

***Teacher Factors in Enhancing Quality Assurance in Physics Education:
A Panacea for Transforming Physics Education for Sustainable Development***

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Abstract

The study employed a descriptive survey to investigate Senior Secondary School three (SSS3) physics students' perception of the teacher factor in enhancing quality assurance in the teaching and learning of physics in Umuahia Education Zone of Abia State of Nigeria. A sample of one hundred and seven (107) SSS3 physics students from senior secondary schools in Umuahia North Local Government Area was selected. The instrument for data collection was the researcher's developed structured questionnaire of the Likert type. The reliability of the instrument was obtained as $r = 0.84$. Two research questions and one null hypothesis tested at 0.05 level of significance guided the study. Data collected was analyzed using mean, standard deviation and χ^2 -test. Findings revealed that qualified physics teachers, physics teachers' adequate use of approved instructional methods, proper use of instructional materials, maintenance of school records, ensuring adequate preparation, professional development of teachers and delivering of lessons by teachers in teaching and learning of physics can enhance quality assurance in the teaching and learning of physics. It was therefore recommended that educational institutions in Nigeria must engage in quality assurance activities that meet best practices by ensuring they explore ways of forging collaborations within and outside their location for sustainable development and also employ good quality and qualified teachers to teach physics in the secondary schools.

Keywords: Physics Education, Teacher Factor, Quality Assurance and Sustainable Development

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Introduction

Education is an expedient factor in nation building and development. In other words the development of any nation is found to be linked to the quality of its education system. This is because education is a major factor that imparts directly on human beings who are at the central point of the whole process of development. No wonder education has been described as the bedrock of every society and tool for nation building therefore making the quality of education an issue of global concern. This is why Adegbesan (2011) is of the opinion that for quality education to be achieved in a nation, the principal actors of learning which are the teachers, learners and the environment must be cooperatively organized. The implication of this is that the teacher must be adequate in quality and quantity. Today's education therefore must have the effect of making Nigeria a country that has a steady supply of highly creative citizens who help to keep improving the living conditions of the general citizenry and to solve problems that exist from time to time. For quality education to be achieved, the minds of the young therefore need to be exposed to critical thinking, analysis and problem-solving strategies in a fast-changing world (Okobia 2012),

Physics as one of the sciences is very crucial to understanding the world around us, the world inside us and the world beyond us. It is an international enterprise which plays a key role in the future progress of humankind. For a nation to develop a sound basis for modern technology, the study of physics which enhances an understanding of the interplay of forces which forms veritable armour against superstition anywhere. Physics is a science that observes natural phenomena and explains them by using general rules to describe what has been observed. According to Ayodele and Anyaegbuna (2012), today's physics has two sides, on the one hand, it provides the basis for our current world picture, while on the other hand, it is the foundation of other subjects for technological developments. Physics has helped in the development of modern technology through the application of its principles to modern invention. . The implication is that the outcomes of physics education affect the attainment and realization of our national goals and objectives with regards to the development of science and technology in Nigeria (Ayodele & Anyaegbuna, 2012).

There has been a drastic reduction in the performance of secondary school students in Nigeria in the past decades especially in Physics (Awolabi & Ogini, 2013). This could be traceable to lack of qualified teachers, poor methods of teaching and other related factors (Emaiku, 2012).. This means that Nigeria cannot develop technologically if the quality of the teaching and learning of physics in Nigerian secondary schools is not assured. For us to have a physics education that sharpens the mind of the recipients and a physics education that emphasizes not only certificates but prominently diverse skills, abilities and attitudes to cater for differences in talents and opportunities there is therefore the need for quality to be assured in the teaching of physics.

Various people have defined quality assurance variously. Quality assurance has been defined by Okobia (2012), as the standard of something as compared to other things: that is the degree of goodness or excellence. Boraham and Ziarati (2002) referred to quality assurance as a planned and systematic action deemed as necessary to provide adequate confidence that a product or service will satisfy given requirements for quality. The American Society of Quality Assurance defined assurance of quality as

the planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled. Wikipedia Encyclopedia defined it as the process of verifying or determining whether the product or services rendered meet or exceed customers' expectations. Quality assurance is really the best way to begin to turn around the present state of the Nigerian education system to serve as a change agent to meet local needs and for global competitiveness after several quantities of mass failure and half baked products from our educational institutions. This is in place since quality assurance ensures that input processes and output of the education system are geared towards meeting set standards to bring about improvement in teaching and learning. Quality assurance can also be said to be a holistic method of identifying and resolving problems within the educational system in order to ensure continuous quality improvement. Quality assurance according to Boraham and Ziarati (2002) is a planned and systematic action deemed as necessary to provide adequate confidence that a product or service will satisfy given requirements for quality. Ehindero (2004) emphasized that quality assurance focused on:

- Learners entry behavior, characteristics and attributes including some demographic factors that can inhibit or facilitate their learning.
- The teacher entry qualification, values, pedagogic skills, professional preparedness, subject background, philosophical orientation.
- The teaching and learning processes including the structure of the curriculum and learning environment.
- The outcomes which are defined for different levels in terms of knowledge, skills and attitudes including appropriate and relevant instruments to access these objectives.

