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Influence of Teacher's Gender on Secondary School Students' Performance in Physics in Ekiti State, Nigeria

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Abstract:
The study examined the influence of teacher's gender in secondary school students' performance in Physics in Ekiti State, Nigeria. Subject for the study were two hundred (200) SS II Physics students in randomly drawn from ten secondary schools in Ikere Local Government Area of Ekiti State. The research design adopted was descriptive survey of the expos-facto research type. ANOVA statistical analysis was used to analyze the tree null hypotheses formulated for the study. The findings showed that there is significant difference in the performance mean scores of boys taught by male and that of those taught by female Physics teachers, there is significant difference in the performance mean scores of girls taught by male and that of those taught by female teachers and there is significant difference in the performance mean scores of students taught by male and that of those taught by female Physics teachers. Conclusion and recommendations were also made in this paper.

Key words: *Teacher's gender, students' performance, Physics*

1. Introduction

The role of science in this modern era of technology is wide and profound. In line with this reasoning, Olagunju, Adesoji, Iroegbu and Ige (2003) as cited by Ogunleye and Babajide (2011) emphasized the importance of scientific knowledge in boosting national prestige, military might, national income and international rating of the country. According to them, science gives birth to the production of micro computers and their innovative applications which earned the developed countries such as the United States of America and Japan unparalleled national wealth, military potential and enviable national prestige. Effective science teaching is the gateway to attainment of scientific and technological greatness (Francis, 2007).

In the words of Olarinmoye (2000), "Physics is the most utilized basic science subject in most technology and technology- related profession". This merely indicates that the enormous role that Physics plays in the technological growth of any nation must not be undermined. It is germane to say that the technological growth of a nation leads to its social and economic development. The importance of Physics for the development of a nation is, therefore, glaring.

Physics is also a cross-cutting discipline that has applications in many sectors of economic development, including health, agriculture, water energy and information technology (Macmillan, 2012). There is no doubt that a good part of the scientific knowledge is derived from the principles of Physics. Indeed, the knowledge of Physics has led to so many inventions such as the production, application and utilization of integrated circuits, production and use of machines and other contrivances. It also accounts for the discovery and production of hydroelectric power, gas turbine and thermonuclear power plant, telephones, refrigerators, heaters and gas/electric cookers.

The invention of modern technologies such as Information and Communication Technology (ICT) which has made the world a global village is also part of the benefits of Physics. Other benefits that are derivable from the knowledge of Physics include the construction of modern vehicles, rockets, nuclear bombs, missiles, diodes, computers and other electronic systems (Okoronka, 2004). Ogunleye and Babatunde (2011) says that the principles of radiation used in modern medicine for diagnosis and treatment, the production and use of so many appliances such as electronic gadgets and computers, surgical and astronomical instruments are all traceable to the study of Physics. The effective learning of the subject in schools is therefore desirable.

Faleye (2011) quoted Adesina (1981) that teachers are the major indicator and determinant of quality education. Similarly, Gbore (2013) cited Adodo (2007) that one key overriding factor for the success of students' academic achievement is the teacher. Gbore (2013) further stretched that teachers' role in the preparation of students to succeed in examinations cannot be undermined.

There has been significant noticeable difference in the proportion of male to female science teachers in the country, physics in particular. In Ekiti state public secondary schools for instance, statistics show that male physics teachers constitute the larger proportion of 76.47% while female constitute about 23.53% (Ekiti state teaching service commission, 2014).

Gender gaps in educational outcomes are a matter of real and growing concern. A phenomenon in the school system that has been rather disturbing is the fact that despite the clamour for gender equality treatment and advancement in teaching and learning of science, boys and girls do not seem to e level of academic achievement in the teaching and learning of science and physics in particular. Okoro, Ekanem and Udoh (2012) cited Ammermueller and Dalton (2006) that large literature existed on the difference between the academic achievement of boys and girls.

