



Junior Secondary School Basic Science Examination As Predictor of Senior School Certificate Examination, Physics, Chemistry and Biology In Rimi Educational Zone, Katsina State, Nigeria.

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Abstract

This study determined Junior Secondary School Basic Science Examination as Predictor of Senior School Certificate Examination, Physics, Chemistry and Biology in Rimi Educational Zone, Katsina State, Nigeria. The objectives were to determine the predictive validity of JSCE Basic Science on final SSCE Science subjects (Physics, Chemistry and Biology). The study adopted correlational design. The population of the study was 1.152 out of which a sample of 289 2021/2022 sets of public secondary school SS3 science students that sat for JSCE in 2019 was drawn. PPMC was used to analyzed the data. All hypotheses were tested at 0.05 level of significance. The finding showed that positive relationship existed between JSCE Basic Science and SSCE Physics, with ($r = 0.348$, $p = 0.000$), JSCE Basic Science and SSCE Chemistry ($r = 0.369$, $p = 0.000$), and JSCE Basic Science and SSCE Biology ($r = 0.250$, $p = 0.014$). Based on the outcome of the study, it was concluded that junior secondary school Basic Science is related to senior secondary school science examination in Rimi Educational Zone, Katsina State. It was recommended that students willing to study science subjects in future should be motivated to take Basic science examinations serious as this will be a prerequisite for placing them into science arms of the senior secondary schools.

Keywords: Predictor, Basic Science, Biology, Physics and Chemistry

Introduction

Education is an avenue of training and learning, especially in schools or colleges, to improve knowledge and develop skills. The ultimate purpose of education is to empower an individual to excel in a chosen field of endeavor or career, and to be able to positively impact his/her environment (Adeyemi, 2008). The National Policy of Education in Nigeria (2013) recommends a two-tier secondary system; the Junior Secondary School (JSS) and the Senior Secondary School (SSS), the duration for each of the two levels is three years (Federal Republic of Nigeria [FRN], 1998). The Junior Secondary Certificate Examination (JSCE) is a public examination in Nigeria conducted by each state of the federation through their respective Ministry of Education for final-year students of the JSS at the end of the third year of Junior Secondary schooling. While each state develops, administers, marks, and awards grades and certificates to all public schools under its jurisdiction. The National Examinations Council (NECO) is responsible for conducting the JSCE to all JSS III students of Federal Government Colleges and other private secondary schools that are to take the NECO-conducted examination. The Senior Secondary Certificate Examination (SSCE) on the other hand, is a

National Examination for all Senior Secondary School 3 Students in all secondary schools in the country, it is conducted and administered by the West African Examinations Council (WAEC), NECO or NABTEB.

Basic Science (formerly known as integrated science) in the JSS which is the focus of this study is a subject that occupies an important place in science education program in Nigerian. One of the major objectives of Basic Science curriculum is to lay a solid foundation for subsequent specialized study in these science subjects including Physics, chemistry and Biology at SSS (Dike, Ngozi, Garba, & Maryam, 2017). Basic science is a multi-disciplinary course which provides a meaningful understanding of science without differentiating it into various scientific fields; it lays the foundation for advance studies in science and technology (Opara, Ijeoma & Stella, 2017). It is the science subject offered in primary and junior secondary schools and also offered as a course of study in the school of education in Nigeria Tertiary Institutions. Its' curriculum is a compilation of subject matter drawn from physics, chemistry and biology which are three divisions of science subjects in the senior secondary school.

Academic achievement can be described as the quality and quantity of learning (changes) that has taken place in the learner after being exposed to a course of instruction during the teaching and learning experience within a specified period. Bell (2012) defined academic achievement as the ability to study and remember facts and to be able to communicate the knowledge verbally or on paper.

The concept of validity is one of the most important characteristics in determining the quality of a testing instrument. Predictive validity is the ability of some assessment tools to predict future performance either in some activities in schools or in another assessment of the same construct. Anikweze (2013) refers to predictive validity as tests that are designed to predict someone's status on an external criterion measure. In a similar vein, Orubu (2012), observed that predictive validity can be used to provide a framework for determining the degree of accuracy or credibility that can be accorded Student performance. Orububu (2015) investigated predictive validity of junior secondary school Basic Science A comparative study of senior secondary school Physics, Chemistry and Biology scores in Delta States. The study adopted ex-post factor design, using 400 students who participated in JSCE in 2010 and SSCE in 2013. The result establishes that there is a significant relationship between scores obtained by students in SSCE Physics, Chemistry and Biology. Also Adeyemi (2008) conducted a study to find out whether the Junior Secondary Certificate Examination JSCE Basic Science then (Integrated Science) performance can predict students performances in Secondary School Certificate SSCE Physics, Chemistry and Biology in Ondo State. The study explored a correlational design. Pearson Product moment correlation was used to analyze the data. The findings revealed that the JCSE Examination in Basic Science was a good predictor of performance for SSCE Physics, Chemistry and Biology Examination.

