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Comparative Analysis on Continuous Assessments' Validation for Biology and Physics Teachers in Katsina Educational Zone, Nigeria

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ABSTRACT: This research is on continuous assessment (CA) and academic performance in biology and physics students in secondary schools in Kastina educational zone. There is no empirical data to support the validity and reliability of the CAs being administrated in schools. Ninety four were purposely sampled within thirteen senior secondary schools from the selected study area. Past CA questions for the term were collected from both Biology and Physics teachers. The researchers used, a 4-points Likert scale instrument for factor analysis and validation of the CA. The reliability of the instrument used for CA validation was established through Cronbach Alpha. A reliability of 0.863 shows the reliability of the instrument. The interviews were conducted on biology and physics teachers using structured questions. The data was analyzed on the significant difference of the validity between CA questions composed by male and that of female teachers. And also determine significant difference in validation between Biology and Physics CA questions ($p > 0.05$). The findings of the study revealed high mean scores ≥2.5 on the use of cognitive and psychomotor domains as well as evidence of practical activity in Biology CAs. While in Physics CAs mean score ≥2.5 on used of cognitive and affective domains respectively. Where affective domain was not observed in Biology CAs, psychomotor domain was completely absence in the Physics' CAs. Low frequencies of CA administrated per term were observed in all the subjects. Similarly, the sets of CA questions for the two subjects per term were not comprehensive enough to capture wide range of assessment instruments. Some of the challenges associated with CA administration are large class size represented by 20% and 11% in Biology and Physics respectively. This is followed by students' negative attitude towards CAs with 12% in Physics and 3% in Biology. There is significant difference in terms of validity between CA questions composed by male and that of female teachers. However, there is no significant difference in validation between that of Biology and Physics CA questions ($p > 0.05$). Recommendations proffered include Government should make provision of additional classes and staff to address the issues of very large class size and reduce the size of teacher: student ratio. And also embark on electronic CA in form of software across all schools with aim of addressing problems; lack of standardization, marking stress and loss of records.

KEYWORDS: Continuous assessment, cognitive, affective, psychomotor domains and validation

BACKGROUND TO THE STUDY

Continuous assessment is an important system of assessment and evaluation. An innovation in the Nigeria educational system which has its genesis from the first national curriculum conference held in Ibadan 1969 Federal Republic of Nigeria [1]. The primary assignment of any school is to ensure effective teaching and learning of which assessment and examination form of evaluation plays a significant role especially in decision making about school programme [2]. Assessment in education in general is essential and it is an on-going process. It is the basis for all educational activities. Assessment process is a vital tool in the hand of professional teacher. It directs, guides and protects both the teacher and learners at every stage of academics [3].

Continuous Assessment (CA) is "defined as a method of ascertaining what a student or pupil gains from schooling in terms of knowledge, industry and character development". It takes into account all the child's performances in tests, assignments, projects and other educational activities during a given period of term, year or during the entire period of an educational level. Furthermore, CA refers to a systematic and objective process of determining the extent to which changes have taken place in the students' performance in the various areas of educational objectives [4]. Here the learner's progress could be defined as a mechanism whereby the final grading of learners in the cognitive, affective and psychomotor domains is achieved. It is an evaluation that takes place over a period of time. In other words, the student is assessed right through the learning process and not only after the learning process. Continuous assessment it a vital evaluation method in Nigerian educational system, which considers everything the child does in school. The instruments used include but not limited to test, assignment, interview, observations, projects, questionnaires, socio-gram, rating scales, anecdotal records, examination etc right from the first day of entering a class. This takes care of the assessment of learning in the educational domains [5] [4].

The new National policy on Education in Nigeria has directed that CA should be used at all educational levels for the evaluation of students' achievement. That means every teacher from primary to higher level of learning should understand and practice it. Before the implementation of CA, the summative system of assessment was used where students were assessed at the end of the term without including any form of assessment. However, summative is a form of assessment used to evaluate students' achievement for placement and promotion into upper class [6][7]. Mock Examination was conducted prior to West African Examination Council (WAEC) examinations. This result was often used to secure provisional admission into higher institution of learning before the release of WAEC result [8].

