TEACHERS QUALITY AS CORRELATES OF STUDENTS LEARNING OUTCOMES IN PHYSICS IN OSUN STATE, NIGERIA

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Abstract
This study investigated teacher qualities as correlates of student achievement and attitude to Physics among secondary school students in Osun State. A random sampling technique was employed for selecting 55 senior secondary (public and private) schools from two local government areas in Osun State. The sample consisted of 1166 Physics students and 55 Physics teachers. Four instruments were used to gather information. T-test analysis was used as the statistical tool for this study and the findings revealed that the learning outcomes of students do not depend on the qualities of teachers considered which include, qualification of teachers, teaching experience, teachers' use of instructional methods, teachers' use of instructional materials and teachers' gender. The study recommended therefore that teachers should be rewarded for their performance. Government should work hand-in-hand to fund secondary schools so as to make learning environment conducive. Parents should not force their children to study the Sciences.

Keywords: *Teacher Qualities, Teachers Qualification, Teachers Experience, Instructional materials, Instructional method*

Introduction

Teachers are the yardstick that measures the achievements and aspirations of the nation. The worth and potentialities of a country get evaluated in and through the work of the teachers and the people of a country are the enlarged replica of their teachers and that is why teacher education should be of great concern to the society at large.

Understanding of science begins with understanding of Physics. Physics is the most basic science, which deals with the study of nature

and natural phenomena. With every passing day, physics has brought to us deeper levels of understanding of nature. Its concepts and techniques underpin the progress of all other branches of science. Physics can be seen as the most fundamental of all natural sciences. The most fundamental discoveries in Physics have rapidly been exploited by the medical community to devise new techniques for diagnosing and treating a variety of illnessess.

Physics has been acknowledged as a pre-requisite for the study of several courses in the universities such as, medicine, engineering, technicians and other applied sciences. Obioma (2009) stated that, Physics is crucial for effective living in the modern age of science and technology. Given its application in industries and many other professions, it is necessary that every student is given an opportunity to acquire some of its concepts, principles and skills.

Despite the importance of Physics, it is quite unfortunate that the teaching and learning of the subject has been unpleasant with challenges which prevent many students from performing well in external examinations. At least students must make a credit pass in physics in the senior secondary certificate examination so as to proceed to the tertiary level. Poor performance in Physics may be as a result of what some researchers think about it. For example, Adeyemo (2010) stated that Physics is perceived to be a difficult course because of its abstract nature. Akanbi (2003) stated that poor performance in Physics might be because of numerous fundamental reasons like shortage of science instructors in quantity and quality, insufficient laboratory equipment and facilities, poor teaching methods, shortage of appropriate Physics books, among other factors. Another problem as stated by Ezeliora (2004) and Okoli (2006) are poor teaching methods adopted by Physics teachers during instruction. A survey from schools (Ajayi, 2007) revealed that inadequacy of good instructional materials; equipment and laboratory facilities in the schools also affect negatively the effective learning of Physics in the schools. However, if students are made to see Physics as a means to enrich their personal lives, add value to them and improve the economic growth of the nation through making their surrounding more comprehensive and interesting, then some of these factors, if not all, must be considered. Therefore, this study sought to ascertain teachers' qualities as a correlate of students'

learning outcomes in Senior Secondary School Physics in Osun state, Nigeria.

Hypotheses

The following null hypotheses were tested at the 0.05 level of significance.

- **HO_1 :** There is no significant difference in the achievement of students taught by qualified Physics teachers and those taught by unqualified Physics teachers.
- **HO_2 :** There is no significant difference in the attitude of students taught by qualified Physics teachers and those taught by unqualified Physics teachers.
- **HO_3 :** There is no significant difference in the achievement of students taught by experienced Physics teachers and those taught by less experienced Physics teachers.
- **HO_4 :** There is no significant difference in the attitude of students taught by experienced Physics teachers and those taught by less experienced Physics teachers.
- **HO_5 :** There is no significant difference in the achievement of students taught by male Physics teachers and those taught by female Physics teachers.
- **HO_6 :** There is no significant difference in the attitude of students taught by male Physics teachers and those taught by female Physics teachers.

The Theoretical framework on which this study is situated is Socio-constructivist approach to teaching and learning, since the study dealt with relationships between variables within a society (in this context, the school). Some of the theorists associated with constructivism are Jean Piaget, John Dewey, Jerome Brunner and Lev Vygotsky, but for the purpose of this study, the work of Lev Vygotsky will be considered because he placed more emphasis on the social context of learning. According to him, the teacher is typically active and involved in this development. The classroom is expected to provide varieties of learning materials (including electronic). Lev Vygotsky (1978) defined those who are to teach as the "More Knowledgeable Other" (MKO). The MKO is anyone who has a better understanding or a higher ability level than the learner, particularly as regards a specific task, concept or process.

