to gather students' performance in Mathematics and Physics for the years in question. Data collected were analysed using mean and standard deviation to answer the research questions and t-test of independent samples to test the null hypotheses at 0.05 level of significance. The findings of the study showed that there are significant differences in the mean performances of male and female students in WASSCE in both Mathematics and Physics in favour of the male students. The implication of this is that there is gender disparity in the performance of students in both Mathematics and Physics in 2014-2016 WASSCE. Thus, it was recommended among others that efforts should be put in place by both mathematics and physics teachers in order to encourage active participation of female students in the learning of the subjects.

Keywords: Gender, Disparity, Performance, Mathematics, Physics

Introduction

Mathematics is enshrined in the National Policy on Education (NPE) as a core and compulsory subject for all primary and post-primary school students in Nigeria (Federal Republic of Nigeria [FRN], 2009). Despite the objectives of secondary school Mathematics curriculum, students' performances in this subject are not encouraging (Uzoechi, Kurumeh & Azuka 2013). Physics enables students to develop analytical and scientific skills necessary for problem solving in various situations they encounter in life (Adeoye, 2010) and are transferrable to other areas of life (Lyons, 2005). However, the decline in the performance of Physics is prompting question about the future level of scientific literacy and technological expertise (UNESCO, 2000). Performance in Mathematics and Physics may be linked to gender (Mekonnen, 2014).

Males and females are biologically different although all cultures interpret and elaborate their biologically inherent differences into a set of social expectations about what behaviours and activities are appropriate for them and what rights, resources and even power they possess (Okeke, 2000). Gender gaps occur in treatment of males and females, which put females in a corner that has deterred their progress and achievement in schools (Okeke, 2000). Nworgu (2005) and Ukwungwu (2002) discovered that either gender disparity as it exist in the schools on the part of the student or the teacher has great influence on student performance. The interactions, which may be direct or indirect, have a lot of influence on the students' performance (Okoye, 2009). Research done by Gisela (2011) on students' academic achievement shows that parent, peers and the society all influence the performance of male and female students. Zhaoyao (2002) stresses further that, how students are encouraged or discouraged

to succeed in particular subjects, the expectations placed on them and learning opportunities they are presented with contribute to gender achievement gaps in schools. Okoye (2009) noted that male students tend to receive more encouragement in Mathematics and Science courses, while female students are nurtured more in reading and arts. The author further asserted that parents often inadvertently practice gender biases, which influence their performance. Gender-bias behaviour usually surfaces early in a child's life where parents tend to buy their sons and not their daughters toys and books that are related to Mathematics and Sciences (Okoye, 2009). The author went further to say that educators are also strong influential factors in determining motivation for their students. Mekonnen (2014) found that many teachers unknowingly call on male students more often than female students to answer questions and give them more complex problem to solve, which create a competitive learning environment where men tend to thrive. All these seemingly influence the students' sense of accomplishment and performance in school. Adeyegbe (2002) claims that males are more superior to females in Physics activities. Ezeudu (2008) observes a significant difference between males and females performance in Mathematics in favour of the girls. Thus, Halpern & Diane (2011) found that Science is free from gender bias. These indicate that gender, as a factor of students' performance in mathematics and physics is not conclusive. Thus, this study explored gender disparity in students' performance in Mathematics and Physics in WASSCE results in Nsukka L.G.A. of Enugu State.

Research Questions

The study was guided by the following questions:

1. What are the mean performances of male and female students in WASSCE in Mathematics?
2. What are the mean performances of male and female students in WASSCE in Physics?

Research Hypotheses

The following null hypotheses test at 0.05 level of significance guided the study:

H₀₁: There is no significant difference in the mean performances of male and female students in WASSCE in Mathematics.

H₀₂: There is no significant difference in the mean performances of male and female students in WASSCE in Physics.

