

Predictive Validity of Students' Continuous Assessment Scores in Senior Secondary School Science Subjects in Katsina State

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Abstract

The study investigated predictive validity of students' continuous assessment scores in senior secondary school science subjects in Katsina State. Four null hypotheses were formulated and tested in the study. The study adopted descriptive research design of correlational type. The population of the study consists of two thousand eight hundred and sixty-three public senior secondary school students in Dutsin-Ma Education Quality Assurance Zone of Katsina State, who sat for NECO SSCE from 2017-2019 academic sessions. Simple random sampling techniques was used to select one thousand four hundred and ninety-five students for the study. Researcher-design pro-forma was used for data collection and data collected were analysed using Pearson Product Moment Correlation. Findings revealed that, there was significant relationship between students' performance in continuous assessment and their performance in NECO science subjects in senior secondary schools in Katsina State (Mathematics, $r = 0.657$; $r = 0.352$; $r = 0.338$ for 2017, 2018 and 2019; $p < 0.05$; Physics, $r = 0.158$; $r = 0.538$; $r = 0.365$ for 2017, 2018 and 2019; $p < 0.05$; Chemistry, $r = 0.296$; $r = 0.393$; $r = 0.355$ for 2017, 2018 and 2019; $p < 0.05$; Biology, $r = 0.231$; $r = 0.396$; $r = 0.411$ for 2017, 2018 and 2019; $p < 0.05$). It was concluded that, CA scores in science subjects are good predictors of students' NECO grades in science subjects. It was recommended that seminars and

workshops should be organized for science teachers on the importance of CA scores in preparing students for both internal and external examinations.

Keywords: Predictive Validity, Continuous Assessment, Science Subjects, National Examinations Council

Introduction

Education is an instrument of social, political and economic development. The products of education in any nation will determine the development of such nation. Education is generally considered as the process of ensuring desirable changes in learners' behaviour in a direction stipulated by individual and societal goals. It is carried out in both formal and informal settings. Education refers to an organized set of ideas, theories, policies, principles, practices or a particular way in which education is operated to attain its aim and objectives (Ayua, 2012). Also, Ndubueze, Iyoke, Okoh and Akubulo (2015) views education as the passing on what is of value from the conservator (teachers) to the trainee (learners). Education at secondary school level is supposed to be the bedrock for higher knowledge in tertiary institutions (Ashikhia, 2010). In education, the importance of assessment in teaching and learning process cannot be overemphasized.

Educational assessment is the systematic process of documenting, usually in measurable terms, knowledge, skill, attitudes, and beliefs. Educational assessment is an interactive process between teachers and students to give feedback to both teachers and students on learning progress; without this, teachers will find it difficult to make effective decision on students' learning (Borich, 2011). Assessment assists the teachers to monitor students' level of mastery and weakness in order to possibly offer remedial solutions. Assessment refers to the activities teachers use to assist students to learn and to determine students' improvement and performance (Olutola, Daramola, & Ogunjimi, 2016). Assessment can be seen as a teaching and learning instrument for teachers and learners respectively (Olutola, Olatoye & Owolabi, 2018). Good students' assessment cannot exist without effective and quality teaching. Teacher's always conducting various assessment in the school to achieve different objectives, but this is essentially internal. This internal assessment can be teacher- made test, continuous assessment, school-based assessment and local tests (Olutola 2015). When assessment becomes regular and frequent it is called continuous assessment.

Continuous assessment (CA) is a form of examination that evaluates a student's progress throughout a prescribed course. CA is a mechanism whereby the final grading of a student in the cognitive affective and psychomotor domains of behavior takes into account in a systematic way all his performances during a given period of schooling (Alonge 2003). The CA scores are added to final examination scores of the students in examinations conducted by the examination bodies such as West African Examinations Council (WAEC), National Examinations Council (NECO), National Business and Technical Examinations Board (NABTEB) and so on. It is important to note that continuous assessment is teacher-made test which is internal. The practice of CA in senior secondary schools by the teachers has been useful therefore; the CA scores of the students are been added together and sent to examination bodies such as WAEC, NECO, NABTEB and so on. Olutola, et al. (2018) viewed that a good continuous assessment must be reliable, useable and valid.

