

## **Impact Of Continuous Assessment, Mock Results And Gender On Physics Students' Achievement In Senior School Certificate Examination In Ekiti State, Nigeria**

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## Abstract

*The impact of Continuous Assessment, Mock results and Gender on Physics Students' achievement in Senior School Certificate Examination (SSCE) in Ekiti State of Nigeria was investigated in this study. The study adopted a survey research design of the ex-post facto type. The sample comprised 450 Physics students drawn from Public Senior Secondary School III from Senior Secondary Schools in Ado Local Government Area of Ekiti State. Two research questions were answered in the study. Data were analysed using multiple regression statistic. The results showed that 80.0% of the total variance in physics students, performance in Senior Secondary School Examination (SSCE) results is accounted for by Mock results, Continuous Assessment and Gender (adjusted  $R^2 = 0.800$ ). The three factors made significance relative contribution to Physics students' achievement in SSCE; Continuous Assessment ( $\beta = 0.341$ ,  $p = 0.05 <$ ), Mock results ( $\beta = 0.486$ ,  $p = < 0.05$ ) and Gender has the least value ( $\beta = 0.162$ ,  $P = < 0.05$ ). That is, the three variables could be used to predict students' achievement in Physics. It is recommended among others that school authority should ensure that only students whose performance in Continuous Assessment and Mock examination is encouraging are allowed to register for final SSCE. Also, both internal and external assessment should be done without gender bias.*

**Key words:** *Continuous Assessment, Mock results, Gender, Academic performance*

## Introduction

The role of science in this modern era of technology is wide and profound. In line with this reasoning, Olagunju, Adesoji, Iroegbu and Ige as cited by Ogunleye and Babajide (2011) emphasized the importance of scientific knowledge in boosting national prestige, military might, national income and international rating of the country. According to them, science gives birth to the production of micro computers and their innovative applications which earned the developed countries such as the United States of America and Japan unparalleled national wealth, military potential and enviable national prestige. The development of any nation, which depends on science and technology, hinges on the nation's science education. Science education is a distinct form of creative human activity which involves distinct ways of seeing, exploring and understanding reality. Science has become such an indispensable tool that no nation, developed or developing, wishing to progress in the socio-economic sphere will afford to relegate the learning of science in schools to the background. Technological growth of a nation leads to its social and economic development. In the world today science and technology have become a dominant culture factors. America, Russia, Japan and China are typical examples of nations which are now referred to as developed, as a result of their development in the area of Science and Technology. The contemporary world is driven by science and technology and the two are interrelated.

Odeleye, Olusola and Awodun (2010) affirmed that science is the theory upon which the technology is built, without Science; there cannot be intuition for technology. Also, to confirm the assertion, Macmillan (2012) claims that while science probes into the question "Why?" technology probes into the "How?" aspect. Physics is among the three major pillars of science (i.e. Physics, Chemistry and Biology). Physics deals with the study of laws that determine the structure of the universe with reference to the matter and energy in the universe (Ike, 2002). In the words of Olarinmoye (2000) "Physics is the most utilized basic science subject in most technology and technology-related profession". This merely indicates that the enormous role Physics plays in the technological growth of any nation must not be undermined. It is germane to say that the technological growth of a nation leads to its social and economic development. The importance of Physics for the development of a nation is, therefore, glaring. Physics is the most basic of the sciences and its concepts and techniques underpin the understanding of other disciplines: A thorough understanding of mechanics is necessary to chemists and material scientists since the structure of every atom in the universe is determined by mechanics.

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

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

In Nigeria, in spite of the enormous role that Physics plays in national development and the efforts of government and other stake holders in improving science education, Physics results in most certified examination bodies like the West African Examination Council (WAEC) and National Examination Council (NECO) have not been satisfactory. These have been attributed to many factors which include utilization of inappropriate teaching methods in schools, poor quality school science teachers and school location (Macmillan, 2012). The broad aims and expectations of any teaching and learning programme is productivity and positive-evaluated end-product (achievement). But in recent times, there have been complaints from almost all quarters of the Nigerian society that the standard of education has subsided. Students' achievement in the Senior School Certificate Examination (SSCE) conducted by WAEC and NECO has continued to deteriorate from year to year, particularly in the area of sciences (specifically, Physics). In particular, reports on WAEC results of Senior Secondary School Certificate Examination in Ekiti State over the years often revealed low performance of students in Physics. A summary of students' performance in Physics at WAEC from 2005-2012 are as given below:

**Table 1: Summary of WAEC results in Physics in Ekiti State**

YEAR	No Registered	A1- C6	D7- D8	F9
2005	3738	2156 (57.7%)	1104(29.5%)	478 (12.8%)
2006	4157	2661 (64.0%)	1004 (42.2%)	492 (11.8%)
2007	4435	2524 (56.9%)	1243 (28.0%)	668 (15.1%)
2008	3385	1274 (37.6%)	797 (23.5%)	1314 (38.9%)
2009	4289	2296 (53.5%)	1036 (28.7%)	937 (17.8%)
2010	5459	2569 (49.8%)	1825 (31.6%)	1065 (18.6%)
2011	6859	4020 (58.6%)	1124 (16.4%)	1715 (25.0%)
2012	5081	2514 (49.5%)	1379 (27.1%)	1188 (23.4%)

Source: Ekiti State Ministry of Education, Science and Technology

A cursory look at table 1 above shows that not very many of the candidates had credit pass in the subject over the period of observation. This shows that the level of performance is not good enough. Observations on students academic performance in science generally, and Physics, in particular over the years in the results of Senior Secondary Certificate Examination (SSCE) conducted by West African Examination (WAEC) and National Examination Council (NECO) revealed that a very few number of students perform better in Physics examination compared with other subjects. Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend. That is, despite their hug investment on education, students' performances still remain poor. Teachers, also complain of students low performance at both internal and external examinations (Asikhia, 2010).

Some problems were identified by researchers as reasons behind this ugly trend. Studies of Olonade, 2000; Ojo, 2001; Aiyelabegan, 2003; Akanbi, 2003; Bamidele, 2004; Okooboh, Afolabi and Asilika, 2004; Garba, 2004; Akinola, 2006; Apata, 2007; and Aina, 2012 revealed that poor academic performance and low enrolment in science generally, and Physics, in particular in Nigeria are caused by : ineffective teaching methodology, negative students attitude/interest towards physics, school location and gender inequalities among other problems. in spite of these research effort on which of the factors could determine achievement of students in physics, the performance of students continue to be generally poor. It is against this backdrop that this study needs to investigate the extent to which Continuous Assessment, Mock examination results and Gender could predicts academics performance of students in physics in Public Senior Secondary Schools in Ekiti State, Nigeria.

Kenni (2011) opined that educational assessment has been identified to be an integral and inseparable part of a sound educational system. Assessment data forms the basis upon which vital educational decisions about teaching, leaning, educational programme and learning environment are made. Kenni (2011) further affirms that Continuous Assessment is a mechanism whereby the final score of a student in the cognitive, effective and psychomotor domains of leaning systematically takes accounts of all his/her performance during a period of schooling. The penultimate examination at the secondary school level of education under the old educational

programme of 6-3-2-3 system was named “mock Examination” because it was usually used to assess the likely performance of the students in the senior secondary certificate Examination. However, it was not used as part of the overall assessment of the student at the school certificate level. Adeyeye and Ilugbusi as cited by Kenni (2011) that since the introduction of the 6-3-3-4 system, the Continuous Assessment, in particular has been integrated as part of the overall SSCE results for each student. Ojerinde (2004) stressed the need to integrate the behaviour of school-based scores sent to examination bodies into the results of schools and also recalled that the Nigerian policy on Education (2004) stipulates the use of school-based scores as a component of certification. Studies have shown that one of the variables affecting learning in general and science learning in particular is gender, it is necessary to investigate the interrelationship between gender and science learning. Research have revealed that women are not only under-represented in science, but their levels of academic achievement in science and technology are low compared to men (Ishaya,2003 and National Science Foundation, 2008).

