

STUDENTS' GENDER AND NUMERICAL PROFICIENCY IN SECONDARY SCHOOL PHYSICS IN KWARA STATE, NIGERIA

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ABSTRACT

This study investigated the influence of students' gender on numerical proficiency in secondary school physics in kwara state. Eighty one co-educational secondary schools were selected using purposive sampling technique. Numerical Proficiency Test comprised of questions in practical physics and physics theory was administered to secondary school III physics students in each of the schools. The test lasted for 2hr 40min. sampled students of 405 males and 405 females were involved. Data collected were subjected to t-test. Two null hypotheses formed were tested at 0.05 level of significance. Results show that males had higher numerical proficiency than their female counterparts in physics theory. Similar trend was observed for physics practical. It was concluded that male students perform better than the female students in numerical proficiency in secondary school physics.

Keywords: *Gender, influence, numerical proficiency, secondary school, physics*

INTRODUCTION

The application of knowledge, productive skill and sustainable technological development in any nation are achievable through meaningful physics education. However, in Nigeria, there is a perennially low achievement in physics in Secondary School Certificate Examinations conducted by West Africa Examination Council and the National Examination Council which had been attributed to the inability of most students to perform numerical process (WASSCE, 2004, 2007). Other reasons advanced by educational researchers include (i) inability to express ideas logically and in clear terms (ii) inadequate knowledge of fundamentals of physics and (iii) lack of calculative skills (Rafiu et al; 2006; Owolabi, 2006)

According to Apata (2011), numerical proficiency is the strength of an individual to proffer numerical solutions to mathematical problems through the manipulations of numbers. Such manipulations have been found to have practical applications in physics learning (Adesoji, 2008). Wilkins (1999) reported that a physicist must have a good understanding of basic physical laws and be able to unravel the implications of the laws using calculative skills to solve problems. Physics laws are known to be established and accepted only if they can be measured and quantified numerically (Anyakoha, 2008). The teaching and learning of physics is better enhanced by understanding of numerical proficiency (Adegboye, 2007)

For physics learning to realize its objectives as stated in the National Policy on Education (2004), it is imperative for both male and female students to contribute towards good academic performance in physics. Studies on gender revealed inconsistency in the performance of male and female students in science subjects. For instance, Nworgu (1988) and Ogunkunle (2007) reported that male students were academically superior to their female counterparts in science. In contrast, Anagbogu and Ezeliora (2007) found that female students performed better than their male counterparts in science subjects. Other researchers have shown little or no gender difference in the performances of males and females in science subjects (Daramola, 1983; Salman, 2004; Aiyedun 2000).

At present, available empirical data describing the influence of students' gender on numerical proficiency are limited. Therefore, the study reported here was carried out to investigate the influence of students' gender on numerical proficiency in secondary school physics in kwara state. In pursuit of the research problems and to realize the objective of this study, the following hypotheses were raised and tested:

- Ho₁:** There is no significant difference between the numerical proficiency of males and females in solving problems in physics theory.
- Ho₂:** There is no significant difference between the numerical proficiency of males and females in solving problems in practical physics.

METHODOLOGY

Population for this study was made up of SSS III physics students in kwara state. Eighty one (81) co-educational secondary schools that satisfied the criteria relevant to the study were selected. Numerical Proficiency Test (NPT) instrument which comprised of alternative to physics practical questions and physics theory questions was employed in this study. The instrument which had undergone reliability and validity test was used to assess the numerical proficiency of the students. Students showed all workings to all the questions. The NPT was administered and lasted for 2hr. 40min.

Student's scripts were collected on gender basis immediately after the test for grading in line with prepared marking schemes. Through random and stratified sampling technique, five male students and five female students were chosen from each of the participating schools .Selection was done before the marking exercise commenced. The sampled size was eight hundred and ten (810) students (405 males and 405 females). Data collected were analyzed using t-test statistical analysis for the hypotheses formulated.

RESULTS AND DISCUSSION

From the data shown on Table 1, the mean score of male students (13.47) was higher than that of the female students (10.29).The t-test value 3.546 at significant level of 0.000 which is lower than alpha level 0.05. Thus, the result is significant .The null hypothesis, which states that there is no significant difference between the numerical proficiency of male and female

student in solving problems in physics, is therefore rejected. This shows that the numerical proficiency of male is significantly higher than that of their female counterpart

From Table 2, the mean numerical proficiency of males is 13.24 and 10.40 for female. The t-test value 4.250 at significant level of 0.000 which is lower than alpha level of 0.05. The null hypothesis, which states that there is no significant difference between the numerical proficiency of male and female student in practical physics is therefore rejected. There is a significant difference in the numerical proficiency of male students and female students in practical physics. The result shows that male students performed better than the female students.

The superiority of males over the females in numerical proficiency is in agreement with the reports of Nworgu (1988) and Ifamuyiwa(2004), but it is in contrast to the report of Ireogbu (1998) who found no significant relationship between gender and achievement in physics. It is evident from this study that male students surpassed the female in numerical proficiency. This could be attributed to (a) lack of confidence in girls arising from their perception of physics as a difficult subject that is seasoned with calculations and (b) male students tend to quantify and achieve mastery of the physical aspect of the environment, while girls show interest in human integration and things that are immediately relevant to life.

From the study, females were not as proficient as their male counterpart in both physics theory and physics practical. This indicates low calculative skills in the females which may result in further reduction of the already low female population in the fields that are mathematically and practically challenging. In this direction, females' contribution to technological advancement will be adversely affected. Based on the findings of the study, the following recommendations have been made: stakeholders in education should inspire confidence in the female students to solving problems in physics through counselling services; female students should be empowered through Information and Communication Technology (ICT) by providing them with lap tops that will enhance their exposure towards calculative skills; and There is the need for curriculum planers to incorporate introductory topics in numerical processes, which will enhance problem solving skill in secondary school physics.

Table 1: t-test on the numerical proficiency of males and females in solving physics theory problems.

Variables	No of cases	Mscore	Std dev.	df	t-cal	t-tab	Sig (2-tailed)
Male	405	13.47	13.8	809	3.546	1.96	.000
Female	405	10.29	11.7				

Significant level at 0.05

Table 2: t-test on the numerical proficiency of male and of female in solving problems in practical physics

Variables	No of cases	M score	Std dev	df	t-cal	t-tab	Sig (2-tailed)
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Male	405	13.24	13.9	809	4.250	1.90	.000
Female	405	10.40	10.30				

Significant level at 0.05

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