Assessment of Teachers' Qualifications and Students' Numerical Proficiency in Solving Physics Problems in Ekiti State Senior Secondary Schools.

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Abstract
This study assessed teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools in Ekiti State. The study employed descriptive research of the survey type. A sample of 200 students was selected through multistage and stratified random sampling technique. The instrument used in collecting data for this study was a self-constructed questionnaire titled Numerical Ability Test (NAT) that contained 20 items. The instrument was validated by giving it to experts in Physics Education and Tests and Measurement and both face and content validity were ensured. Reliability of the instrument was established using test re-test method of reliability with a coefficient of 0.67. Data collected were subjected to inferential statistics such as students' t-test and Analysis of Variance (ANOVA) to test the research hypotheses. Results of the finding showed that there was a significant difference in the mean score of male and female students on their numerical proficiency in solving physics problems. The finding also showed there was a significant difference between teachers' qualification and students' numerical proficiency in solving physics problems. Therefore, it was recommended that class instruction should be structured in such a way that female students can catch up with calculation aspect of physics like their male counterparts and there should be a kind of training and retraining of physics teachers in secondary schools.

Key words: Teachers' qualification, Numerical proficiency, Problem solving, Physics

Introduction
The application of knowledge, productive skill and sustainable technological development in Nigeria are achievable through meaningful science education. The national policy on education (FRN, 2004) stated that the main objective of secondary school education is to prepare students for a useful living in science and technological oriented society, through equipping them with all the skills necessary for coping with higher education. In an attempt to achieve these objectives, the policy prescribes science as a core subject for both junior and senior secondary school classes. According to Sorojini in Adegboyegun (2014), science is defined as the study of natural things around us while

Omosewo (2006) described it as a body of knowledge and a way of investigating and thinking in pursuit of an understanding of nature.

Teaching of science started in 1859 as a study of nature and this later expanded to physics, chemistry and biology. Physics is seen as the bedrock for sustainable growth and technological development. Okoro (2003) affirmed that unless one understands the foundation of physics and links it with applied knowledge, one cannot call oneself an educated person in a country like Russia. Therefore, for a system to experience development, it must be physics driven. This is because the theory behind technology and foundation of some theoretical and applied knowledge are premised on physics.

The secondary school physics curriculum was developed by the Federal Ministry of Education in conjunction with Comparative Education Study on Adaptation Centre (FME and CESAC, 1985). This Curriculum, according to Ajakaye in Adegboyegun (2014) was structured using the concentric approach with similar contents in the SSI, SSII and SSIII but with an increasing demand and intensity as the level of education increases.

In spite of the universal recognition of the importance of physics to scientific and technological development of a nation and the tremendous influence being made by educationist, physicist and researchers towards improving both the quality and quantity of teaching and learning of physics in secondary schools, available report shows students under- achievement in sciences especially physics at West African Examination Council (Omosewo and Umeh in Adegboyegun, 2014).

Teachers' qualification according to Apata (2007) might be responsible for the failure recorded in physics. In the same vein, Omosewo (2008) asserted that the efficiency of any institution depends to a large extent on the academic competence of teaching staff and that no educational system can rise above the quality of its teachers.

However, eagerness of the science teachers to cover the syllabus at the expense of problem solving objectives, negatives attitude of science teachers to developing problem solving skills in their students, lack of understanding on the part of science teachers on how to go about teaching students to develop problem solving skills, unavailability of specific steps that must be serially followed to develop problem solving skills as the premises for the little impact shown by science teachers in developing and using problem solving skill in secondary schools attributed to the students poor performance in physics.

Problem solving involves the process by which the previously acquired knowledge, skills and understanding of learners are used to provide solution to the demand of an unfamiliar situation. According to Vosk, Oghan

and Perdikaris in Adegboyegun (2014), problem solving involves process by which the previously acquired knowledge, skills and understanding of learners are used to provide solution to the demand of an unfamiliar situation.

