

Analysis of Students' Performance in Physics in Senior School Certificate Examination from 2015-2018 in Ado Local Government Area, Ekiti State, Nigeria

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Received: March 25, 2021

Accepted: May 01, 2021

ABSTRACT: *This study examined the analysis of Students' Performance in Physics in Senior School Certificate Examination from 2015-2018 in Ado Local Government Area, Ekiti State, Nigeria. Ex-post facto research design was adopted for this study. The target population comprised all the public senior secondary school students in Ado Local Government Area of Ekiti State, Nigeria. A total of 400 students were sampled across the four schools selected for the study using purposive and stratified random sampling technique (this sample was divided into male and female students in ratio 1:1). Instruments used to collect data for the study are scores obtained by Physics students from WAEC Examinations from 2015 to 2018. The three formulated null hypotheses were tested at 0.05 levels of significance. Frequency counts, percentages and student t-test were used to analyze the null hypotheses generated at 0.05 levels of significance. Findings of this study showed that about 50% of the sampled students passed (that is, A1-C6 grades) in SSCE Physics examination from 2015-2018. The results also showed that there was statistically significant difference between male and female students who passed Physics in WAEC from 2015-2018 and there was statistically significant difference between male and female students who failed Physics in WAEC from 2015-2018. Based on the findings of the study, conclusion and recommendations were made.*

Key Words: *Analysis, performance, students' performance, school certificate examination*

Introduction

Physics is the science concerned with the study of physical objects and substances, and of natural forces such as light, heat, and movement. Physics is about asking fundamental questions and trying to answer them by observing and experimenting. Vetii (2011) defined Physics as the study of energy and matter in space and time and how they are related to each other. Physics studies how things move, and the force that makes them move. For example, velocity and acceleration are used by physics to show how things move.

Physics is an exciting intellectual adventure that inspires young people and expands the frontiers of our knowledge about nature. Physics generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world. Physics contributes to the technological infrastructure and provide trained personnel needed to take advantage of scientific advances and discoveries. Physics being a fundamental science course has numerous applications and constitute the bedrock of development of science and technology in any nation. Achieving proficiency in physics should, therefore, be of a national concern (Adegoke, 2010).

The broad aim of Physics is to understand and explain various physical phenomena occurring in nature/laboratory through observation, experimentation and theoretical formulation. Well known examples of physical processes are the motion of planets around the sun, evaporation of water, sound emission from a tuning fork, refraction of light, attraction of iron by magnets, discharge of an electrical capacitor, and decay of the pi meson (Agrawal and Menon, 2015). Thus, meaningful learning of Physics is acquired through proper planning of Physics syllabuses and their relationship to environmental issues. It is important that at secondary school, the aim of Physics should be acquisition of process skills. These skills help the students apply Physics knowledge to solve every-day problems. In addition, these skills aid in the acquisition of the Physics concepts and apply them in their daily life (Zdenek & Hana, 2018).

Physics is an important element in the education of chemists, engineers and computer scientists, as well as practitioners of the other physical and biomedical sciences, (Maxwell, 2012). Physics extends and enhances our understanding of other disciplines, such as the earth, agricultural, chemical, biological and environmental sciences, plus astrophysics and cosmology- subjects of substantial importance to all peoples of the world. According to Smiths (2010), Physics improves our quality of life by providing necessary

strategies for developing new instrumentation and techniques for medical applications, such as computer tomography, magnetic resonance imaging and laser surgery.

Furthermore, Physics strives towards an understanding of the material universe. To gain this understanding, physicists systematically question nature through experiments. These experiments are designed to challenge existing hypotheses and provide clues to more powerful theories. However, experiments are not only essential in expanding our knowledge of our universe, but play a key role in the teaching of Physics (Chris & Vollmer, 2016).

The challenges faced by Physics as a subject include teachers' training and conceptualization of the subject, students' understanding of the subject, physical resources such as laboratories, teaching aids and text books. Research findings suggest that traditional lecture instruction is ineffective in dealing with students' misconceptions. Traditional lecture instruction does not consider the view of students. This technique is limited in helping a learner develop skills (Tarekegn, 2017). The practical approach on the other hand engages the student productively and leads to relational understanding. The proposed study contends that if practical work instructional approach is used perhaps improved students' achievements in the subject may occur. In addition, the enrolment is likely to increase. It is on this basis that the proposed study is designed to investigate the effects of Physics practical work on students' achievements in Physics.