In Nigeria, there are examination bodies that conduct external examinations such as WAEC, NECO, and NABTEB. National Examinations Council (NECO) as one of the examining bodies in Nigeria will be discussed in this study. National Examinations Council (NECO) is an examination body in Nigeria that conducts the Senior Secondary Certificate Examinations and the General Certificate in education in June/July and December/January respectively. It is the examination taken by candidates in their last stage of secondary school education. In addition, external examinations such as WAEC, NECO NATEB etc. conducts SSCE in science subjects, arts subjects, commercial subjects and vocational subjects. Some of the science subjects in senior secondary schools in Nigeria are; mathematics, physics, chemistry and biology. These science subjects (mathematics, physics, chemistry and biology) are important to any science programme in Nigerian tertiary institutions because science students must have at least credit before they can gain admission to the higher institutions to study any science programme. Therefore, this study aims at determining if students' performance in CA science subjects will serve as a predictor of their performance in NECO science subjects.

Several researchers have carried out studies on the predictive validity of students' achievement in internal and external examinations. Kolawole and Ala, (2013) examined the predictive validity of continuous assessment scores on students' performance in

mathematics in some selected states in the south-west Nigeria. The researchers found that there was a positive but significant influence of Actual Aggregate Continuous Assessment (AACA) and Examination Scores on the Final Score. Also, there was a positive and significant influence of Moderated Aggregate Continuous Assessment Scores (MACA) and Examination Scores on Final Scores. Also, the results of Awodun, Olusola, and Oyeniyi, (2013) found that the three factors (Mock results, Continuous Assessment and Gender) made significance relative contribution to Physics students' achievement in SSCE.

Also, Kpe-Nobana, and Wonu (2019) found that WASSCE had the strongest predictive power when compared with UTME and Post-UTME. In addition, Fareo (2020) examined the influence of continuous assessment on academic performance of secondary school students. The result of the study revealed a significant relationship between continuous assessment scores and academic performance of students in Biology. In addition, Adesoji and Kenni, (2013) investigated continuous assessment, mock results and gender as predictors of academic performance of chemistry students in WASSCE and NECO examinations in Ekiti state. The result of their study revealed that the three factors CA scores, mock results and gender made significant relative contribution to chemistry students' academic performance in WASSCE. None of the researchers investigate predictive validity of students' continuous assessment scores in science subjects in senior secondary schools in Katsina State. These create a gap which this study tends to fill.

In Nigeria, students' performances in science subjects (mathematics, physics, chemistry and biology) in internal and external examinations have been yielding poor results. Ige (2013) viewed that there is massive and high failure in science subjects like biology, chemistry and physics particularly in the external examinations such as senior secondary certificate examinations (SSCE). The poor academic achievement makes the students to be frustrated and later become out-of-school children which may become nuisance to the society (Olutola, Olatoye & Owolabi, 2018). However, from the various factors viewed by different researchers, it is clear to understand that peer group influence, poor interpersonal relationship between teachers and students, social media addictions by the students, lack of evaluation techniques during lessons and unqualified teachers teaching science subjects may also contribute to poor performance in science subjects.

Researchers have been searching for permanent solution to the failure of students in science subjects in both the internal and external examinations (Olutola et.al, 2018) but not many have made attempt to correlate CA scores in science subjects and NECO grades in science subjects. Therefore, this study is designed to find out whether CA scores in science subjects are good predictors of students' performance in NECO grades in science subjects.

Purpose of the Study

The main purpose of this study is to investigate the predictive validity of students' continuous assessment scores in senior secondary school science subjects in Katsina State.

Specifically, the study seeks to compare students' performance in:

1. Mathematics CA scores and their performance in mathematics NECO SSCE from 2017-2019 in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State.
2. Physics CA scores and their performance in physics NECO SSCE from 2017-2019 in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State.
3. Chemistry CA scores and their performance in chemistry NECO SSCE from 2017-2019 in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State.
4. Biology CA scores and their performance in biology NECO SSCE from 2017-2019 in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State.

Research Hypotheses

The following research hypotheses were formulated and tested at 0.05 alpha level of significance.