The role of science in technological development has long been realized in many of the developing countries. In Nigeria, this has necessitated the government policy of not less than 60% of places allocated to science and science oriented courses in higher institutions (FRN, 2004). The study of the sciences especially physics and capacity building for technological development is predicated on teacher's quality, because no education can rise above teacher' quality. According to Olanrewaju (2014), teachers' qualification improves teaching skills and makes students learn better. It is a known fact that a professional teacher becomes more efficient and effective as he stays longer on the profession by learning more on the job and learns more about the difficulties students encounter while learning (Abiri, 1988). In the same vein, Apata (2007) remarked that experience serves to nourish teachers through exposure to training, rearing and upbringing, and socialized them into teaching culture that translates into good pedagogic technique and problem solving strategies required of physics students. There is need for students to be mathematically inclined to have good learning in physics and be proficient in the problem solving skills needed for guided discovery method adopted in physics learning (Meyer 2001). Mathematics provides the basis for stimulating learning in physics through:

1. Provision of concise statement that is devoid of English words.
2. Expression of relation that exists in most concepts by mathematical structure.
3. Mathematical rules that aid students' understanding in how concepts are related and simplify problem solving strategy.

A physicist must have a good understanding of basic physical laws using calculative skills to solve problems (Wilkins, 1999). Mathematics is used to clarify the concepts and principle of physics and serves as basis for numerical proficiency that is needed to solve problems in physics (Apata, 2011). In spite of the universal recognition of the importance of physics to technological development and a number of studies being conducted on experience and students' learning outcomes in various subjects (Richard & Barbara (2002), Rice (2003) and Adeyemi, (2008), evidence abound that students are not numerically proficient in solving problems in physics (WASSCE, 2004, Apata, 2011). Hence, a persistent low achievement in physics in senior school certificate examinations. However, many studies have been conducted to address the issue of the failure rate of students in physics. Adenugba (2000) reported the usefulness and pitfall of microcomputers to physics education and advocated the use of computers to

enhance students' performance in physics through practical design of multi-stage opera amplifier. Owolabi (2006) demonstrated how physics can be taught by using out-of-class learning experiences within the immediate environment of the learners. The underlying emphasis is to teach physics in order to provide understanding base learning experiences. Therefore, this study investigated the strength of students to perform numerical processes with the aim of proffering solution to mathematical problems in physics in relation to teachers 'qualification. However, scanty studies have been carried out on teachers' qualification and numerical proficiency and information on the influence of teachers' qualification on numerical proficiency of students in solving problems in senior secondary school physics is limited. For this reason, there is need to provide information on numerical proficiency in senior secondary school physics.

Over the years, students' performance in physics seems to be poor. Students' perception of the subject is that it is difficult primarily from its dominant problem solving nature. From experience, chief examiners' Reports of WAEC have consistently reported that inability of students to handle numerical process properly is a major factor contributing to low performance in physics. Other reasons advanced by educational researchers include prevalence of mathematical calculations in physics problems, lack of calculative and manipulative skill by the students and the issue of unqualified and inexperienced physics teachers.

It has been observed that students' poor background in mathematics affects their performance in physics. Problem solving strategies used by teachers could also contribute to the low achievement recorded in physics by the students. This could be evidenced in the fact that most of the physics teachers have poor background in mathematics, thus, they only teach the introductory part of the topics.

In a study conducted by Adegboyegun (2014) to address the issue of failure rate of students in physics, different suggestions that could better the performance of students in physics were raised such as training and retraining of physics teachers and improvement in study habit of students. However, despite the suggestions raised by various researchers to reverse the trend of poor performance in physics, students' performance in the subject still seems to be below average and this can undermine rapid technological transformation in Nigeria.

Information on numerical proficiency of students in solving physics problems in secondary schools seems to be inadequate, hence, the need to provide information through data, based on numerical ability of senior secondary school students in physics viz a viz the teachers qualifications.