Gender differences have become critical issues of concern around the world most especially to educators and researchers. Hansman, Tyson and Zahidi (2009) reports that there is no country in the world that has yet reached equality between women and men in different critical areas such as in economic participation or education. This is also evident from the reports of Okebukola (2002) in a study titled "beyond the stereotype to new trajectories in science teaching", Longe and Adedeji (2003) in their study on increasing girls access to technical and vocational education in Nigeria, Yoloye (2004) in the study on increasing female participation in science and Ezirim (2006) in the study on "scaling up girls participation in science education: towards a score card on quality education" asserts that gender has impact on science education.

Francis (2007) in his study on student and teacher related variables as determinants of secondary school students academic achievement in chemistry affirms that teacher's gender has direct effect of students' achievement in chemistry. Francis (2007) cited Okoruwa (1999) that teacher's gender has significant effect on achievement mean scores of pupils in science; male teachers were more effective than their female counterparts.

Dee (2007) in a study investigated teachers and gender gaps in student achievement. The study revealed that society's fundamental interest in fairness and equal opportunity to motivate all are the root causes of gender differences in educational outcomes. Gender inequality in education has remained a perennial problem of global scope (Bordo, 2001; UNESCO, 2003; and Reid, 2003). Kwaku (2010) states that girls are generally looked upon to preserve the status quo of tradition, thus, in many cases, girl's education are curtailed by early marriage. Much of this heated discussion, both in popular and academic settings has focused on assessing the relative contributions of biological and environmental determinants.

Onah and Ugwu (2010) in their study to determine the factors which predict performance in secondary school Physics asserts that sex is a very good predictor of performance in Physics at secondary school level. Also, Esan (2002) in the study of gender differences in mathematical problem-solving amongst Nigerian students cited Agbolor (1993) that the level of participation of girls in science, technology and Mathematics activities is low. Similarly, the findings of Ariyo (2006) reveals significant in the aspect of gender difference in favour of boys in Physics achievement. Also, Ogunleye and Adepoju (2011) observed that there is gender inequality in science, technology and mathematics.

Conversely, Igboke (2004), Ma (2007) and Coley (2010) in their separate studies on comparative analysis of SSCE and NECO results in Ohaukwu local government area of Ebonyin State, gender differences in learning outcomes background and differences in gender gap comparisons across racial/ethnic groups in education and work respectively reported that there is no significant effect of gender on achievement of Physics. In the same way, Kolawole and Popoola (2011) in their study maintained that academic achievement is free of gender influence. Also, the findings of Ogunkola and Fayombo (2009) in their study of "investigating the combined and relative effects of some student-related variables on science achievement among secondary school students in Barbados" confirms that there was no significant statistical difference in Barbadian secondary students' science achievement based on their gender.

Similarly, Abiam and Odok (2006) in their study of "factors in Students' Achievement in different branches of Secondary School Mathematics" found no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics. In addition, Igboke (2004), in a study on comparative analysis of SSCE and NECO results in Ohaukwu Local Government Area of Ebonyin State, Nigeria noted that the differences in performance of male and female students' in Physics are not significant. Also, Udousoro (2003), in the study on gender differences in computing participation, stated that there is there is no significance difference in the academic achievement of male and female students. But, Jegede (2007) found that students showed higher anxiety towards the learning of Chemistry in secondary schools than male students. In another study, Okereke and Onwukwe (2011) shows that the male students achieved better than the female students.

According to Jari, L., Reijo, B., Kalle J., Veijo, M. & Anna, A. (2012), one important goal in the development of Physics education has been to bridge the gender gap in Physics. They stressed that there are two main reasons for this: firstly, an equal number of women and men in science and technology-related occupations would promote a more equal society, and secondly, in general, students are choosing Physics less and less.