However, some of the observed shortcoming of summative test/examination are lack of diagnostic and guide area oriented property, creation of emotional problems, low content converges and high rate of examination irregularities [9]. [10]Carew stated that irrespective of how well a student's performance in the summative type of examination is, it's not the best evaluation method as it is becoming inadequate in advancing further education. CA also enables teachers to be more flexible and innovative in their teaching, it provides basic guidance for students and it will reduce examination malpractices.

The school environment is exclusively a centre for education. Hence, the most important function of the school is imparting of knowledge and the certification of the learners that passes through it. Thus, for fairness and justification in the certification of learners, assessment and examination in one form or the other is required in order to certify and reward them according to their levels of hard work, commitment and dedication on the subject matter [11]. In recent times, an improved system of assessing student's performance has emerged through the formalization of CA as a major component of evaluation process. [12]Adebowale & Alao opined that at the senior secondary school level, CA constitutes 40% of final examination. Similarly, the level of implementation of CA is also very important in facilitating better output as well as good grades in science courses such as Biology and Physics. This system will not only help in evaluating the existing methods of teaching and learning process alone, but will help in production of competent and self-reliant graduates that are rich in both theory and practical of the subject matter.

PROBLEM STATEMENT/JUSTIFICATION

Science educators have advocated the need for CA as an integral part of science evaluation programme [13]. However, there is no empirical data to support the effectiveness of CA systems. The students' failure in science courses such as physics, chemistry and biology; shows the improper administration and utilization of CA in teaching and learning environment [14].

In addition, another factor which contributes in the student's failures in both WEAC and National Examination Council (NECO) examinations is lack of adequate related information on causes of the failure. Therefore, this study intends to compare the validation and standard of biology and physics CA questions set up by teachers in Katsina educational zone. And the specific objective(s) of the study are as following; 1) to determine the frequency of CA per term in the study area, 2) to access the students' academic performance in the study area 3) to identify problems associated with implementation of CA in the study area. The finding of the research will provide an insight on validation, sustainability, applicability and effectiveness of CA. It will also guide and provide science teachers with skills and techniques in organizing and administering standard CA questions. The teacher would be in position to provide parents with a reliable feedback that could be used to predict student's grades in the final examination. To curriculum planners, the research findings will help to determine the number of CA to be inserted when designing the curriculum.

Additionally, two hypotheses were formulated to guide the conduct of the study as follow:

HO1: There is no significance difference between scores obtained from validation of past CA questions composed by male and female teachers.

HO2: There is no significance difference between scores obtained from validation of Biology and Physics past CA questions composed and administered in the class.

Concept of Continuous Assessment in Education: Continuous assessment is to be diagnostic and formative evaluation of student's learning [8]. It serves several purposes particularly in decision making whether at primary, secondary or tertiary level [15]. CA is not only a means of indicating the progress of the students but also used especially for detecting problems. It's therefore, in the interests of the teacher to administer some form of assessment on continuous basis on its students to eventually cover the materials he is teaching. The final grading of the student in the cognitive, affective and psychomotor domains of behaviours systematically takes account of all the pupils/students' performance during a given period of schooling. By definition CA is based on observable characteristics of assessment that are practicable on day to day evaluation of students' performance on any subject matter. The implementation of CA into Nigerian educational system was expected to play a vital role in reforming educational system in Nigeria. CA as a driving force behind the education reform is desired to initiate improvement of standard and measure their attainment. These standards include knowledge, skills and attitudes [13].

In support of the CA policy, the [1]FGN stated that "Educational assessment and evaluation will be liberalized by basing them on the assessment of the progress of the individual". The above statement is amplified in subsequent section dealing with primary and

secondary school education as well as in the administration and planning of the entire educational systems of the country. The policy also stated that school leaving certificates should be based on CA and examination results of the students. The policy is stipulated to ensure the maintenance of common standard, which are expected to meet and work out a common scheme [1].
To achieve the policy objective of CA implementation at all levels of our educational system. [16]Ipaye advised that the daily performance of the students should be regularly graded, summarized and also reflect in the termly summaries. [17]Yoloye recommended that teachers should shoulder the major responsibilities for CA since they are closer to the students and as a result they stood a better chance of assessing the overall development of the students in and outside of the classroom.