According to Chu & Lin (2013), it has been observed that students taking Physics at all levels find it difficult to internalize physics concepts which do not agree with what they had already internalized (Refik & Bahattin, 2018). Furthermore to capture and retain interest in the subject is one of the many difficulties faced by the teachers. A number of research conducted have shown that teaching of physics faces the same problems in the whole world. This is credence by Mac Dermott (2017), who showed that students from different cultural background and social classes have different understanding of physics concepts. However many young people have similar understanding of physics concepts.

A study conducted by Juan (2017) on totalizing of didactic teaching-learning process in physics. The study found out that the teaching and learning physics faces some challenges since its teaching has been largely confined in the classroom. He also found out that the teaching appealed more to the cognitive domain and little on the affective-emotional domain. Teaching and learning physics was individualized.

Another finding was that learning was not focused on changing the individual to change the environment but learning was focused on making the individual to fit in the environment. Thus, due to the fore going it is important to change the approaches of teaching so as to improve it and be meaningful. Also, it is worth noting that there is a break down between the practicals and theory taught. The practical are taught as a different entity from the theory and this does not reinforce concept acquisition. Practical should be integral part of teaching and theory should be derived from the practical (Juan, 2017). This informed the designing of the current study.

Another challenge facing the Physics as a subject is inadequate content knowledge by the teachers of Physics. Fadaei (2012) carried a research to find out the teachers level of knowledge acquisition. It was based on Force and Motion Conceptual Evaluation (FMCE) for teachers understanding of mechanics concepts. It was administered to a large group of teachers in teacher training courses. The study found out most of the Physics teachers did not completely understand kinematics and dynamics concepts.

In addition, Assessments using the FMCE indicate that teacher understanding of dynamics concepts will be improved when some learning strategies are planned. Therefore, 1) Self-evaluating for teachers to know their abilities and motivating them to be more active in teaching. 2) Recognizing the necessity and planning for teacher training projects have to be emphasized. Maríael *al.*, (2012) proposed a new approach to teaching Physics having considered a problem within the teaching of Physics, in two aspects: The first, the didactic part, which concerns the professor, since Physics courses, generally, are imparted without giving the student an active role and with knowledge and concepts unlinked of his/her environment, making the teaching and learning of this subject lose its essence and significance. The second, the discipline part, has to do with the student; since it is observed recurrently that even with the education, the student does not use precisely the concepts of a studied theme when explaining or arguing a Physic problem or situation. Particularly within the Heat topic, although there is a daily generalized interaction of people with thermal phenomena.

In school setting, emphasis is placed highly on the outcome of the examination which is a reflection of the cognitive aspect of their learning as the evaluation mode. Subtle to this, examination in broad perspective is an instrument for testing, assessment, evaluation and accreditation. It is used for the purpose of prediction, selection, placement, certification and promotion. Interestingly, the 1887 education ordinance made provision for public examinations in schools (Adeyemi, 2010). Thus the National Policy on Education (2004) stipulates that all secondary schools should gear their programme to meet the requirements of

examinations being conducted for the senior school certificate. The pattern of grading candidates' scores in the examinations was such that the distinction grades were represented by A1 to B3. The credit grades were represented by C4 to C6. The ordinary pass grades were represented by D7 and E8, while the failure grade was represented by F9 (WAEC, 2002). It needs to be mentioned however, that the distinction and credit grades are the only requisite qualifications for admissions into universities, polytechnics and colleges of education in Nigeria and candidates must have at least credit in five subjects including English Language plus UTME result that is up to the cut-off point in order to qualify for admission (JAMB, 2012). Thus examinations occupy a unique position as a measure of quality within the educational system of Nigeria.