Ifamuyiwa (2005) examined the relationship between student's performance in J.S.S. Basic Science then (Integrated Science) and Senior Secondary Chemistry, Biology and Physics. A sample of two hundred and eighty eight students-164 boys and 124 girls selected randomly from four public schools in Apapa L.G.A. of Lagos state. The result of the study showed significant correlation between performance in Junior Secondary School Basic Science and the performance in Senior Secondary Chemistry, Biology and Physics. Positive relationship was found to exist

between JSS Basic Science and SSS Chemistry ($r = 0.59$), Biology ($r=0.52$) and Physics, ($r=0.50$) respectively. The finding also revealed no significant gender difference in students' performance in J.S.S. Basic Science but significant in favor of boys at the SSS.

In contrary Edokpayi and Suleiman (2011) found that the academic achievement of students in JSCE among some selected schools in Zaria metropolis, Kaduna state, Nigeria, was a poor predictor of their later achievement in Chemistry

The Basic Education Certificate Examination BECE (formally known as JSCE in Katsina State) Basic Science results of 2018/2019 students conducted by Katsina State Ministry of Education was used in this study for the purpose of comparison with the WAEC version of the SSCE of the same students that sat for WAEC science subjects (Physics, Chemistry and Biology) in 2021/2022 session.

Statement of the Problem

Basic Science is the bedrock on which the science subjects – Biology, Chemistry and Physics at the Senior Secondary Schools is laid. Emphasis is therefore placed on it to provide the students with the right foundation for higher achievements in these science subjects at the SSCE (Bello 2019). It has however been observed by the researcher that there is a persistent poor performance of students particularly in SSCE over the years. This poor performance of students has been a matter of concern for all stakeholders including government, law makers, teachers, parents and even the public at large. Several factors have been attributed to the poor performance such as inadequate facilities, poor attitude of students to work, inadequate teaching methods to mention but a few. Achievements of students in Basic Science at JSCE which is the basis of their placement in the senior secondary schools science arm have also been implicated as a factor for the poor achievement of students in science subjects including Biology, Physics and Chemistry.

The above unhealthy conditions observed, provided the researcher with courage in conducting the study on Junior Secondary School Basic Science Examination as Predictor Senior School Certificate Examination, Physics, Chemistry And Biology In Rimi Educational Zone, Katsina State, Nigeria.

Objectives of the Study

The study has the following objectives; to determine;

1. The predictive validity of JSCE Scores in Basic Science on final SSC examination in Physics.
2. The predictive validity of JSCE Scores in Basic Science on final SSC examination in Chemistry.
3. The predictive validity of JSCE Scores in Basic Science on final SSC examination in Biology.

Hypotheses

The null hypotheses formulated for the study are;

- Ho 1.** There is no significant relationship between students' performance in JSC Basic science examination and final SSCE Physics.
- Ho 2.** There is no significant relationship between students' performance in JSC Basic science examination and final SSCE Chemistry.
- Ho 3.** There is no significant relationship between students' performance in JSC Basic science examination and final SSCE Biology.

Methods

The research design for this study is correlational design. Correlational design was defined by Kpolovie (2010) 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. Correlational research is a type of research that attempts to analyze the mutual interaction between two or more entities from the same group of subjects looking for relationships on which to base the prediction (Cherry, 2013). The data were collected and used as they occurred naturally.

The population of this study comprised all 2021/2022 set of public secondary school SS3 Science students who sat for JSCE Basic Science examination in 2018/2019 session, across the sixteen (16) public secondary schools in Rimi Educational Zone, Katsina State. The number comprise of (609) male and (543) female students making a total number of (1152) SSS 3 Science students. While the sample of this study is 289 male and female SS3 science students, Krecjie and Morgan (1970) table for determining sample size of a given population was adapted, In selecting the sample of the study, multistage sampling procedure was used for the research. Stratified sampling technique was used to select (8) schools from which the sample obtained. Two (2) schools were selected from Batagarawa local government, three (3) from Rimi and (3) schools from Charanchi local government in the zone, this was done because the schools have similar characteristics, and stratified sampling assisted in selecting a representative sample, While proportional and random sampling technique was used in selecting the students.