Teachers' qualities have been key issues throughout the country. The content knowledge of teachers is considered as one of the qualities of teachers. Ball (2000) stated that teachers' content knowledge influences students' learning outcomes. Findings support the notion that teachers who teach subjects that they have previously studied in depth (by earning a major or minor in the field while in college or earning an advanced degree in the discipline) are particularly effective. Adediwura and Bada (2007) stated that nobody could teach what he does not understand or know. Thus, the ability to teach effectively depends on the knowledge of teachers and knowledge that exists in many forms. Quality teachers are also considered to be those who bring about "student learning" which can be regarded as students' achievement. Maranzo, Pickering and Pollock (2001) asserted that though schools make little difference, that is only approximately 10% in students' achievement, the most important factor affecting students' learning is the teacher. According to them, teachers can have a profound influence on students**'** learning even in school**s** that are relatively ineffective. If a teacher performs his/her role in teaching, it will influence students' attitude to the subject being taught, Physics in this context.

The formal qualifications of teachers indicate their knowledge and competence in teaching their respective discipline. Akinsolu (2010) asserts that availability of qualified teachers determined the performance of students in schools. Huang and Moon (2009) documented that teacher qualification accounted for approximately 40 to 60 percent of the variance in average of students' achievement in assessment. It has been evidenced that in many countries, teacher qualifications that are considered to be related to student learning have become desirable targets of teacher education reform. Some of these reforms call for the professionalization of teacher education by making it longer, upgrading it to graduate programmes, and regulating it through mechanisms of licensure, certification, and promotion aligned with standards (Darling-Hammond, Berry, Thorenson, Chung and Frelow, 2001, 2002).

Teachers experience is a topic of concern to policy makers as experienced teachers have more opportunities to teach higher level or advanced classes, and thus have higher achieving students in their classrooms. The underlying assumption is that experience promotes

effectiveness. Experienced teachers have a richer background of experience to draw from and can contribute insight and ideas to the course of teaching and learning. Rivers and Sanders (2002) suggested that teacher' effectiveness increases dramatically each year during the first ten years of teaching". Soelein (2010) found a positive correlation between teachers experience and students' learning outcomes. Ilugbusi, Falola and Daramola (2007) showed that teaching experience in schools count significantly in the determination of students' achievement in external examinations such as West Africa Senior School Certificate Examination (WASSCE), National Examination Council (NECO) examination, National Business and Technical Education Examinations (NBTEE) and the Unified Tertiary Matriculation Examination (UTME).

Attitude can also be defined as the mental predisposition to act that is expressed by evaluating a particular entity with some degree of favor or disfavor. That is, the way individuals evaluate people with whom they are familiar in everyday life. Murphy and Whitelegg (2006) contended that the key determinants of students' attitudes to Physics are: how students see themselves in relation to the subject, both now and in the future, their "Physics self-concept", their experience of school Physics and a personally supportive Physics teacher. This personal supportive teacher must have been the one that has gained experience and use the experience to relate well with the students.

Educational practitioners have generally agreed that teacher-dominated pedagogy where students are placed in a passive role is undesirable and this is still the practice in a majority of classrooms in Sub-Sahara Africa in general and Nigeria in particular. Methods are meant to be varied since students learn in various ways. It is also a general perception among stakeholders that the methods of teaching and learning science at the secondary school level have been widely implicated for the undesirable state of students' achievement in science education in Nigeria (Ezeliora, 2004; Okebukola, 2003; Osinubi, 2003). Therefore, the desire for a cooperative, participatory, interactive, student-centred, active pedagogical approach or strategy learning is a common and general agreement amongst educational stakeholders (Kolawole, 2008; Ajiboye and Ajitoni, 2008; Adeyemi, 2008).

The methods used in science teaching vary depending on the concept to be taught. Getso (2008), Dike (2008), NTI (2007), Dangbe, Cirfat, Ajere, Asilika, Dung and Mwans (2008) listed the following science teaching methods depending on the situation and the categories of the learners. Demonstration method, project method, discovery/inquiry method, discussion method, laboratory method, process-based approach, cooperative learning or group method, concept mapping approach, games and play method, computer-assisted learning, field trip/excursion, individualized learning method and lecture or conventional method.