Methodology

The study adopted Ex-post facto research design. The targeted population for the study was Senior Secondary III (SS III) Mathematics and Physics students of public secondary schools in Nsukka Local Government Area, Enugu State of Nigeria. The population of the study was students in all public Secondary Schools in Nsukka Local Government Area. A total of 1060 Mathematics and Physics Students were used as sample for the study which consist of 611 males and 449 females. Students' Academic Performance in Mathematics and Physics Proforma was used for data collection. Data collected were analyzed using mean and standard deviation to answer the research questions and t-test of independent samples to test the null hypotheses at 0.05 level of significance.

Results

The results were presented in line with the research questions and hypotheses that guided the study.

Research Question One: What are the mean performances of male and female students in WASSCE in Mathematics?

Table 1: t-test analysis of difference in the performance of male and female students in mathematics in WASSCE

| Gender | N | Mean | SD | Df | t-cal | Sig. (2-tailed) |
|--------|-----|-------|-------|------|-------|-----------------|
| Male | 611 | 57.88 | 9.76 | 1058 | 5.940 | .000 |
| Female | 449 | 52.83 | 15.99 | | | |

Table 1 shows the mean performance of male and female students in mathematics in WASSCE. It shows that male students had mean mathematics performance of 57.88 with standard deviation of 9.76 while the female students had mean mathematics performance of 52.83 with a standard deviation of 15.99. This indicates that male students mean mathematics performance is higher than that of the female students.

Ho1: *There is no significant difference in the mean performances of male and female students in WASSCE in Mathematics.*

Table 1 also shows the t-test analysis of difference in the mean performances of male and female students in mathematics in WASSCE. It reveals that the probability associated with the calculated value of t (5.940) is 0.000. Since the probability associated with the calculated value of t is less than the 0.05 level of significance, the null hypothesis was rejected. Thus, there is a significant difference in the mean performances of male and female students in WASSCE in Mathematics in favour of the male students.

Research Question Two: What are the mean performances of male and female students in WASSCE in Physics?

Table 2: t-test analysis of difference in the performance male and female students in physics in WASSCE

| Gender | N | Mean | SD | df | t-cal | Sig. (2-tailed) |
|--------|-----|-------|-------|------|--------|------------------|
| Male | 611 | 60.69 | 7.14 | 1058 | 14.950 | .000 |
| Female | 449 | 52.00 | 11.44 | | | |

Table 2 shows the mean performance of male and female students in physics in WASSCE. It shows that male students had mean physics performance of 60.69 with standard deviation of 7.14 while the female students had mean physics performance of 52.00 with a standard deviation of 11.44. This implies that male students mean physics performance is higher than that of the female students.

Ho2: *There is no significant difference in the mean performances of male and female students in WASSCE in Physics.*

Table 2 reveals that the probability associated with the calculated value of t (14.950) for the difference in mean performances of male and female students in WASSCE in Physics is 0.000. Since the associated probability value is less than the 0.05 level of significance, the null hypothesis was rejected. Thus, there is a significant difference in the mean performances of male and female students in WASSCE in physics in favour of the male students.

Discussion of Findings and Educational Implications

The result of the study showed that there is a significant difference in the mean performances of male and female students in WASSCE mathematics in favour of the male students. This result is a clear indication that there is gender disparity in the performance of students in mathematics in which female students are lagging behind the male students. This may be as a result of the fact that mathematics and some other science subjects are regarded as being difficult for the female students. Corroborating this result, Maria (2004) found that female students significantly showed low performance in mathematics, taking more responsibility for their failures than male students do. This result is also in agreement with the findings of Adetunji (2007) who found that male mathematics students performed better than their female counterparts. Adedeji (2007) equally found that male students significantly show high motivation in mathematics and performed better than female students.

With respect to students' performance in physics, it was revealed that there is a significant difference in the mean performances of male and female students in WASSCE physics in favour of the male students. Since physics as a science subject is mathematics oriented, the result is not foreign. Most female students shy away from physics due to its mathematics' nature and this phobia makes them to lag on the male counterparts in terms of performance. Buttressing this result, Etukudo (2001) found that male students performed significantly better than the female students in physics. Gisela (2011) found that how students are encouraged or discouraged to succeed in particular subjects, the expectations placed on them and learning opportunities they are presented with contribute to gender achievement gaps in schools. Male students tend to receive more encouragement in mathematics and science courses, while female students are nurtured more in reading and arts.