Education is the total process of human learning by which knowledge is imparted and skills developed. Secondary schools not only occupy a strategic place in the educational system in Nigeria, it is also the link between the primary and the university levels of education. According to Asikhai (2010), education at secondary school level is supposed to be the bedrock and the foundation towards higher knowledge in tertiary institutions. It is an investment as well as an instrument that can be used to achieve a more rapid economic, social, political, technological, scientific and cultural development in a country. It is rather unfortunate that the secondary schools today are not measuring up to the standards expected of them. There have been public outcries over the persistently poor performance of secondary school students in public examinations. According to Nwokocha & Amadike (2015), academic performance of students is the yardstick for testing the educational quality of a nation. Hence, it is expedient to maintain a high performance in internal and mostly external examinations.

The persistent decline in students' performance in public examinations is not only frustrating to the students and the parents, its effects are equally grievous on the society. One of the most potent barometers so far, if not the strongest, of measuring school performance of students is through public examinations such as Senior School Certificate Examination (S.S.C.E.) in Nigeria. These examinations are externally moderated and enjoy a lot of public confidence.

The form of education children receive after primary and before tertiary stage is called secondary education. Without secondary school products, it is obvious that the basis for any future academic study cannot be laid. Admittedly, no educational system is problem free. However, the decay in Nigerian educational system is becoming embarrassing. Ogunsaju (2010) described it as calamitous. Though, brilliant students can be found even in public schools, the high percentage of failure in WASSCE tends to rubbish the good ones among them.

Academic performance has been described as the scholastic standing of a student at a given moment. This scholastic standing could be explained in terms of the grades obtained in a course or groups of courses (Daniels & Schoulen, 2013). Simkins (2011) commented on this scholastic standing and argued that performance is a measure of output and that the main outputs in education are expressed in terms of learning, that is, changes in knowledge, skills and attitudes of individuals as a result of their experiences within the school's system. STAN, (2012) supported this argument and reported that performance is the level of attainment of a person in an examination, that is, how an individual is able to demonstrate his or her abilities in an examination.

Noting this point, Al-Shorayye (2015) regarded a student's performance in an examination as being depended on his cumulative grade point average. His argument supported Entwistle and Wilson's (2013) assertion that a student's success is generally judged by examination performance while the best criterion of performance is the sum of the student's academic performance in all the subjects taken. Physics is to a nation what protein is to a young human organism. As a vital tool for the understanding and application of science and technology, the subject plays the necessary role of a precursor and harbinger to the much needed technological and natural development of the developing nations of the world.

Consequently, students are being encouraged to take up science and technology related disciplines. Globally today, scientific methods persuade literally field of human endeavour and play a fundamental role in economic development of any country. In our march toward scientific and technological advancement and following our aspiration to be among the first twenty economies in the world by the year 2020 (Obioma, 2010; NERDC, 2013) we need nothing short of good performance of our youths in Physics in education. The West African Senior Secondary Certificate Examination is a school-based ordinary level school certificate examination conducted by the West African Examinations Council (WAEC) in Nigeria every May/June.

According to Asuru (2016), the West African Examination Council is one of the major examining bodies in Nigeria. The West African Examinations Council was set up in 1952 as an Inter-territorial body to conduct examinations as would be best suited to the needs of West Africa and as required in the public interest for the four British West African Countries of Nigeria, Ghana, Sierra-Leone and Gambia. Its two

functions are; to review and consider annually the examinations to be held in West Africa and to conduct such examinations and award certificates and diplomas on the results of the examination conducted.

In Nigeria, WAEC conducted its first examination-the Public Service Executive Competitive Examination in May, 1953. The Lagos office was opened in September of the same year. The council in conjunction with the University of Cambridge Local Examination syndicate conducted for the first time the West African School Certificate Examination (WASSCE) in December, 1955, and also the Teacher College grade II (TCII) in the same year. Liberia joined the council as an associate member in March, 1970 and as a full member in 1974. In spite of its inter-territorial structure of the council, however, the National office of each of the member countries administers the examinations within its own territory.

The academic achievement of students in Nigeria has been a source of concern to researchers, educators, government and parents. Obviously, the great importance that education has on the national development of the country cannot be over-emphasized. Basically, the aim of classroom teaching and learning is to satisfy the set objectives of instructions with the aim of attaining the goals of education. Consequently, all the activities in the classroom are geared towards achieving the societal goals of education.