Continuous Assessment and academic performance: The CA policy requires the students are assessed through both CA and terminal assessment to evaluate the progress and growth of students. [18]Odili & Ajaur asserted that CA takes account to all the students' performance, short tests, assignment and project with other educational activities during a period of term, semester, and entire period of an educational level. Teachers often take critical decision on the promotion of students to the next class, identification of students who need emotional balance and for grading and certification of students. Therefore, CA is an all-embracing exercise which the learner should undergo throughout schooling period as an aggregated of all the achievement of students from the beginning to the end of course.

Features of Continuous Assessment and its administration: Some important characteristics of CA include; systematic [19], comprehensive [19], cumulative [9][21], and guidance oriented. Continuous assessment is mainly teachers oriented; hence some refers it as 'teacher assessment'. The objective of CA fall within three main broad areas called domains; affective, cognitive, psychomotor domains. The cognitive domain is concerns with knowledge and its use. The affective domain has to do with emotion such as interest, feeling. While psychomotor domain, deal with motor, physical and manipulative skills [22].
In term of the comprehensive nature of CA, teacher is expected to make used of different approaches and evaluation tools in the process of assessing the learners such as test, questionnaire, and observation, record to obtain information of learning by children [23][24]. [25]Bajah viewed the attributes of being comprehensive because of the need to use variety of instrument in order to obtain a total picture of students. The expected change in the behaviour of student are assessed and reported upon the decisions made based on the information obtained. Additionally, since cognitive refers to the aspect related to the development of capacity to think and reason, attitudes, beliefs and interest while psychomotor related to the development of muscular co-ordination and physical skills. It would amount to acknowledge the teacher to ask them to conduct assessment in areas other than strictly academic as transmitters of values, attitudes, and skills which may supersede subject boundaries [23].

Validation of Continuous Assessment: Validity has been considered a trait of tests: A test is valid if it measures what it has to measure and nothing more [26]. The questions in tests, assignment, practical, observation etc should reflect the skills, tasks, or content stipulated in a curriculum. This connection is collectively called content validity [27][28][29].
Content validity as an indicators and measurements are carefully developed based on relevant existing knowledge. This requires the use of recognized subject matter experts to evaluate whether test items assess defined content and more rigorous statistical tests.
It is essentially a method for gauging agreement among raters or judges regarding how essential a particular item is, proposed that each of the Subject Matter Expert raters (SMEs) on the judging panel respond to the following question for each measurement item: "Is the skill or knowledge measured by this item 'essential, ' 'useful, but not essential, ' or 'not necessary' to the performance of the job [30]. The validation here deals with whether the assessment is measuring the correct construct (trait/attribute/ability/skill). Does the test measure the concept that it's intended to measure? Is the test fully representative of what it aims to measure? For example, is this human biology examination actually measuring human biology constructs? While construct validity deal with how well a set of indicators represent or reflect a concept that is not directly measurable [31].

METHODOLOGY

Research design: The descriptive survey design was employed in this study, structured questions were used to interviewed the biology and physics teachers. The samples of CAs' question papers were collected, analyse and interpreted. Similarly, students' academic performances were also collected, analyse and interpreted.

Area of the study: This study was carried out in thirteen senior secondary schools representing 20% of schools within five (5) local government areas out of the eleven local government areas in Kastina educational zone. Furthermore, purposive sampling technique was employed to sample all the biology and physics teachers.

Table 1: List of senior secondary schools used in the study area

SN	School names	LGAs
i.	Govt. Day Senior Secondary School Darawa	Dutsinma
ii.	Govt. Girls Day Arabic Senior Sec. Sch.Hayin Gada	Dutsinma
iii.	Govt. Science Senior Secondary School	Dutsinma
iv.	Govt. Day Senior Secondary School Kaita	Kaita
v.	Govt. Day Senior Secondary School Dankama	Kaita
vi.	Govt. Day Senior Secondary School Rimi	Rimi
vii.	Community Day Girls Secondary School Rimi	Rimi
viii.	Govt. Day Senior Secondary School Kofar Yandaka	Katsina
ix.	Govt. Day Senior Secondary School Kofar Sauri	Katsina
x.	Govt. Day Senior Secondary School Kofar Kaura	Katsina
xi.	Govt. Senior Secondary School Batagarawa	Batagarawa
xii.	Govt.Day Senior Secondary School Batagarawa	Batagarawa
xiii.	Govt.Day Senior Secondary School Ajiwa.	Batagarawa

LGAs= local Government Areas

Data collection procedure

Instrumentation: Interview and observation were used as instruments for this study. The samples of Senior Secondary School (SSS) II past question papers from CA (test, assignment and practical questions) were collected from all the selected schools. Using structured questions, the interview was conducted to both biology and physics teachers. Furthermore, to determine the students' academic performance the SSCE results by number of grades were collected from each of the selected school. Confidentiality- the researchers ensured that all information provided by the respondents were kept and used for only educational purpose. All data collected does not include the name of the respondents.