Conclusion and Recommendations

Based on the results of this study, the researchers concluded that there is gender disparity in the performance of students in both mathematics and physics in WASSCE. This gender disparity is to the disadvantage of the female students. Thus, the following recommendations are proffered:

1. Efforts should be put in place by both mathematics and physics teachers in order to encourage active participation of female students in the learning of the subjects.
2. Both mathematics and physics teachers should seek for alternative methods of instruction that can benefit female students to enable them meet up with their male counterparts.
3. State Government should have special packages for the mathematics and science teachers especially those of physics. Such incentives will motivate the teachers to teach the subjects effectively to the benefit of the female students who are lagging behind.

References

- Adeoye, A. F. (2010). Impact of Systematic Assessment in Instruction on Secondary Students Physics Achievement at Cognitive level of Knowledge. *Eurasia J, Physics and Chem. Educ.* 2 (1), 44-52.
- Adetunji, A. O. (2007). Profile of human and ICT resources in mathematics. *Ebonyi Journal of Science Education (EJSE) Abakiliki; Department of Science Education*, 2 (1), 97-104.
- Adeyegbe, D. O. (2002). Community science: Implication of Science teacher. *Proceeding of the 39th Annual conference of STAN.*
- Etukudo, O. E. (2001). The female mathematics teacher in the 21st century: Adequacy, competency and challenges. *STAN 42nd Annual Conference Proceedings 167-169.*
- Ezeudu, S. A. (2008). Development and validation of some projects and instruments for evaluating student-learning outcomes in Senior Secondary Geography. *Journal of Sciences Teachers Association of Nigeria* 20 (2), 4-6
- Federal Republic of Nigeria (2009). *National Policy on Education. 5th edition,*

Lagos, Nigeria: NERDC.

- Gisela, C. (2011). Gender achievement and motivation: University of Michigan. *New Educational Review*. 3 (30), 32-33.
- Halpern, E., & Diane, F., (2011). *The pseudoscience of single-sex schooling*. *Science* 333(6050): 1706-1707. Retrieved May 20, 2017.
- Lyons, T. (2005). The puzzle of falling enrolment in Physics and Chemistry courses: putting some pieces together. *Research in Science Education*, vol. 6 (pp 159-168)
- Maria, T. C. (2004). Gender differences in academic motivation of secondary school students. *Education Journal of Research in Educational Psychology*, 2 (1) 97-112.
- Mekonnen, S. (2014). Problems challenging the academic performance of Physics students in higher governmental institutions in the case of Arbaminch, Wolayita Sodo, Hawassa and Dilla Universities, *Natural Science*, 6 (3), 362–375.
- Nworgu, B. G. (2005). *Educational Research: Basic Issues and Methodology* (2nd edition). Ibadan: Wisdom Publishers Limited Nigeria.
- Okeke E. A. C (2000). Gender equity/equality in education. WCCI Region II Forum 3, 1.
- Okoye, B. (2009). Gender Imbalance in Science and Technology Based Human Resources and Development in Africa: Causes and Remedies. In Akale MAG. (Ed) 2002. Proceeding of the 43rd Annual Conference of STAN and Inaugural conference of CASTEME Africa.
- Ukwungwu, J. O. (2002) Gender Differences Study of Performance in Integrated Science. A Summary of Studies Conducted in Nigeria. *Journal of Science Teachers Association of Nigeria*. 37 (1-2), 55-59
- UNESCO. 2000. *World Declaration on Education for All*. Retrieved January 25, 2002, at http://www.unesco.org/education/efa/ed_for_all/background/jomtien_declaration.shtml.
- Uzoечи, B. C., Kurumeh, M. S. & Azuka, B. E. (2013). Emotional Intelligence: A tool for improving the Academic Achievement of Secondary School Students in Mathematics. *Journal of Mathematical Science Education*, 2 (1) 220-231.
- Zhaoyao, T. (2002). Who is joining Physics and why? Factors influencing the choice of Physics among Ethiopian University students. *Journal of Environmental and Science Education*. 5 (3) 319–340.