Purpose of the Study

The purpose of this study was to examine teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools. Specifically, the study

i. examined the numerical proficiency of male and female students in solving physics problems.
ii. determined the influence of teachers' qualification on students' numerical proficiency in solving physics problems in secondary schools.

Research Hypotheses

The following hypotheses were formulated in this study:

1. There is no significant difference between teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools.

2. There is no significant difference between the numerical proficiency of male and female students in solving physics problems in secondary schools.

Methodology

This study employed descriptive research design of the survey type. The study was on the assessment of teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools. The population for the study consisted of 4195 Senior Secondary School Two (SSS II) Physics students of 2018/2019 academic session, as obtained from Planning, Research and Statistics Department, Ekiti State Ministry of Education, Science and Technology, Ado Ekiti. A total of 200 students were selected through multistage and stratified random sampling technique as sample for the study. The instrument used in collecting data for this study was a self-constructed Numerical Ability Test (NAT). The instrument was divided into two sections: Section A reflects teachers' qualification and students' bio data while Section B consisted of 20 items to reflect numerical ability of the students in solving physics problems. The validity of the instrument was ensured by giving it to experts in Physics Education and Tests and Measurement to ensure the face and content validity. A test re-test method of reliability was used; the instrument was administered on 30 students who were not among the sample for the study on two occasions within an interval of two weeks. The Pearson Product Moment Correlation yielded a coefficient (r) of 0.67.

Results

Ho_1: There is no significant difference between teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools.

Table 1: Analysis of Variance on teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools

Source of variance	SS	df	MS	F_{cal}	F_{tab}
Between groups	533.061	3	177.020	*9.362	2.26
Within groups	562.019	196	190.030		
Total		199			

P>0.05 (Significant Result)

Table 1 showed that Fcal (*9.362) is greater than Ftab (2.26) at 0.05 level of significance. The null hypothesis was not accepted. This implies that there is a significant difference between teachers' qualification and students' numerical proficiency in solving physics problems.

Ho_2: There is no significant difference between the numerical proficiency of male and female students in solving physics problems in secondary schools.

Table 2: t-test of students' numerical proficiency in solving physics problems in secondary schools by gender

Gender	N	Mean	SD	df	t_{cal}	t_{tab}
Male	96	18.643	10.446	198	*2.766	1.960
Female	114	13.519	9.794			

*P>0.05 (Significant Result)

Table 2 showed that the t_{cal} (*2.766) is greater than t_{tab} (1.960) at 0.05 level of significance. The null hypothesis was not accepted. This implies that there is a significant difference in the mean score of male and female students on their numerical proficiency in solving physics problems.

Discussion

The findings of this study revealed that there is a significant difference between teachers' qualification and students' numerical proficiency in solving physics problems in secondary schools in favour of students taught by teachers having B.Sc/PGDE. This could be evidenced in both the knowledge acquired by the teachers and the pedagogy of teaching learnt during post graduate programme. This finding is in line with Ruth (2003), who found that students taught by science teachers with a second degree or by teachers who majored in at least one of five relevant subject areas and in pedagogy (science education) had achievement levels that were slightly higher than those of students taught by science teachers with a first degree or less.

The findings also revealed that there is a significant difference between the numerical proficiency of male and female students in solving physics problems in secondary schools. The mean score of male students outweigh that of their female counterparts. This could be evidenced in the interest of male students in calculative subjects. This finding is in contrast to the finding of Olanrewaju (2014), who concluded that there is no significant difference between the performance of male and female students in Mathematics Achievement test. This finding however, corroborates that of Apata (2011) who found that male students taught by experienced physics teachers had better numerical proficiency than their female counterparts.

Conclusion

This study specifically showed that male students have higher numerical proficiency in solving physics problems than female students. It also showed that teachers' qualification has influence on students' numerical proficiency in solving physics problems.

Recommendations

Based on the findings in this study, it was therefore recommended that; there should be a kind of training and retraining of physics teachers in secondary schools in order to enhance students' learning. The class instruction should be structured in such a way that female students can catch up with calculation aspect of physics like their male counterparts.

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