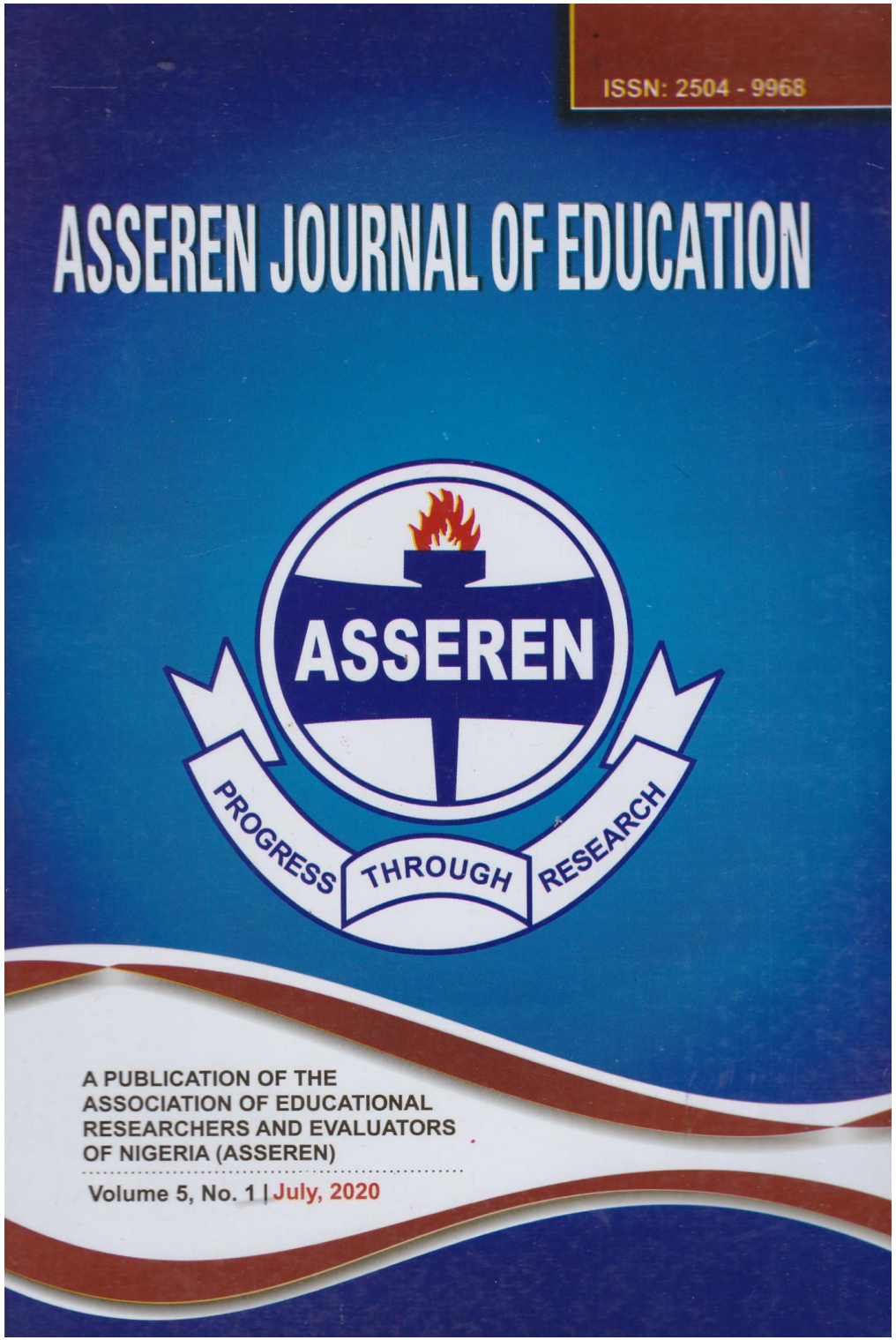

CHEMISTRY AND BIOLOGY MOCK RESULTS AS PREDICTORS OF STUDENTS' ACADEMIC PERFORMANCE IN SENIOR SECONDARY CERTIFICATE EXAMINATION IN AKWA IBOM STATE, NIGERIA