The importance of students' positive views of science lies in the significant impact of science in our everyday lives. Attitude is viewed as the evaluative dimension of concept and is acquired through learning and can be changed through persuasion using variety of techniques. According to Eggen and Kauchak (2001), positive teachers' attitudes are fundamental to effective teaching. A teacher must be interesting. That is, the teacher must work the students into a state of interest in what the teacher is going to teach that every other object of attention is banished from their minds. The teacher should also fill the students with devouring curiosity through the methods, to know the next steps in connection with the subject area. When this is done, the students will be in expectant for the next class.Ibeh, Onah, Umahi, Ugwuonah, Nnachi, and Ekpe (2013) recommend that encouraging Physics teachers to teach Physics in an interactive manner will improve attitude of students towards Physics.

Instructional materials are highly important for teaching. Teachers ought to use instructional materials in every aspect of teaching so as to encourage effective teaching. The use of instructional materials provides the teacher with interesting and compelling platforms for conveying information since they motivate learners to learn more. Instructional materials assist the teacher to overcome physical difficulties that could hinder effective presentation of a given topic. Abdo and Semela (2010), Jotia and Matlale (2011) and Dahar and Faize (2011) observed that while some educators are fascinated by the potential of instructional materials in enhancing teaching and learning, other teachers lagged behind in using instructional materials to teach. Learning is more permanent when the learner is able to complement classroom instruction with adequately selected materials (Denwigwe,

2008). Despite the importance and relevance of **i**nstructional material**s**, Uyoata (2006) and Nwagbo (2008) stated that **s**cience teaching equipment and materials are often lacking in schools. However, most of the equipment needed for teaching Physics in the secondary schools can be easily improvised to substitute when the real equipment cannot be procured in adequate quantity or are unavailable.

The study by Dee (2007) investigated the beliefs that gender gap in student outcomes is as a result of interactions between teachers and students. Dee is of the opinion that gender matters when it comes to learning. Dee (2007) was able to show that boys and girls have higher skills when they were taught by a same-sex teacher. Dee also contends that gender influences attitudes. Carrington and Mcphee (2008) stated that "it was clear that students who had female teachers had more positive attitudes" toward school.

A study by Luschei (2011) shows that student of female teachers performs better as compared to those of male teachers. Gender issues, both on the part of the teachers and students, have been documented to affect achievement generally (Erinosho, 2005; Kennedy, 2000).Researchers like (Carrington and McPhee, 2008; Driessen, 2007) have raised several arguments that boys' under-achievement in education is due to female dominance in the teaching profession. Afolabi and Audu (2007) found that teachers' gender has significant effect on the performance of students in the sciences. On the contrary, research by Driessen (2007) confirms that teacher's gender has no influence on the achievement, attitudes or behavio**u**r of pupils.

Methodology

This study was an *ex-post facto* type which involved the use of two sets of questionnaires to elicit responses on teachers' qualification, teaching experience, teachers' use of instructional method, teachers' use of instructional materials, students' attitude to Physics and Physics Achievement Test. The study was carried out in two local government areas in Osun State. A sample of 1166 Physics students were involved in the study. They comprised 923 male and 243 female students. These were the entire S.S 2 Physics students in fifty-five (55) schools in the two local government areas. Fifty-five (55) Physics teachers also formed part of the study. Thirty multiple choice item Physics Questions

with four alternatives (A-D) was constructed. The result of the Physics test reflects the understanding of students in Physics which was in accordance with Okpala and Onocha (1995) in which the six level of Bloom taxonomy has been reduced to three levels, which are Knowledge, Comprehension and Application. The instrument has a reliability index value of 0.87 after it has been subjected to KR 20 to ascertain its suitability. Students Attitude to Physics Questionnaire which comprises 20 items was designed to assess students' view and attitude to Physics. The instrument has a cronbach value of 0.86 after it has been subjected to KR 21 to ascertain its suitability. Teachers Instructional Technique Questionnaire (TITQ) and Teachers Instructional Material Questionnaire (TIMQ) were designed by the researcher to measure teachers' use of methods in teaching Physics, teachers' opinion on the use of Instructional material for teaching physics, years of teaching experience and qualification. It was likert type of four points scale with responses ranging from Strongly Agree to Strongly Disagree measures of teaching Physics. The scale also measured Physics teachers years of teaching experience which are classified as 0-5years as less experience and above 5years as experienced and any teacher with HND, NCE and B.Sc as Unqualified, while those with HND+PGDE, B.ED, B.Sc+PGDE, M.ED,M.SC+PGDE are Qualified. The instrument has a reliability value of 0.70 after it has been subjected to KR 21 to ascertain its suitability. Strongly Agree to Strongly Disagree. The instrument has a reliability value of 0.86 after it has been subjected to KR 21 to ascertain its suitability. The data collected for this study were analyzed using frequency count, mean, standard deviation and t-test statistical calculation to compare the mean scores of the variables using Statistical Package for Social Sciences (SPSS).