Both the JSCE and SSCE were standardized examinations by external examining bodies and therefore were valid and reliable therefore, no instrument was used in this research, but a proforma developed by the researchers was used for extracting the grades of selected students in the JSCE and SSCE examination for the 2018/2019 and 2021/2022 set respectively. The score of each student in Basic Science was matched with his/her score in Physics, Chemistry and Biology. The genders of the students were also obtained. Both the SSCE scores and the JSCE examination scores were obtained from the schools and Ministry of Education as the case may be and it was recorded on the space provided in the proforma for further analysis

Results

Table 1: Pearson Product Moment Correlation (r) on relationship between performance in JSCE Basic Science and SSCE Physics.

| Variable | N | df | Mean | Std. Dev | r value | P(sig) |
|--------------------|-----|-----|-------|----------|---------|--------|
| JSCE Basic Science | 289 | 287 | 1.566 | 0.869 | 0.348 | 0.000 |
| SSCE Physics | 289 | | 1.623 | 1.227 | | |

Table 1 revealed that the r value computed is 0.348 and p-value of 0.000 is obtained. Since the p-value of 0.000 is not greater than the alpha value of 0.05, therefore, the null hypothesis which states that there is

no significant relationship between students' performance in JSCE Basic Science and final SSC Physics examination is here by rejected. This implies

that significant relationship exist between BECE Basic Science and SSCE Physics Examination

Table 2: Pearson Product Moment Correlation (r) on the relationship between JSCE Basic Science and SSCE Chemistry.

| Variable | N | df | Mean | Std. Dev | r | P (sig) |
|--------------------|-----|-----|-------|----------|-------|---------|
| JSCE Basic Science | 289 | 287 | 1.566 | 0.866 | 0.369 | 0.000 |
| SSCE Chemistry | 289 | | 1.842 | 1.288 | | |

Table 2 revealed that the r value computed is 0.369 and p- value of 0.000 is obtained. Since the p-value of 0.000 is not greater than the alpha value of 0.05, therefore, the null hypothesis which states that, there is no significant relationship between students'

performance in JSCE Basic Science and final SSC Chemistry examination is here by rejected. This implies that significant relationship exist between JSCE Basic Science and SSCE Chemistry Examination.

Table 3: Pearson Product Moment Correlation (r) on the relationship between JSCE Basic Science and SSCE Biology.

| Variable | N | df | Mean | Std. Dev | r | P(sig) |
|--------------------|-----|-----|-------|----------|-------|--------|
| JSCE Basic Science | 289 | 287 | 1.566 | 0.889 | 0.250 | 0.014 |
| SSCE Biology | 289 | | 2.026 | 1.091 | | |

Table 3. revealed that the r value computed is 0.250 and p- value of 0.014 is obtained. Since the p-value of 0.014 is not greater than the alpha value of 0.05, therefore, the null hypothesis which states that, there is no significant relationship between students' performance in JSCE Basic Science and final SSC Biology examination is here by rejected. This implies that significant relationship exist between JSCE Basic Science and SSCE Biology Examination.

Discussions

Findings from the study revealed that there is significant positive relationship between student's performance in JSCE Basic Science and SSCE Physics in Rimi Educational Zone, Katsina State. This shows that the higher the performance of students in Basic Science, the higher their performance in Physics. This finding is in line with the findings of Adeyemi (2008) who conducted a study to find out whether the Junior Secondary Certificate Examination JSCE Basic Science performance can predict students performances in Secondary School Certificate SSCE Physics, Chemistry and Biology in Ondo State. The findings revealed that the JCSE Basic Science Examination was a good predictor of performance for SSCE Physics, Chemistry and Biology Examination.

This finding is also in consonance with the findings of Ifamuyiwa (2005) who examined the relationship between student's performance in J.S.S. Basic Science then (Integrated Science) and Senior Secondary Chemistry, Biology and Physics. A sample of two hundred and eighty eight students-164 boys and 124 girls selected randomly from four public schools in Apapa L.G.A. of Lagos state. The result of the study showed significant correlation between performance in Junior Secondary School Basic Science and the performance in Senior Secondary Chemistry, Biology and Physics. Positive relationship was found to exist between JSS Basic Science and SSS Chemistry ($r = 0.59$), Biology ($r=0.52$) and Physics, ($r=0.50$) respectively. The finding also revealed no significant gender difference in students' performance in J.S.S. Basic Science but significant in favor of boys at the SSS. Also the findings of Orububu (2015) investigated predictive validity of junior secondary school Basic Science A comparative study of senior secondary school Physics, Chemistry and Biology scores in Delta States. The study adopted export factor design, using 400 students who participated in JSCE in 2010 and SSCE in 2013. The result establishes that, there is a significant relationship between scores obtained by students in SSCE Physics, Chemistry and Biology.