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Abstract
The study investigated chemistry and biology mock results as predictors of students' academic performance in Senior Secondary Certificate Examination (SSCE) in Akwa Ibom State, Nigeria. Two research questions and two hypotheses guided the study. A correlation research design was adopted. The population and sample size used in this study were the same, being 688 science students who sat for both chemistry and biology in senior secondary certificate examination and mock examination in 2017/2018 academic session which was drawn from three Federal Government Colleges in Akwa Ibom State, through purposive sampling technique. The mock and SSCE results in chemistry and biology were obtained from the sample schools simple regression analysis was used to answer the research questions while analysis of variance (ANOVA) and t-test associated with the regression were used to test the null hypotheses at .05 alpha levels. The study revealed that students' mock in chemistry and biology significantly predicted their SSCE chemistry and biology results. Thus, it was recommended that mock examination should be encouraged in various secondary schools.

Key words: Mock examinations, predictor, Senior Secondary Certificate Examination, Federal Government Colleges.

Introduction

Nigeria has official national examinations usually conducted by different examination bodies: West African Examination Council (WAEC), National Examination Council (NECO), National Business and Technical Examination Board (NABTEB), Joint Admission Matriculation Board (JAMB) and so on. These examination bodies conduct several summative examinations such as; West African Senior Secondary Certificate Examination (WASSCE), Senior Secondary Certificate Examinations (SSCE), Basic Education Certificate Examination (BECE), National Board Technical (NABTEB), Unified tertiary Matriculation Examinations (UTME) respectively for students who are in their final classes at either Basic Education or Secondary Education and even those who are about to enter University mainly for the purpose of grading, decision making and certification. This brings about a lot of competition in terms of furthering of education and job obtainment.

Relating to the fact that these examinations are high stake, some unethical practices have arisen to the fact that recently the credibility of these examinations is poor. As a result of this, Mock Examination was introduced to help reduce some of these irregularities, a situation that has caused unnecessary embarrassment to many candidates seeking for admission into tertiary education and to those seeking for jobs using these certificates.

However, especially in a school, Mock Examination is that examination which is taken as practice usually three to four weeks before any summative examination. It is a special type of teachers' made test which is usually conducted for the purpose of studying in order to see the extent of a students' performance in the real examination. In Nigeria for example, in Federal Government Colleges it is usually conducted regionally and monitored by the Federal Ministry of Education. That is, items (questions) are contributed by individual teacher base on subject mandate/school and then vetted region by region. These items are usually picked from WAEC and NECO past question papers in order to undergo some level of standardization as in the case of the external examinations. Its administration is usually carried out by individual schools while the subject teachers perfect the marking and scoring. These contradict with what that is obtainable in WASSEC and SSCE.

According to Ekim and Orluwene (2015), Mock Examination gives the students a better idea on what to study harder and the teacher, the idea about the students' ability/preparedness for the fourth coming external examinations. As reasonable and expedient, Mock Examination has a profound influence on external examinations since it is regarded as a promoter of success even when it does not count for a grade. It is diagnostic and prognostic in nature since it aim at revealing the academic competence, preparedness, strength and weakness, orderly presentation of materials and ability to communicate effectively and intelligently (WAEC Annual Report, 1980).

Base on its relevance, Mock Examination although not made compulsory in some countries, is not only confined to Nigeria. It is a practice of all educational sectors in the entire world. No wonder the government of Nigeria placed much emphasis on its practice to enable them actualize its educational goals/objectives most especially in the area of sciences as the world is rapidly becoming technological. But despite all these efforts on the importance and improvement of examination system, it is very sad to realize that the country is not still making any significant head way and is still besieged with technological problems despite the emanation of Chemistry, Biology among other science subjects as attested by many literatures such as the work of Maduabum (2006), many other researchers. For instance, Federal Ministry of Education in SSCE, 2012 result analysis, discovered that more than 32% of students who sat for Senior Secondary Certificate Examination (SSCE) in Chemistry and Biology in the last few years had failed grades. This calls for much concern from the government, parents, teachers and many other stakeholders in education and even at international level.