According to Osborne, Simon and Collins (2003), girls are often seen as untapped resources. They suggested in principle, two possible approaches to take when aiming to increase the number of girls involved in Physics. The first is to change girls' attitudes, interest, or behaviours. An example of this would be to conduct a marketing campaign advertising the technology industry, to increase the perceived attractiveness of the field. The second approach is to change the content or context, the idea being that learning should be made more interesting (Biklen and Pollard, 2001).

According to Kathryn (2013), teachers' unconscious gender biases can produce stereotypic explanations for students' success and participation in the classroom. Teachers view male students' domination of the classroom and their time as typical masculine behavior. Kathyn (2013) affirms that gender bias can occur within subject areas and school activities. For example, in subject such as Mathematics and sciences, there are different participation patterns for girls and boys that boys are naturally better at mathematics and

science than girls. Teacher unconscious stereotyped gender bias that boys are smarter than girls, especially in mathematics and the science, meant they were willing to work with boys to reach capable of achieving that goal but girls were not. Conversely, teachers of subjects perceived as feminine will spend more time engaged with girls.

Researchers have found that teachers interact differently with students on similar gender they do with students of opposite gender. John (2005) cited Meece (1987) that evidence suggests that male teachers lend to be more authoritative whereas female teachers tend to be more supportive and expressive. Also, John (2005) cited Rodriguez (2002) that male teachers are likely to select a more aggressive disciplinary approach towards boys while teachers of either gender tended to ignore boys' disruptive behaviour than that of girls when the behaviour was not aggressive. Similarly, In the study conducted by John (2005) on student gender and teacher gender: the impact on high stake test scores, the study showed that students of the same gender as their teacher score better on reading and writing and were overall more likely to pass the final examination than students of opposite gender than their teachers. While this may indicate that student benefit from being instructed by teachers of similar gender.

In addition, Thomas (2006) in a study on how a teacher's gender affects boys and girls affirms that one theory asserts that the teacher's gender shapes communication between teacher and pupil, while another says the teacher acts as a gender-specific role model, regardless of what he or she says or does. According to this second theory, students are more engaged, behave more appropriately, and perform at a higher level when taught by me who shares their gender. Girls have better educational outcomes when taught by women and boys are better when taught by men (Thomas, 2006).

In Nigeria, in spite of the enormous role that Physics plays in national development and the efforts of government and other stakeholders at improving science education, Physics results in the examination conducted by most certified examination bodies like the West African Examinations Council (WAEC) and National Examinations Council (NECO) have not been satisfactory.

This study therefore intends to examine the influence of teacher's gender on secondary school students' performance in physics in Ekiti state, Nigeria.

2. Research Hypotheses

The following null hypotheses were formulated and tested at $p< 0.05$.:

1. There is no significant difference in the performance mean scores of boys taught by male and that of those taught by female physics teachers.
2. There is no significant difference in the performance mean scores of girls taught by male and that of those taught by female physics teachers.
3. There is no significant difference in the performance mean scores of students taught by male and that of those taught by female physics teachers.

3. Methodology

The design was a descriptive survey of the expos-facto research type in which there was no treatment and manipulation of independent variable. It involves the collection of data from records. The targeted populations for the study were all senior secondary class two (SS II) Physics students in all the public senior secondary schools in Ikere Local Government Area of Ekiti State.

A total of two hundred (200) SS II Physics students, which were randomly selected from ten (10) public secondary schools in Ikere Local Government Area of Ekiti State, formed the sample (i.e. 20 physics students from each school). The sample comprises of one hundred and twenty two (122) male and seventy eight (78) female. The researchers made personal contact with all the selected schools and collected the following:

1. Terminal continuous assessment scores of SS II physics students by gender, and
2. The list by gender of all the teachers involved in the teaching of the SS II physics students involved in the study.

4. Results and Discussion

- Hypothesis 1

There is no significant difference in the performance mean scores of boys taught by male and that of those taught by female physics teachers.