The result suggested that Basic Science at JSCE should be taken seriously by students to enhance better performance in the Science subject at SSCE.

Conclusion

Based on the findings of this research, the researcher concluded that significant positive relationship exist between JSCE Basic Science examination and SSCE Physics, Chemistry and Biology examination in Rimi Educational Zone, Katsina State. This implies that the higher the performance in JSCE Basic Science, the higher the performance in SSCE Physics Chemistry and Biology examination.

Recommendations

The following recommendations were given on the basis of findings in this research:

1. Teachers, School administrators, Guidance counselors should always use the results of junior secondary school to place students into suitable arms in the senior classes. This will enable them to place the students into suitable classes based on their performance in the junior secondary school examination..
2. The students willing to study science subjects in future should be motivated to take the Basic science examinations serious as this will be a prerequisite for placing them into science arms of the senior secondary schools.
3. It was also recommended that career counselors should consult students' past record in Basic Science before advising them to offer science subjects including Biology.

References

- Adeyemi, T.O (2008). Predicting Students' Performance in Senior Secondary Certificate Examinations from Performance in Junior Secondary Certificate Examinations in Ondo State, Nigeria. *Middle-East Journal of Scientific Research*, 3 (2), 73-81.
- Anikweze, M. C. (2013). *Measurement and Evaluation for Teacher Education*, (2nd Edition). Ibadan: Constellation Nig. Publisher.
- Bell, M. (2012). *Defined Academic Performance*. retrieved on 12/12/2016 from Online at http://www.chow.com/about474075_define_academic_performance.htm/.
- Dike, Ngozi I., Garba, & Maryam A. (2017). Students Integrated Science Achievement as Predictor of Later Achievement in Biology in Selected Government Secondary Schools in Soba Local Government Area. : *IOSR Journal of Research & Method in Education (IOSR-JRME) e-ISSN: 2320-7388,p-ISSN: 2320-737X*
- Edokpayi J. N. & Suleiman M. A. (2011) Students integrated science achievement as predictor of later achievement in chemistry: A case study among selected secondary schools in Zaria metropolis. *Archives of Applied Science Research*, 2011, 3 (4):527-535 Retrieved on 16/05/19 from <http://scholarsresearchlibrary.com/archive.html>
- Federal Republic of Nigeria, (1992). *Guidelines on Uniform Standards for the Junior School Certificate Examinations (Revised)*. Lagos: Federal Ministry of Education.
- Ifamuyiwa, A. S. (2004). The Predictive Validity of J.S.S. Mathematics and Senior Secondary School Mathematics and Physics. *45th STAN Annual Conference proceedings* 166-167.
- Osadebe, P. U. (2003). Predictive validity of junior secondary certificate examination for. *Unpublished M.Ed Project.Department of Educationa Physics Education in Edo State*.
- Ojerinde, A. (1986). They all end at the same point. *Nigerian Journal of Curriculum Studies*, 4(1), 149-158.
- Opara H., jeoma M. C., & Stella U. (2017). Basic Science Junior School Certificate Examination AsPredictor Of Senior School Certificate Examination In Physics, Chemistry And Biology In Aba Metropolis Of Abia State Nigeria. *IOSR Journal of Research & Method in Education. Volume 7, Issue 6 Ver. II (Nov. – Dec. 2017), PP 32-38*. Retreived on 13/07/2018 from www.iosrjournals.org
- Orububu, M. E. N. (2015). Basic Science Junior School Certificate Examination AsPredictor Of Senior School Certificate Examination In Physics, Chemistry And Biology In Delta Metropolis Of Delta State Nigeria. *IOSR Journal of Research & Method in Education. Volume 7, Issue 6 Ver. II (Nov. – Dec. 2017), PP 32-38*.
- Osadebe, P. U. (2003). Predictive validity of junior secondary certificate examination for. *Unpublished M.Ed Project.Department of Educationa Physics Education in Edo State*.
- Ugwuja, J. O. (2008). Students Achievement in Junior Secondary School Certificate Basic Science Examination as a predictor of their Achievement in Senior Secondary certificate Physics Examination in Nsukka Educational zone.(Unpublished M.ED thesis). University of Nigeria, Nsukka.
- Ukwuije, R. P. I. (2009). *Test and measurement for teachers*. Port Harcourt, Nigeria: Chadik.