Thus, the reason researchers such as; Adepoju (2009), Wirngo (2013), Kolawole (2003), Nwankwo (2007), Orluwene (2006) and others worked tirelessly on the causes of massive and persistent failures and a way forward. While some such as; Adesoji (2017) made findings to find out whether the performance of students in the SSCE in Physics could be predicted from their grades in English and Mathematics at the 1998 Mock Examination. The study of Ajayi, Lawani and Muraina (2011) was also designed to

investigate the predictive validity of Mathematics mock results of students in SSCE in Ogun state, Nigeria. Still in accordance to this, is the study of Awodun, Olushola and Oyeniyi (2013) who worked on the impact of continuous assessment mock results and gender in Biology students' achievement in Senior School Certificate Examination in Ekiti State, Nigeria. Also, is the work of Andala, Digolo and Kamanda (2014), on reliability of Mock Examinations for prediction of the Kenya Certificate of Secondary Examination (KCSE) result. Therefore, in order to rectify these unwelcoming performances, it is then necessary for Mock Examination to be redesign in order to add more values to the entire educational system due to its relevance as a means of academic performance improvement. Hence, the driving force for this study is based on the emphasis placed on mock examinations in relation to the ordinary level Certificate Examinations (O, level) especially in Federal Government Colleges by the Federal Ministry of Education. Thus, this study is involved in establishing the link between the grade of students in the mock and ordinary level certificate examinations.

To this end, the aim of this study was to find out the extent to which Chemistry and Biology mock results could be used to predict the performance of the students in the Senior School Certificate Examination (SSCE) in Chemistry and Biology. To guide the course of investigation in this study answers were sought to the following questions:

1. To what extent do students' mock scores in Chemistry predict their SSCE scores in Chemistry?
2. To what extent do students' mock scores in Biology predict SSCE in Biology?

The following hypotheses were tested at 0.05 alpha levels of significance:

1.Students, mock scores in Chemistry do not significantly predict their SSCE scores in Chemistry.

2.Students' mock scores in Biology do not significantly predict their SSCE scores in Biology.

Methodology

The study was conducted using correlation research design. A correlation design is concerned with the determination of the degree of relationship between two or more variable. Kpolovie (2010) defined correlation design as a design which investigates the magnitude and direction or nature (positive or negative) of relationship that exists between a dependent variable and one or more independent variables. The population of the study comprised of all the science students who sat for chemistry and Biology senior secondary certificate examination and mock examination in 2016/2017 academic session in federal government colleges in Akwa Ibom State. At the time of the study, there were 688 students who sat for both SSCE and mock examination in Chemistry and Biology. This forms the sample size which was drawn through purposive sampling technique. The data used for this study were the mock results and SSCE results in Chemistry and Biology which were collected from the statistical department of the three Federal Government Colleges in Akwa Ibom State. The researchers adopted the simple regression analysis to answer the research questions. This involves SSCE scores as dependent variable and mock scores as independent variable. Analysis of variance (ANOVA) and t-test associated with the regression were used to test the significance of each of the hypotheses at .05 alpha levels.

Research question 1: To what extent do students' mock scores in chemistry predict their SSCE scores in Chemistry?
Hypothesis 1: Students' mock scores do not significantly predict their SSCE scores in chemistry.

Results
In order to answer the research question, simple regression was used while analysis of variance (ANOVA) and t-test associated with the regression were used to test the hypothesis.

Table 1: Simple Regression Analysis f Students' Mock Scores and SSCE in Chemistry

Model	R	R^2	Adjusted R^2	Standard Error of Estimate
1	.093	.009	.007	7.0890

Table 1 shows simple regression of coefficient R of.093, $R^2$of .009, adjusted $R^2$of .007 and standard error of estimate of 7, 0890. Based on the coefficient of determination (R^2values) of .009, it can be deduced that the prediction of mock scores only explains.9% of the variation on SSCE scores in Chemistry.

Table 2: Summary of ANOVA for Prediction of MOCK scores on SSCE scores in Chemistry

Sum of Variance	Sum of Square	Df	Mean of square	F	Sig.
Regression	37.419	1	37.419		
Residual	42737.113	686	62.299	5.963	.015
Total	43108.603	687			

To establish the results, the beta-value and associated t-value were also computed in table 2.

Table 2 reveals that the calculated F-values of 5.963 were significant at .015 which is less than the chosen alpha level of 0.05 ($p<0.05$). Hence, the null hypothesis is rejected indicating that Chemistry mock scores significantly predict SSCE scores in Chemistry.