Testing of Hypotheses

HO_1: There is no significant difference in the achievement of students taught by qualified Physics teachers and those taught by unqualified Physics teachers.

Table 1: Test Analysis on Difference between the Achievement of Students Taught by Qualified Physics Teachers and those Taught by Unqualified Physics Teachers.

Teacher's Qualification	N	Mean	Standard Deviation	Standard Error Mean	t-cal	Df	Sig
Qualified Teachers	515	10.17481	3.3835	0.1491	0.968	1164	0.600
Unqualified Teachers	651	10.3702	3.4520	0.1353			

As shown in **T**able 1, the calculated t-value is greater than the 0.05 level of significance, thereby do not reject the null hypothesis. This implies that the achievement of students taught by qualified Physics teachers is not significantly different from those taught by unqualified Physics teachers.

HO_2: There is no significant difference in the attitude of students taught by qualified Physics teachers and those taught by unqualified Physics teachers.

Table 2: T-Test Analysis on Difference between the Attitude of Students Taught by Qualified Physics Teachers and those Taught by Unqualified Physics Teachers.

Teacher's Qualification	N	Mean	Standard Deviation	Standard Error Mean	t-cal	Df	Sig
Qualified Teachers	515	47.8000	6.0639	0.2672	1.216	1164	0.738
Unqualified Teachers	651	48.2289	5.9100	0.2316			

As shown in Table 2, the calculated t-value is greater than the 0.05 level of significance. Therefore the null hypothesis that there is no significant difference in the attitude of students taught by qualified Physics

teachers and those taught by unqualified Physics teachers is not rejected. This implies that the attitude of students taught by qualified Physics teachers is not significantly different from those taught by unqualified Physics teachers.

HO_3: There is no significant difference in the achievement of students taught by experienced Physics teachers and those taught by less experienced Physics teachers.

Table 3: **T-test analysis on difference between the achievement of students taught by experienced Physics teachers and those taught by less experienced Physics teachers.**

Teacher's Experience	N	Mean	Standard Deviation	Standard Error Mean	t-cal	df	Sig
Experienced Teachers	559	10.3667	3.5449	0.1499	0.793	1164	0.240
Less Experienced Teachers	607	10.2076	3.3056	0.1342			

As shown in Table 3, the calculated t-value is greater than the 0.05 level of significance. Therefore the null hypothesis that there is no significant difference in the achievement of students taught by experienced Physics teachers and those taught by less experienced Physics teachers is not rejected. This implies that the achievement of students taught by experienced Physics teachers is not significantly different from those taught by less experienced Physics teachers.

HO_4: There is no significant difference in the attitude of students taught by experienced Physics teachers and those taught by less experienced Physics teachers.

Table 4: T-test analysis on difference between the attitude of Students taught by experienced Physics teachers and those taught by less experienced Physics teachers

Teachers Experience	N	Mean	Standard Deviation	Standard Error Mean	t-cal	df	Sig
Experienced Teachers	559	48.2379	6.0270	0.2549	1.088	1164	0.698
Less Experienced Teachers	607	47.8567	5.9348	0.2409			

As shown in Table 4, the calculated t-value is greater than the 0.05 level of significance. Therefore the null hypothesis that there is no significant difference in the attitude of students taught by experienced Physics teachers and those taught by less experienced Physics teachers is not rejected. This implies that the attitude of students taught by experienced Physics teachers is not significantly different from those taught by less experienced Physics teachers.

HO_5: There is no significant difference in the achievement of students taught by male Physics teachers and those taught by female Physics teachers.

Table 5: **T-test analysis on difference between achievements of students taught by male Physics teachers and students taught by female Physics teachers**

Gender	N	Mean	Standard Deviation	Standard Error Mean	t-cal	df	Sig
Male	923	10.2990	3.4621	0.1140	0.294	1164	0.198
Female	243	10.2263	3.2705	0.2908			

As shown in Table 5, the calculated t-value is greater than the 0.05 level of significance. Therefore the null hypothesis that there is no significant difference in the achievement of students taught by male Physics teachers and those taught by female Physics teachers is not rejected. This implies that the achievement of students taught by male Physics teachers is not significantly different from those taught by female Physics teachers.

HO_6: There is no significant difference in the attitude of students taught by male Physics teachers and those taught by female Physics teachers.