Source of Variation	Sum of Square	df	Mean Square	F_{cal}	F_{cri}	Remark
Between Groups	12.40	2	6.200			
Within Groups	22462.00	120	126.904	5.23	3.30	*
TOTAL	22474.40	122				

Table 1: Summary of One-way ANOVA of the performance mean scores of boys taught by male and that of those taught by female physics teachers

P < 0.05 (= Result is Significant at 0.05 level)*

The result in table 1 showed that F value, F_{cal} (5.23) with a P value < 0.05 alpha level obtained for the two groups is greater than the critical F value (3.30). This shows that there is significant difference in the performance mean scores of boys taught by male and that of those taught by female physics teachers. Therefore, the null hypothesis is rejected.

- Hypothesis 2

There is no significant difference in the performance mean scores of girls taught by male and that of those taught by female physics teachers.

Source of Variation	Sum of Square	df	Mean Square	F_{cal}	F_{cri}	Remark
Between Groups	14.32	2	7.311	3.12	2.26	*
Within Groups	16241.12	76	112.810			
TOTAL	16255.44	78				

Table 2: Summary of One-way ANOVA of the performance mean scores of girls taught by male and that of those taught by female physics teachers

P < 0.05 (= Result is Significant at 0.05 level)*

The result in table 2 revealed that F value, F_{cal} (3.12) with a P value < 0.05 alpha level obtained for the two groups is greater than the critical F value (2.26). This shows that there is significant difference in the performance mean scores of girls taught by male and that of those taught by female physics teachers. Therefore, the null hypothesis is rejected.

- Hypothesis 3

There is no significant difference in the performance mean scores of students taught by male and that of those taught by female physics teachers.

Source of Variation	Sum of Square	df	Mean Square	F_{cal}	F_{cri}	Remark
Between Groups	53.61	2	13.240	7.18	1.42	*
Within Groups	31423.42	198	423.112			
TOTAL	31477.03	200				

Table 3: Two-way ANOVA of the performance mean scores of students taught by male and that of those taught by female physics teachers

P < 0.05 (= Result is Significant at 0.05 level)*

The result in table 3 revealed that F value, F_{cal} (7.18) with a P value < 0.05 alpha level obtained for the two groups is greater than the critical F value (1.42). This shows that there is significant difference in the performance mean scores of students taught by male and that of those taught by female physics teachers. Therefore, the null hypothesis is rejected.

5. Discussion

As shown in table 1, there is significant difference in the performance mean scores of boys taught by male and that of those taught by female Physics teachers. The findings agreed with that of Francis (2007) that cited Okuruwa (1999) that teacher's gender has significant effect on achievement mean scores of pupils in science; male teachers were more effective than their female counterparts.

Similarly as shown in table 2, there is significant difference in the performance mean scores of girls taught by male and that of those taught by female Physics teachers. The findings agreed with that of Thomas (2006) that girls have better educational outcomes when taught by women and boys are better when taught by men.

Moreover table 3 showed that there is significant difference in the performance mean scores of boys taught by male and that of those taught by female Physics teachers. The findings also agreed with the findings of Thomas (2006) that girls have better educational outcomes when taught by women and boys are better when taught by men. It also agreed with the findings of Francis (2007) that cited Okuruwa (1999) that teacher's gender has significant effect on achievement mean scores of pupils in science; male teachers were more effective than their female counterparts.

6. Conclusion

Based on the results of this study, the findings revealed that there was statistical significant difference in the performance mean scores of boys taught by male and that of those taught by female Physics teachers and also there was statistical significant difference in the performance mean scores of girls taught by male and that of those taught by female teachers. Findings also revealed that there was statistical significant difference in the performance mean scores of students taught by male and that of those taught by female Physics teachers.

7. Recommendations

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

- Science educators (in particular, Physics educators), should discourage gender stereotype in teaching and learning of Physics; and
- Science educators (in particular, Physics educators), should pay particular attention to students of the opposite sex with a view to ensuring that latter are not detached from the teacher because of gender disparity as such could hamper the students performance.

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