In predicting academic performance, what a learner knows will play a large part in determining what sense they can make of new information. The extent of relevant previous knowledge is a major factor in determining the achievement of learners in a particular subject or course. Learners build their own knowledge in an idiosyncratic way, using past experience and existing knowledge to make sense of new information. Since no two learners have the same knowledge and experience, different learners deal with all new information in different ways (Adebayo, 2002). Peers and Johnston in Adeyemi (2003) argue that a prediction of a future examination result could be made on the bases of the results of an earlier examination. However, despite all these research efforts to solve this problem, there still little or no improvement in the students’ performance in physics. There is need to carry out a study with a view to determining which of the selected variables (Mock examination, Continuous Assessment and Gender) could be use to predict student academic performance in SSCE.

## Research Questions

The following research questions were formulated and tested at  $P < 0.05$ :

1. What is the composite effect of the independent variables (Continuous Assessment, Mock result and Gender) on Physics students’ academic performance in SSCE?
2. What are the relative effects of each of the independent variables (Continuous Assessment, Mock result and Gender) on Physics students’ academic performance in SSCE?

## Methodology

The design was a descriptive survey of the ex-post facto research type in which there was no treatment and manipulation of independent variable. It involves the collection of data from records. The target population for the study was schools that registered students for 2010 to 2012 final year Physics SSCE in Ado Local Government of Ekiti State, Nigeria. Eight hundred and ninety two (450) physics students, which were randomly selected from ten (10) secondary school from Local Government Area of Ekiti state, formed the sample. The researchers made personal contact with all the selected schools and collected the following:

- (i) the copy of cumulative continuous assessment for three consecutive years (2010-2012) in Physics; (ii) the 2010-2012 Physics mock results and (iii) the 2010-2012 May/June SSCE computerized result sheets sent to each school by WAEC.

## Results and Discussion

This section presents the results obtained in the study in line with the research question raised.

**Research question 1:** What is the composite effect of the independent variables (Continuous Assessment, Mock result and Gender) on Physics students’ academic performance in SSCE?

**Table 2: ANOVA Table showing the composite effect Continuous Assessment, Mock results and Gender on students' performance in SSCE in Physics**

MODEL	Sum of squares	df	Mean square	F	Sig	R	R <sup>2</sup>	Adj.R <sup>2</sup>	SE
Regression	867.389	3	289.130	210.049	.000	0.880	0.808	0.800	2.1732
Residual	1222.318	450	1.376						
Total	2089.707	453							

Significant at  $P < 0.05$ .

Table 2 reveals the joint effect of the independent variables (continuous assessment, mock result and gender) will significantly predict physics students' academic performance ( $R=0.880$  significant;  $F=210.049$  and at  $P<0.5$ ). This implies that the variables are quite relevant in explaining students' performance in Physics to a very large extent. The table also shows adjusted R value of 0.800 which indicate that 80.0% of total variance in Physics students' performance in WAEC examination accounted for by the three variables (CA, Mock result and Gender) when combined. The remaining 20.0% could be due to other factors or variable not investigated in this studies as well as residuals. This implies that there is a significant composite effect of the continuous assessment, mock results and gender on Physics students' academic performance in SSCE.

**Research Question 2:** What are the relative effects of each of the independent variables (continuous assessment, mock result and gender) on students' academic performance in Physics in SSCE ?

**Table 3: Multiple Regression Analysis showing the relative effects of Continuous Assessment, Mock Results and Gender on students' performance in Physics in SSCE.**

Factors	Unstandardized coefficients		Standardized coefficients	Ranks		Sig
	B	Std.	Beta		T	Sig
Constant	-5.784	.423			-16.029	.000
CA	5.013	.008	.341	2	7.564	.000
Mock	.120	.010	.486	1	10.570	.000
Gender	-.339	.080	.162	3	3.005	.003

\*Significant at  $p < 0.5$ .

Regression Equation  $Y = 5.0E - 02X + 0.120X - 0.339X$ . Where, Y= Performance in Physics in SSCE ; X = Continuous Assessment; X = Mock and X = Gender

Table 3 shows that out of the three variables, mock result had the greatest contribution ( $B = 0.486$ ;  $P < 0.5$ ) followed by Continuous assessment ( $B = 0.341$ ;  $P < 0.5$ ). The third in the ranking is gender. Gender had a low ( $B = 0.162$ ;  $P < 0.5$ ) but significant influence on Physics student performance in SSCE. From this result, all the contribution made by each of the three factors are significant. Hence, they all contribute significantly towards the determination of students' performance in SSCE.