Table 6: T-test analysis on difference between attitudes of students taught by male Physics teachers and taught by female Physics teachers

Gender	N	Mean	Standard Deviation	Standard Error Mean	t-cal	df	Sig
Male	923	48.2806	6.0172	0.1981	2.691	1164	0.752
Female	243	47.1235	5.7554	0.3692			

As shown in Table 6, the calculated t-value is greater than the 0.05 level of significance. Therefore the null hypothesis that there is no significant difference in the attitude of students taught by male Physics teachers and those taught by female Physics teachers is not rejected. This implies that the attitude of students taught by male Physics teachers is not significantly different from those taught by female Physics teachers.

Discussion of findings

From this study, the response from the completed questionnaire reveals that, Teachers Quality in terms of their qualification, experience, use of instructional method, use of instructional material, and their gender has nothing to do with the achievement and attitude of the students in Physics, even though, no other school factors could

have more impact on how much students learn than the quality of their teachers.

A finding from this study shows that the qualification of teachers has no significant difference on the achievement and attitude of students to Physics. The t-test analysis carried out reveals that students taught by HND,NCE, B.Sc, holders and those taught by B.Sc (Ed), B.Ed, M.Ed holders performed poorly. This result is in agreement with Makinde and Tom-Lawyer (2008) who found no significant relationship between student academic achievement and teachers' qualification. However, this poor result on Physics may be due to the lack of students' interest in the subject. It does not matter whether a teacher possesses Ph.D. in Physics, if students assume they cannot know Physics and have negative attitude to physics, they may not learn anything meaningful in the subject. This may be the reason why students still fail Physics.

A finding from this study also reveals that the experience of teachers has no significant difference on students' achievement in and attitude to Physics. This is in support of Aaronson, Barrow and Sander (2007) and Betts, Zau and Rice (2003) who found no significant correlation between teacher experience and student achievement. As a matter of fact, teachers gain experience each day as they teach Physics in their respective classroom, therefore the result of students in this study may not be the teachers fault but rather students fault due to their wrong perception of Physics.

Another finding from this study reveals that the use of instructional methods has no significant influence on students' achievement and attitude to Physics. This is contrary with the view of Ogwa (2002) who stated that teaching methods are vehicles used to convey the objectives of a lesson in such a way that the learner can best acquire knowledge from the lesson.

Another finding from this study shows that the use of instructional materials has no significant difference in the achievement of students and their attitude to Physics. This is contrary to the opinion of Ogwa (2002) that teachers who use teaching aids to deliver their lesson convey more facts than one who uses only oral speeches for lesson delivery. From this study, it may be inferred that the materials are not available while some that are available are not properly used.

A finding from this study further reveals that teachers' gender has no significant difference on students' achievement and attitude to Physics. This is in agreement with Carrington and McPhee (2008) who found that teachers' gender had no effect on students' achievement. And it is in agreement with Mullola, Ravaja, Lipsanen, Alatupa, Hintsanen, Jokela, and Keltikangas-Jarvinen (2011) that found that teacher gender had no influence on student's grades.

Summary

Summarily, the study examined the quality of teachers as it related to students' learning outcomes in Physics in two Local Government Areas in Osun State. The sample used for this study were 55 respondents which consist of 45 male and 10 female physics Teachers drawn from Osogbo Local Government Osogbo and Ilesa East Local Government Ilesa. The statistical tools used were frequency distribution (percentages) and t-test analysis using 0.05 level of significance.

Conclusion

Though, teachers have a special role in controlling all the instruction and learning environment in the classroom, yet it is clearly shown that the four qualities of teachers considered in this study do not have any influence on the achievement and attitude of Physics students. Acquiring an advanced degree does not mean teachers will perform better in the classroom. Teaching experience does not improve performance either, for everyone tends to do better for the first few years in their profession. But afterwards, teachers with few years' experience do just well as those who have been in the profession for long in boosting their students' achievement. However, it was realized during the study that, the failure of students in physics is linked to the students' non-readiness for the subject, lack of interest in the subject, the mentality of "I cannot know it" and the likes. Therefore, in order to achieve good learning outcomes in Physics among students, everybody has a role to play.

Recommendations

Based on the findings from this study, teachers should vary their teaching methods and the periods allotted to teaching of Physics should be increased so that teachers could have enough time to teach.

Teachers should try as much as possible to move round while teaching in order to ensure full concentration of students in the class.

In order for students to achieve the best in this subject, there is need for the Government to fund the schools, in terms of providing necessary amenities, such as chairs and tables, instructional materials according to the syllabus, laboratory facilities to enhance good learning of students and to make the classroom a conducive environment for learners. Parents should encourage their children but not force them to offer Physics.

There is need for qualified Physics teachers to be recruited and rewarded for a job well done. Teachers should always attend seminars and workshop for knowledge updates.

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