Table 3: Standardize and Unstandardized Questions

Model	Unstandardized B weight	Coefficient standard Error	Standardize coefficient Beta	Coefficient T	Sig
Constant	53.694	2.415		22.234	.000
Mock scores	.112	.046	.093	2.442	.015

Table 3 shows that the beta value of .093 which was significant based on its associated t-value (2.442) was significant at .015 level which is less than the chosen probability level of 0.05 ($p<0.05$) therefore, the null hypothesis of no significant prediction of mock scores on SSCE scores in Chemistry is rejected. Thus, it means that chemistry mock scores is a good predictor of SSCE Chemistry scores. The regression equation of SSCE Chemistry was

$Y'=53.694+.112_{x}$, where $_{x}$ is the raw scores for each candidate in **Chemistry mock** examination and Y' is the predicted SSCE Chemistry score.

Research 2: To what extent do students' mock scores in Biology predict their SSCE scores in Biology?
Hypothesis 2: Students' mock scores in Biology do not significantly predict their SSCE scores in Biology.

In an attempt to give answer to research question and test its corresponding hypothesis, the collected data (Biology Mock scores and SSCE Biology score) were also subjected to simple regression. Simple regression was used to answer the research question while testing the hypothesis; ANOVA and t-test associated with regression were employed.

Table 4: Simple Regression Analysis of Students' Mock Scores and SSCE Scores in Biology

Model	R	R^2	Adjusted R^2	standard Error of Estimate
1	.115	.013	.012	7.4306

Table 4 reveals the simple regression coefficient R of 0.115, $R^2$of 0.013 adjusted $R^2$0.012 and standard error of estimate of 7.4306.

Based on the coefficient of determination (R^2 value) of .013, it can be deduced that the prediction of mock scores only explains 1.3% of the variation on SSCE Biology scores.

Table 5: Summary of ANOVA for Prediction of Biology Mock Scores on SSCE Biology Scores

Source of variance	Sum of Square	Df	Means of Square	F	Sig
Regression	507.146	1	507.146		
Residual	37832	686		9.196	.003
Total	38339	687	55.149		

The result in table 5 reveals that, the F-value 9.196 was significant at 0.003 level and is less than 0.05 significant level ($p<0.05$). Hence the null hypothesis is rejected; giving a signal that candidates performance in Biology Mock Examinations significantly predicted their performance in SSCE Biology. Furthermore, other investigation was done in testing for the prediction of Biology mock on SSCE Biology through beta value and its associated t-values are given below in table 6

Table 6: Beta Value and associated T- Value for Prediction of SSCE Biology Scores Using Mock Biology Scores

Model	B-weight	Std.error	Beta	T	Sig
Constant	53.681	2.877	:115	18.656	.000
Biology	.158	.052		3.032	.003

The results from table 6 above indicates that beta value of 0.115 was significant since its t-value of 3.032 was significant at 0.003 which is less than the chosen 0.05 probability level ($p<0.05$).Thus, t-value obtained also proves that students' Biology mock scores significant predicted the SSCE scores in Biology. The regression equation for mock in

Biology was given as Y'=53.681+158$_x$ is the raw score for every individual candidate in Biology mock examinations. While y' is the predicted SSCE Biology score.

Discussion of Findings

The finding reveals that students' Chemistry mock scores significantly predict their SSCE scores in chemistry in Akwa Ibom State, Nigeria. It can also be deduced that the prediction of students' Chemistry mock scores only explains .99% of the variation on their SSCE scores in chemistry. This implies that students with high Chemistry mock scores will generally have high mock score earned low SSCE scores in chemistry. The summary of ANOVA for regression shows that the calculated F-value of 5.963 was statistically significant at 0.05 alpha levels. The result was further confirmed by the beta value of.093 and associated t-value of 2.442 which was also statistically significant at 0.05 alpha levels. This result therefore implies that students' Chemistry mock scores significantly predict their SSCE score in Chemistry.

The findings of this study are in line with the study of Adesoji (2017) whose finding was conducted to find out whether the performance of students in the SSCE in Physics could be predicted from their grades in English and Mathematics at the 1998 mock examination. The study made used of 150 students' in five secondary schools in Lagos state and data was analyzed using regression analysis. The results indicated that performance of students in Mathematics could be used to predict results of SSCE Physics. It was also found that, results English language alone had low predictive values for performance in Physics. Due to the findings, the author suggested that the credit pass in English language should not be made mandatory for students seeking admission for science and applied science.