## Discussion

The study reveals that 80.0% of the total variance in Physics student performance in SSCE is accounted for by Mock results, Continuous Assessment and Gender. This shows that the performance of Physics students in SSCE depend largely on these factors. Indeed, the study has further established that each of the three factors (Continuous Assessment, Mock Results and Gender) could predict academic performance of Physics students in SSCE to a greater extent. The results in table 3 further showed that Mock results made a greatest contribution to Physics students' performance in SSCE. Mock results with a ( $Beta = 0.486$ ;  $p < 0.05$ ) could serve as a better pointer to academic performance of Physics students in SSCE than Continuous Assessment ( $B = 0.341$ ;  $p < 0.05$ ) and Gender ( $B = 0.162$ ;  $p < 0.05$  respectively). The finding agrees with those of (Adesoji, 1999 and Olajide, 2006).

The practical implication of this finding is that mock examination results could be used to predict results of students in the Senior School Certificate Examination (SSCE) in Physics. Gender has influence in Physics student achievement in SSCE. These findings are in agreement with those found by (Adesoji, 1999) that Mock examination results could be use to predict the performance of students in the Senior School Certificate examination in Physics and that students performance in Physics at the SSCE has no significant effect with gender. Also, these findings confirm (Olajide, 2006) findings that Mock results are good pointer to academic performance of students in senior secondary school certificate examination in Agricultural science and further mathematics. Table 3 has equally shown that Continuous Assessment could explain or determine Physics students' achievement in Senior School Certificate Examination particularly in WASCE. However, Continuous Assessment record if properly handled and managed, could provide explanatory information on variable for describing the quality of education in Ekiti State as well as Nigeria at large. It will also help to identify some problem of school children and thereby enable the educators to plan programmes that would assist in arresting such situations. The study further reveals that gender is a relevant factor in its relationship with student achievement in Senior School Certificate Examination especially in Physics. This supports the findings of National Science Foundation (2005 and 2008) that gender dichotomy is a strong factor in students, academic performance. The finding of the study is at the variance with the findings of Adesoji (1999) that students' achievement in Senior Cchool Certificate Examination has nothing to do with gender dichotomy.

### **Conclusion**

The study revealed that the three variables proved potent at predicting academic performance in Physics at senior secondary certificate examinations to an appreciable extent with mock results having the highest predictive capacity. Those factors directly or indirectly pointed to areas which have to be addressed in order to enhance the performance of students in Physics. Also, students whose performance in Continuous Assessment and Mock results are not encouraging should be hindered from registering for public examination.

Finally, if the government and other stakeholders in the educational industry could improve on the mode of assessment and organised seminars for teachers who are the curriculum implementers regularly, it is most likely that students' performance in Physics will be highly enhanced.

### **Recommendations**

Based on the findings of the study, the following recommendations were made: As a result of relevance of Continuous Assessment and Mock examination as predictors of the results of students in the senior certificate examination particularly in Physics, it would be better for present state of assessment to the statistically controlled, teachers should be trained on basic principles of developing and standardizing instruments for assessing cognitive, psychomotor and affective dimensions of learning. As these will go a long way in improving the quality of their questions.

Secondly, the government should provides enough founds for research institute and public examination bodies (NECO, WASCE and NABTEB) to carry out National Assessment of Educational Progress in Nigeria since they are the final users of continuous assessment data. There should be periodic supervision and monitoring of the conducts of Continuous Assessment and Mock examinations in secondary institutions so as to ensure validity and reliability of data; also, students whose performance in Mock examination and Continuous Assessment are not encouraging should be hindered from registering for SSCE. Teachers should try as much as possible to complete the Physics syllabus and improve on the conduct of Continuous Assessment and Mock examination.

In view of the above findings, on gender, our education, in its contents, planning and application should be gender sensitive to correct current anomalies in our culture and education. Some gender issues that must be addressed includes low status of women, son preference, female circumcision, polygamy, widowhood rites, sexual harassment, girl-child abuse, rape and prostitution, increasing divorce rate, lack of proper parenting and limited access to resources education, economic and political power.

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