Bateman (2006) further explained that quality assurance includes defined standards of achievement, documented procedures for identified processes; establish ways of responding to issues and clear accountability for outcomes. Quality assurance in education can also be defined as an all encompassing concept which includes all inputs, process and action through which the quality of education is developed, improved and maintained (Obioma, 2012). Quality assurance connects goals to which all secondary school students' teachers, staff and school leaders must achieve. This could be seen from the National Education Quality Assurance Policy which states that Nigeria is concerned with eight (8) components of quality assurance standards that are itemized as:

- i. Learners achievement and standard
- ii. Learners welfare and participations
- iii. Care, guidance and support
- iv. Leadership and management
- v. School community relationship
- vi. Learning environment
- vii. Teaching and learning
- vii. Curriculum

The quality of teaching and learning of physics is determined by the quality of

- Instructional materials

- Methodology and/or teaching learning approaches
- Capacity/professional development of teachers
- Readiness of learners
- Socio-economic status of learners
- Child friendly school environment

Obioma (2012), is of the view that quality of teaching and learning is determined by the quality and adequacy of teachers that teach the subject, the quality of instructional materials used by the teachers, teachers adequate use of daily lesson plan among other factors. In the case of the quality and adequacy of teachers that teach the subject Obioma (2012) recommended that there should be massive capacity building of physics teachers that are required to meet the demands of quality assurance and updating their knowledge. Quality teaching and learning of physics requires a unified and comprehensive approach relying on teachers professionally trained and equipped with requisite knowledge and skills. The physics teacher needs to understand his subject matter in ways that promote learning. He needs to help students acquire knowledge within the subject area in order that they meet the challenges of a scientific technological world. The availability of high quality physics teachers in adequate number is a necessity if the goal of Nigeria developing technologically is to be realized. The adoption of student centered instruction strategies like inquiring method, discovery method, discussion role play, games and other similar strategies have been shown to enhance active participation of students in the teaching and learning of physics. Consequent to this, the teacher's ingenuity in improvising, adapting and maximizing the utilization of the scarce and often insufficient instructional materials can have tremendous impact in the successful teaching and learning of physics. The emphasis on physics education is on the delivery of physics knowledge and skills. This implies that the quality assurance of physics education is focused on how well physics teaching and learning are organized to deliver the necessary knowledge and skills to the students; how well physics teachers teaching can be improved in a given time period and how well the delivery of physics knowledge and skills to the student can be ensured through the improvement of teaching and learning. Hence the need to investigate students' perception of the teacher factor in enhancing quality assurance in the teaching and learning of physics in secondary schools.

Specifically, this study tends to investigate students' perception of the teacher factor in enhancing quality assurance in the teaching and learning of physics.

Research questions:

The following research questions guided the study:

1. What are the mean scores of students' perception of teacher factor in enhancing quality assurance in the teaching and learning of physics?
2. What are the mean scores of male and female students' perception of teacher factor in enhancing quality assurance in the teaching and learning of physics?

Hypothesis

The null hypothesis below tested at 0.05 level of significance guided the study.

H₀1: There is no significant difference in the mean scores of male and female students' perception of teacher factor in enhancing quality assurance in the teaching and learning of physics.

Method

The study adopted a descriptive survey design to select a sample of one hundred and ninety-eight (107) senior secondary school three physics (SSS3) students from Umuahia North Local Government Area of Umuahia Education Zone of Abia State. The instrument for data collection was a researcher's developed structured questionnaire of teacher factor in ensuring quality assurance in the teaching and learning of physics in secondary schools. The responses are Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) that are weighted 4,3,2,1 respectively. The questionnaire is a fourteen-item questionnaire that is made up of teacher factor issues in enhancing quality assurance in the teaching/learning of physics in secondary schools. The instrument was validated and its reliability r was obtained as 0.89 using test-retest method. Two research questions and a null hypothesis tested at 0.05 level of significance guided the study. Data collected was analyzed using mean, standard deviation and χ^2 -test.

Results

The findings got from the study are presented in tables 1 and 2 below.