Also, in the work of Ajayi, Lawani and Muraina (2011) which was designed to investigate the predictive validity of Mathematics mock results of students in SSCE in Ogun state, Nigeria. 260 students were randomly selected by a simple random sampling technique from 10 public secondary schools in two local government areas of Ogun state, Nigeria. An ex-post facto type of research design was used since data were collected from the already existing school rewards which do not require the manipulation of the independent variables. The collected data were analyzed using the statistical software package for social science (SPSS). It was observed from the findings that mock examination results in Mathematics could be used to project success in academic performance of students in SSCE Mathematics.

In finding out the prediction strength of Biology Mock scores on SSCE Biology scores, it was realized that students Biology mock scores significantly predict their SSCE scores in Akwa Ibom state, Nigeria and that the prediction of students' Biology mock score can only be explained with 1.3% of the variation on their SSCE scores in Biology. The implication is that, students with high level of performance in Biology mock will definitely have high grades in their SSCE Biology scores while those with poor performance Biology mock scores also bound to perform poorly in their SSCE Biology scores. The summary of ANOVA for regression shows that the calculated F. value of 9.196 was statistically significant at 0.05 alpha level. Furthermore, this result was confirmed by beta value of 0.115 and associated t-value of 3.032 which was also statistically significant at 0.05 alpha levels. These results therefore, reveal that Biology mock scores significantly predict their SSCE scores in Biology. This study is in support of the works of Adegbite

(2009) who investigated when continuous assessment (CA) scores could predict student's future performance in junior school certificate examination (JSCE) in Ife-South of Osun state. The result yielded a high predictive strength of the CA over SSCE resulted with a sample size of 520. The result showed a correlation coefficient of 0.79 for English language and Mathematics. The study was further subjected to statistical test to ascertain the level of prediction

of 26.4% was obtained. This study is also in line with the study of Awodun, Olushola, and Oyeniyi (2013), impact of continuous assessment mock results and gender in Biology students' achievement in senior school certificate examination in Ekiti State, Nigeria. The study adopted a survey research design of the ex-post facto type and it adopted a sample size of 450 physic students drawn from public senior secondary school 111 from senior secondary schools in Ado local government area of Ekiti state. The data collected was analyzed using multiple regression statistics. This result revealed 80% of the total variance in Physics student's achievement 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 (β=0.341, p=0.05>), Mock result (β=0.162, p=<0.05>) and Gender has the least value (β=0.162, p=<0.05) that is the three variables could be used to predict students' achievement in Physics. The researchers finally recommended that school authority should ensure that only students whose performance in Continuous Assessment and mock examination should be allowed to register for final SSCE, both internal and external Assessment should be done without gender bias.

The study reveals that Chemistry and Biology Mock score are significant predictor variables. In Chemistry, the mock examinations can only predict about 0.9% variation in SSCE chemistry. The Biology Mock examination scores can only significantly predict about 1.3% variation in SSCE Biology.

These significant predictors in both Chemistry and Biology mock scores on SSCE indicate that:

Mock scores are truly significant, Mock scores can be used by teachers, parents, counselors, school administrators and even students themselves to determine or predict the performance of external examinations, and could also indicate that, may be both examinations (Mock and SSCE) were properly conducted by observing examinations ethics accurately.

Conclusion

Based on the findings, the researchers concluded that mock examinations are a good predictor of SSCE if mock examinations are properly conducted as it ought to be by eradicating or reducing all forms of errors that may want to invade into examinations. Again, for mock performance to be used as predictor of SSCE performance, mock items must undergo some levels of standardization.

Recommendations

Based on the above findings and the implications, the under listed recommendations were made:

- In order to ensure examination sanity and for accurate predictive results. Mock Examinations should be properly supervised by the Federal Ministry of Education

and even the examination bodies such as, NECO and WAEC.

- Mock Examinations should be allowed to undergo some proper standardization. This is to enable it have a perfect match with SSCE in order to ensure proper or adequate prediction.
- The time laps between these examinations (Mock and SSCE) should not be too long.
- Mock examinations should be made compulsory.
- All stakeholders of education, the government, parents, teachers, administrators, examination bodies and every other agents of educational system should join hands to fight out examination malpractice in Mock examinations if Mock is to be considered necessary for prediction SSCE.

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