Thus, the expectation of the society from the learner is to perform well at least to satisfy parental expectations as well as to justify the huge national expenditure on education. Regrettably, despite the increasing public funds committed to education, the Physics students' performance over the years in West Africa School Certificate (WASC) has continued to be of great concern to the society as a result of continuous failure (Rufai, 2010). Similarly, Jegede, Awodun & Olusola (2013) noted that in spite of the enormous role that Physics plays in national development and efforts of government and other stakeholders in moving science education, Physics results in most certified examination bodies like the West African Examination Council (WAEC) have not been satisfactory. Moreover, Adu (2016) noted also that the subject of academic performance is of great concern to individuals and the society. It was observed that failure brings untold hardship and frustration to the individual.

Research report indicated a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2014). Parents and government are in total agreement that their investment in education is not yielding the desired dividend. The reports from the West African Examination Council chief examiners (2016), indicates that the general performance of the candidates in Physics for the May/June 2010, 2011, 2012 and 2015 examinations did not differ significantly from those of the previous years (WAEC, 2010, 2011, 2012 & 2015). Nigeria has been a subject of controversy. Some schools of thought were of the view that the performance was improving through the mock examinations given to students (Ige, 2011).

Therefore, this study is targeted at finding the trends in students' achievement in senior school certificate examination in Physics in Ado local government area between 2013 and 2017.

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant difference in the trends of students' performance in WAEC Physics examinations from 2015-2018.
2. There is no statistical significant difference in the performance of male and female students who passed Physics in WAEC from 2015-2018.
3. There is no statistical significant difference in the performance of male and female students who failed Physics in WAEC from 2015-2018.

Methodology

Ex-post facto research design was adopted for this study. The target population for this study comprised of all senior secondary school Physics students that sat for West African Examination Council (WAEC) Examinations 2015 to 2018 in Ado local government area of Ekiti state, Nigeria.

A total of four hundred (400) Physics students that sat for West African Examination Council (WAEC) Examinations from 2015 to 2018 selected as the sample for the study from four secondary schools selected for the study using purposive and stratified random sampling technique (this sample was divided into male and female students in ratio 1:1).

Instruments used to collect data for the study are scores obtained by Physics students from WAEC Examinations from 2015 to 2018. The West African Examination Council (WAEC) Examinations from 2015 to 2018 was assumed to be valid since they are standardized examinations and the teachers-made examinations externally by specialist in that field.

Data were collected directly from the academic records in the selected schools through Vice Principal of the school.

The grade 'A' to 'F' of the West African Examination Council were used in this study for analysis. The data for distinctions and credits (A1-C6) were put together and treated as passes, while the grades D7, E8 and F9 were treated as failure.

The three formulated null hypotheses were tested at 0.05 levels of significance. Frequency counts, percentages and student t-test were used to analyze the null hypotheses generated at 0.05 levels of significance.

Result and Discussion

Hypothesis One

There is no significant difference in the trends of students' performance in WAEC Physics examinations from 2015-2018.

Table 1: Frequency Counts and Percentages of Students' Performance in WASCE examination from 2015-2018 based on gender

YEAR	PASSES		FAILURE						TOTAL
	A1-C6		D7-E8		F9		Summary		
	Male	Female	Male	Female	Male	Female	M	F	
2015	26	23	15	08	09	19	24	27	100
	49 (49%)		23 (23%)		28 (28%)		51(51%)		
2016	30	25	11	21	09	04	20	25	100
	55 (55%)		32 (32%)		13 (13%)		45 (45%)		
2017	24	23	20	17	06	10	26	27	100
	47 (47%)		37 (37%)		16 (16%)		53(53%)		
2018	22	36	17	05	11	09	28	14	100
	58 (58%)		22 (22%)		20 (20%)		42(42%)		
TOTAL	102	107	63	51	35	42	98	93	400
	209 (52.25%)		114 (28.50%)		77 (19.25)		191(47.75)		

Source: Author's Field Work 2019

Table 1 showed the performance of physics students in WAEC Examination in year 2015, 2016, 2017 and 2018. A cursory look at the table revealed that: In year 2015, 49 (49%) of students passed (A1-C6), while 51 (51%) failed. In year 2016, 55(55%) students passed (A1-C6), while 45(45%) failed. In year 2017, 47 (47) students passed (A1-C6), while 53(53%) failed. Finally, In year 2018, 58 (58%) students (A1-C6) while 42 (42%) failed.