Table 1: Mean and standard deviation scores of students' perception of teacher factors that can enhance quality assurance in the teaching and learning of physics.

S/N	ITEM	X	\overline{SD}	REMARK
1.	Availability of adequate Number of qualified physics teachers.	2.59	0.79	Agree
2.	Availability of good quality Physics teachers.	2.96	0.80	Agree
3.	Physics teachers teaching physics in a way that Students' interest and curiosity are developed	3.34	0.76	Agree
4.	.Physics teachers' adequate use of instructional materials in teaching physics.	2.96	0.81	Agree
5.	Physics teacher's adequate use of recommended instructional methods in teaching physics	3.24	0.71	Agree
6.	Physics teachers' ingenuity in improvising while teaching physics.	3.20	0.80	Agree
7.	Physics teachers having cordial relationship with their students thereby making their students feel comfortable while studying physics.	3.19	0.76	Agree
8.	Physics teachers maximizing the utilization of the scarce and insufficient instructional materials.	3.05	0.86	Agree
9.	Physics teachers adequate use of ICT in the teaching of physics.	2.96	0.81	Agree
10.	Physics teachers taking their students on field trips thereby assisting to understand practical aspects	3.12	0.82	Agree

	of the subject better.			
11.	Physics teachers ensuring active Students' participation in the teaching/learning of physics.	3,31	0.76	Agree
12.	Physics teachers adequate use of well planned lesson to teach physics.	2.59	0.80	Agree
13.	Physics teachers' adequate evaluation of students physics learning outcomes.	3.24	0.71	Agree
14.	Physics teachers taking sufficient account of Students Previous learning before imparting new ones,	3.19	0.79	Agree

Result in table 1 above showed that all the items had mean scores that are greater than 2.5 which is the mean score value of the four point scale used. The table also showed that the physics students all agreed that these factors listed above are teacher factors that will enhance quality assurance in the teaching and learning of physics in our secondary schools.

Table 2: X^2 values of male and female students perception of teacher factors in enhancing quality assurance in the teaching and learning of physics

		SA	A	D	SD	TOTAL
Male	50	447 (407)	349 (347) (46)	51 (30)	31	878
Female	57	397 (437)	370 (372) (50)	45 (31)	29	941
Total	107	844	719	96	60	1819

$X^2_{cal} = 8.78, X^2_{tab} = 7.815, df = 3$

Table 2 above showed that the calculated x^2 value 8.78 is greater than the critical/table x^2 value of 7.815. This implies that the null hypothesis is rejected meaning that there is a significant difference between male and female physics students' perception of teacher factor in enhancing quality assurance in the teaching and learning of physics

Discussion

Table 1 showed that all the students, both males and females agreed that the items listed are teacher factors that will enhance quality assurance in the teaching/learning of physics. This is in agreement with Obioma (2012) who explained that quality of teaching and learning is determined by the quality of instructional materials, methodology and teaching and learning approaches, maintenance of records as well as ensuring adequate preparation and delivery of lessons by teachers. This result is also in line with Ojedele (2007) whose view is that for quality assurance to be assured there is need to examine the qualification of teachers, the adequacy of the curriculum as well as the proper use of the process involved in the various skills to ensure that the finished products are of high standard. This also means that these factors if properly addressed and attained, will have the effect of making it possible for our country to

have a steady supply of highly creative citizens who help to keep improving the living conditions of the general citizenry, and to solve existential problems that are thrown up from time to time (Adegbesan, 2011). The achievement of this will in the long run produce physics students who will contribute to the scientific and technological development of our country.

Result in table 2 showed that the calculated χ^2 value is greater than the critical/table χ^2 value which resulted in the rejection of the null hypothesis. The implication of this is that gender played a significant role in the study.

Conclusion/Recommendation

The importance of Physics education in scientific and technological advancement of any nation cannot be over emphasized. Its study has the capability of explaining natural phenomena and everyday occurrences. For Nigerian citizens to meet global competitiveness in physics education, the assurance of quality in the teaching and learning of the subject is very imperative. It is therefore recommended that;

1. The Federal Government should employ qualified and good quality physics teachers to teach the physics in the secondary schools.
2. Physics teachers should ensure active students participation during physics lessons and adequate evaluation of students' physics learning outcome.
3. The school management should provide appropriate instructional materials that could be used in the teaching of physics in the secondary schools.
4. The school management should also ensure that physics teachers use appropriate instructional materials and approved instructional methods to teach the physics.
5. Physics teachers should be encouraged to make adequate use of Information and Communication Technology (ICT) and well planned lesson plans to teach the physics in the secondary schools to enable the students understand the subject better.

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