1. There is no significant relationship between students' performance in Mathematics CA scores and their performance in mathematics NECO SSCE in

senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.

2. There is no significant relationship between students' performance in physics CA scores and their performance in physics NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.
3. There is no significant relationship between students' performance in chemistry CA scores and their performance in chemistry NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.
4. There is no significant relationship between students' performance in biology CA scores and their performance in mathematics NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.

Methodology

The research design for this study is descriptive research design of correlational type. Correlational research is a type of research in which a researcher measures two variables, understanding and assessing the relationship between the variables without manipulating any of the variables (Adi, 2020). The population of the study consists of two thousand eight hundred and sixty-three (2863) public senior secondary school students three (3) in Dutsin-Ma Education Quality Assurance Zone (DEQAZ) of Katsina State, who sat for NECO SSCE in 2017, 2018 and 2019 academic sessions. Multistage sampling was adopted for the study. All the public senior secondary schools in DEQAZ were divided into two local governments (Dutsin-Ma & Kurfi Local Government Areas). Simple random sampling techniques was used to select five senior secondary schools out of nine secondary schools in Dutsin-Ma LGA and four senior secondary schools out of seven in Kurfi LGA in other to give every school equal chance to be selected for the study. Therefore, a total of nine (9) secondary schools were selected for the study. However, simple random sampling techniques was used to select one thousand four hundred and ninety-five (1495) senior secondary school students out of two thousand

eight hundred and sixty-three (2863) students who sat for NECO SSCE in Dutsin-Ma Education Quality Assurance Zone.

Marks Collection Form (MCF) was used to collect data for the study. MCF is a proforma and it consists of four columns; serial number, students' continuous assessment scores in science subjects (Mathematics, Physics, Chemistry, and Biology) and National Examinations Council SSCE grades. The conversion table used for students NECO examination grades is shown below: Table 1:

Table Showing Grade Weight of NECO Examination Grades

S/N	GRADE	GRADE WEIGHT
1.	A ₁	8
2.	B ₂	7
3.	B ₃	6
4.	C ₄	5
5.	C ₅	4
6.	C ₆	3
7.	D ₇	2
8.	E ₈	1
9.	F ₉	0

Pearson Product Moment Correlation was used to analyse hypotheses one (1), two (2), three (3) and four (4). The hypotheses were tested at 0.05 alpha level of significance.

Results

Hypothesis One: There is no significant relationship between students' performance in Mathematics CA scores and their performance in mathematics NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.

Table 1: Pearson Product Moment Correlation (PPMC) table showing the relationship between Students’ performances in continuous assessment Mathematics and their performance in NECO SSCE Mathematics Examinations from 2017 – 2019.

Variables	Correlation	CA Mathematics	NECO Mathematics
CA Mathematics 2017	Pearson Correlation	1	.657**
	Sig. (2-tailed)		.000
	N	318	318
NECO Mathematics 2017	Pearson Correlation	.657**	1
	Sig. (2-tailed)	.000	
	N	318	318
CA Mathematics 2018	Pearson Correlation	1	.352**
	Sig. (2-tailed)		.000
	N	502	502
NECO Mathematics 2018	Pearson Correlation	.352**	1
	Sig. (2-tailed)	.000	
	N	502	502
CA Mathematics 2019	Pearson Correlation	1	.338**
	Sig. (2-tailed)		.000
	N	675	675
NECO Mathematics 2019	Pearson Correlation	.338**	1
	Sig. (2-tailed)	.000	
	N	675	675

Table 1 reveals the correlation between students’ mathematics CA scores and NECO mathematics grades from 2017-2019 with r-value of 0.657 which shows that the students performed moderately, but it is significant at 0.05 alpha level ($r = 0.657$; $p < 0.05$) for 2017; r-value of 0.352 which shows students low performance of the students but significant at 0.05 alpha level ($r = 0.352$; $P < 0.05$) for 2018; and r-value of 0.338 indicates that the students performed low but is significant at 0.05 alpha level ($r = 0.338$; $p < 0.05$) for 2019. Thus, the stated null hypothesis one is rejected.

Hypothesis Two: There is no significant relationship between students' performance in physics CA scores and their performance in physics NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.