Hypothesis Two

There is no statistical significant difference in the performance of male and female students who passed Physics in WAEC from 2015-2018.

Table 2: Result of male and female students who passed Physics in WAEC from 2015-201

Variables	N	Mean	SD	df	t-cal	t-tab
Male	102			209		
Female	107					

Source: Author's Field Work 2019

* = Significant at $p < 0.05$

Table 2 shows that the calculated significant value (2.02) is greater than t-tab (1.96) at 0.05 levels of significance. Hence, the null hypothesis is rejected. This implies that there is statistically significant difference between male and female students who passed Physics in WAEC from 2015-2018.

Hypothesis Three

There is no statistical significant difference in the performance of male and female students who failed Physics in WAEC from 2015-2018.

Table 3: Result of male and female students who failed Physics in WAEC from 2013-2017

Variables	N	Mean	SD	df	t-cal	t-tab
Male	98			189		
Female	93					

Source: Author's Field Work 2019

* = Significant at $p > 0.05$

Table 3 shows that the calculated significant value (1.79) is less than t-tab (1.98) at 0.05 levels of significance. Hence, the null hypothesis is accepted. This implies that there is no statistical significant difference between male and female students who failed Physics in WAEC from 2015-2018.

Discussion of the Findings

The findings of the study showed that majority of the male students had pass at credit level WAEC examination their female students passed in WAEC Physics 118 (39.3%). The findings of this study indicated that the results of students in physics SSCE revealed that male students have mastery of the physics concept that female their counterpart. The study also indicated that more female students failed physics that male students. This showed that male students like calculations that females. The finding supported the study. The general consensus was that the attainment level of student performance in Senior Secondary Certificate (WAEC 2010) and General Certificate of Examination was below expectation. Considering the concern of the people for their ward performance and the fact that there is a sharp rise in the number of schools and students, Adu & Oshati (2014) noted that there is need to continuously evaluate the trends in the performance of the students. In recent times, there has been a sudden upsurge in the establishment of private secondary schools because of the liberalization policy of the government. Most parents are of the opinion that the standard of education in private secondary schools is higher than that in the public secondary schools.

In terms of achievement, Ekundayo (2013) reported that performance is largely affected by a range of statistical indicators including the student-staff ratio, qualification of teachers, years of experience of the teacher and the school environment. Again, the society is not helping matters at all. There are a lot of factors distracting the students (playing of professional football, going into the entertainment industry) from serious academic work. The government is also shying away from their responsibilities. The World Bank report (2011) noted that most of the public schools have dilapidated infrastructures like building, laboratories and obsolete instructional material. Akinloye (2012) pointed out that the teaching job in Nigeria at all levels is not attractive. There is no nation that can rise above her teachers, so teachers have to be highly motivated. The development of any nation depends largely on the quality of her educational system of human resources. Formal education therefore remains the vehicle for socio-economic development and social mobilization in any society.

Conclusions

Based on the findings of this study, it was concluded that majority of the Senior Secondary School students sampled in this study had pass grades that is D₇ and E₈ in WAEC in Physics for the years. Majority of the respondents passed at credit level in WAEC Physics for the year 2017 WAEC. It was also shown that more students recorded F₉ grades in terminal examination than in the WAEC across the sampled schools. The outcome of the study showed that there was statistically significant difference between male and female students who passed Physics in WAEC from 2015-2018

Recommendations

In view of the findings of this study, the following recommendations were made to all the stakeholders:

1. Students should change their perception towards Physics as a school subject. A change of attitude towards the subject will not only affect academic performance of the students positively but also their technological skills.
2. The examination bodies should spread the Physics course contents evenly to cover the cognitive domain. The examination bodies should construct more items at the higher levels of the cognitive domain which will help the candidates in critical reasoning when giving solutions to the physics problems.
3. The teachers should endeavour to teach to cover all the topics in the syllabi of the examination bodies so that the students would not found wanting when answering the examination questions. Teachers should always develop the test blue print when constructing the Physics items for internal examination.
4. Students should not only rely on what the teachers teach but they must endeavour to look through the subject curriculum and syllabus for them to develop independent reading.

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