Table 2: PPMC table showing the relationship between students' performance in continuous assessment Physics scores and NECO SSCE Physics examinations from 2017-2019

Variables	Correlation	CA Physics	NECO SSCE Physics
CA Physics 2017	Pearson Correlation	1	.158**
	Sig. (2-tailed)		.005
	N	318	318
NECO Physics 2017	Pearson Correlation	.158**	1
	Sig. (2-tailed)	.005	
	N	318	318
CA Physics 2018	Pearson Correlation	1	.538**
	Sig. (2-tailed)		.000
	N	502	502
NECO Physics 2018	Pearson Correlation	.538**	1
	Sig. (2-tailed)	.000	
	N	502	502
CA Physics 2019	Pearson Correlation	1	.365**
	Sig. (2-tailed)		.000
	N	675	675
NECO Physics 2019	Pearson Correlation	.365**	1
	Sig. (2-tailed)	.000	
	N	675	675

Table 2 reveals the correlation between students' physics CA scores and NECO physics grades from 2017-2019 with r-value of 0.158 which indicates that the students performed low but is significant at 0.05 alpha level ($r = 0.158$; $p < 0.05$) for 2017; r-value of 0.538 which shows that the students performed moderately which is significant at 0.05 alpha level ($r = 0.538$; $p < 0.05$) for 2018; and r-value of 0.365 which show students low performance of the students but is significant at 0.05 alpha level ($r = 0.365$; $p < 0.05$) for 2019. Thus, the null hypothesis two is rejected.

Hypothesis Three: There is no significant relationship between students' performance in chemistry CA scores and their performance in chemistry NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.

Table 3: PPMC table showing the relationship between Students’ performances in continuous assessment Chemistry scores and NECO SSCE Chemistry Examinations from 2017-2019

Variables	Correlation	CA Chemistry	NECO SSCE Chemistry
CA Chemistry 2017	Pearson Correlation	1	.296**
	Sig. (2-tailed)		.000
	N	318	318
NECO SSCE Chemistry 2017	Pearson Correlation	.296**	1
	Sig. (2-tailed)	.000	
	N	318	318
CA Chemistry 2018	Pearson Correlation	1	.393**
	Sig. (2-tailed)		.000
	N	502	502
NECO SSCE Chemistry 2018	Pearson Correlation	.393**	1
	Sig. (2-tailed)	.000	
	N	502	502
CA Chemistry 2019	Pearson Correlation	1	.355**
	Sig. (2-tailed)		.000
	N	675	675
NECO SSCE Chemistry 2019	Pearson Correlation	.355**	1
	Sig. (2-tailed)	.000	
	N	675	675

Table 3 reveals the correlation between students’ chemistry CA scores and NECO chemistry grades from 2017-2019 with r-value of 0.296 which show that the students’ performance was low but is significant at 0.05 alpha level ($r = 0.296$; $p < 0.05$) for 2017; r-value of 0.393 which show students’ low performance of the students but is significant at 0.05 alpha level ($r = 0.393$; $p < 0.05$) for 2018; and r-value of 0.355 indicates that the students performed low but is significant at 0.05 alpha level ($r = 0.355$; $p < 0.05$) for 2019. Thus, the null hypothesis three is rejected. This implies that there is significant relationship between students’ performance in chemistry CA scores and their performance in chemistry NECO SSCE grades from 2017-2019.

Hypothesis Four: There is no significant relationship between students’ performance in biology CA scores and their performance in mathematics NECO SSCE in senior secondary schools in Dutsin-Ma Education Quality Assurance Zone, Katsina State from 2017-2019.

Table 4: PPMC table showing the relationship between Students’ performances in continuous assessment Biology scores and NECO SSCE Biology examinations from 2017-2019

Variables	Correlation	CA Biology	NECO SSCE Biology
CA Biology 2017	Pearson Correlation	1	.231**
	Sig. (2-tailed)		.000
	N	318	318
NECO SSCE Biology 2017	Pearson Correlation	.231**	1
	Sig. (2-tailed)	.000	
	N	318	318
CA Biology 2018	Pearson Correlation	1	.396**
	Sig. (2-tailed)		.000
	N	502	502
NECO SSCE Biology 2018	Pearson Correlation	.396**	1
	Sig. (2-tailed)	.000	
	N	502	502
CA Biology 2019	Pearson Correlation	1	.411**
	Sig. (2-tailed)		.000
	N	675	675
NECO SSCE Biology 2019	Pearson Correlation	.411**	1
	Sig. (2-tailed)	.000	
	N	675	675

Table 4 reveals the correlation between students’ biology CA scores and NECO biology grades from 2017-2019 with r-value of 0.231 which show that the students’ performance was low but it is significant at 0.05 alpha level ($r = 0.231$; $p < 0.05$) for 2017; r-value of 0.396 indicates that the students performed low but is significant at 0.05

alpha level ($r = 0.396$; $p < 0.05$) for 2018; and r-value of 0.411 which show students' low performance of the students but is significant at 0.05 alpha level ($r = 0.411$; $p < 0.05$) for 2019. Thus, the null hypothesis four is rejected.

Discussion of findings

The findings in hypothesis one showed that there was significant relationship between students' performance in CA mathematics and their grades in NECO SSCE mathematics which students performed moderately in the year 2017 which indicate that their performance was better and the performances of students were low in the year 2018 and 2019 which indicates that the students' performance in the two years were weak. The finding agreed with Olutola, Olatoye and Owolabi (2018) who revealed that there was a significant relationship between students' performance in final CA Mathematics and later performance in NECO SSCE Mathematics. Also, the finding is not in line with the findings of Kolawole and Ala (2013) who found that Actual aggregate continuous assessment and examination score had no significant effect on final grade as well as moderated aggregate continuous assessment and examination scores combined. The finding also agrees with the findings of Kpe-Nobana and Wonu (2019) who revealed that WASSCE had the strongest predictive power when compared with UTME and Post-UTME.

The finding in hypothesis two showed that there was significant relationship between students' performance in CA physics and their grades in NECO SSCE physics with the students' low performances in 2017 and 2019 which indicate that student's performances were weak in the two years while the students performed moderately well in the 2018 which indicates that students' performance in 2018 was better than the other two years.

The finding admits with Awodun, Olusola, and Oyeniya (2013) who found the joint effect of the independent variables (continuous assessment, mock result and gender) which made significance relative contribution to physics students' academic performance.

The findings in hypothesis three showed that there was significant relationship between students' performance in CA scores chemistry and their grades in NECO SSCE chemistry which shows a low correlation in the year 2017, 2018 and 2019 and it shows that, the students' performance was weak and needs to be improved. The findings are in

line with the findings of Adesoji and Kenni (2013) which the results revealed that the three factors CA scores, Mock results and gender made significant relative contribution to chemistry students' academic performance in WASSCE. The findings in line with the findings of Kolawole and Ala (2013) which found that CA yielded positive influence on students' final scores/final grades.

The findings in hypothesis four showed that there was significant relationship between students' performance in CA scores Biology and their grades in NECO SSCE grades Biology with low correlation in year 2017, 2018 and 2019 indicates weak students' performance and there is need for improvement. The findings agree with Olutola, Olatoye and Owolabi (2018) who revealed that there is significant relationship between students' performance in final Biology and later performance in NECO SSCE Biology. The finding also agrees with the finding of Fareo (2020) that there was a significant relationship between CA scores and academic performance of students in Biology.

Conclusion

The results of the analyses from the data collected indicated positive and significant relationship between students' performance in CA and NECO SSCE in Katsina State in 2017, 2018 and 2019 academic sessions. Thus, it is concluded that students' CA scores science subjects are good predictors of their performance in NECO SSCE science subjects from 2017, 2018 and 2019, in senior secondary schools in DEQAZ of Katsina State, Nigeria.

Recommendations

Based on the findings of this study the researchers recommend that:

1. Students should be informed of the importance of CA to their final SSCE.
2. Science teachers in the senior secondary schools should be monitored by the school management to ensure that the conduct of CA in science subjects are properly done.

3. Seminars and workshops should be organized for science teachers on the importance of CA scores in preparing students for both internal and external examinations.

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