Validation of samples questions: The questions papers from the two subjects were validated via content validity with aid of biology and physics SSSII syllabi. Similarly, frequency of CA administrated was recorded.

Procedure for data interpretation: Content validity of CA past questions conducted for the whole term by both biology and physic teachers in the school. A four points Likert scale were used to validate the pattern of CA questions on the two subjects, determine CA roles and the frequency of administration per term in a class. Ten statements were rated based on very good (V) = 4, good (G) = 3, Need improvement (N) = 2, poor (P) = 1. The linear scale indicating the level at which each item/statement is graded. A mean score of 2.5 and above indicates that the CA pass in a particular item. Whereas, a mean score of less than 2.4 on a particular item of the CA is graded as either need improvement or poor.

Table 2: **Likert scale table used as scoring guide for validation of CA and frequency of administration (very good (V) = 4, good (G) = 3, Need improvement (N) = 2, poor (P) = 1).**

SN	Statements	Likert scale rating			
		V	G	N	P
1	There is more 60% of content coverage of syllabus per term				
2	There is clear instruction in the questions				
3	The CA are systematically administered on the students				
4	In a term, the CAs are **comprehensive** containing wide range of instruments; test/assignment/observation/practical etc				
5	In a term, the CAs **cumulative** and are scheduled and conducted at regular intervals and over a period of time.				
6	**Cognitive** domain applied in questions				
7	**Affective** domain applied in questions				
8	**Psychomotor** domain applied in questions				
9	In a term, the CA involved **cooperative learning** such as group assignment/practical etc.				
10	In a term, the number CAs contain some aspect of practical activity.				

Method of data analysis: The final scores and grades of the students in biology and physics from each of the selected school was subjected to simple descriptive and differential statistics using SPSS Package Version 17, (2000). Student's t test was used to test whether there is significant difference in terms of validity between CA questions composed by male and that of female teachers And also determine significant difference in validation between that of Biology and Physics CA questions ($p > 0.05$).

RESULTS AND DISCUSSION

The results of this study were presented in tables and figures as follows;

Table 3: **Demographic information of biology and physics teachers**

Gender	**Biology**	**Physics**	**Frequency**	**Percentages (%)**
Male	32	36	68	72
Female	18	8	26	28
Total			**94**	**100**
Educational qualifications			**Frequency**	**Percentages (%)**
NCE	0	1	1	1
BSc Ed	24	28	52	57
BSc	22	13	35	37
MSc	4	2	6	6
Total			**94**	**100**
Years of working experience			**Frequency**	**Percentages (%)**
1- 4years	18	12	30	32
5 - 9 years	10	14	24	26
10 - above years	22	18	40	43
Total			**94**	**100**

The percentage for gender for Biology teachers indicates 32% male and 18% female while Physics teachers 36% male and 8% female. On teachers' educational qualifications; Physics teachers with BSc Ed recorded the highest, represented by 28%, while Biology teachers have 24%. This is closely followed by BSc holder having 22% and 13% for Biology and Physics teachers respectively. The least percentage ≤ 6% were showed by teachers with MSc and NCE. Furthermore, the result showed 10 and above years of working experience to be the highest frequencies with 22 and 18 for Biology and Physics teachers respectively, making total of 43% for two subjects. Thus, revealed that large numbers of the respondents have been working for a long period of time and setting of CA's questions by those teachers are most likely to be of good quality and standard **table 3**.

Table 4: Validation of Biology Continuous Assessment (CA) and frequency of its administration (The very good (V) = 4, good (G) = 3, Need improvement (N) = 2, poor (P) = 1).

SNO	**Items**	**V**	**G**	**N**	**P**	**Remarks**
1	There is more 60% of content coverage of syllabus per term	0.00	0.00	4.00	5.00	**0.45**
2	There is clear instruction in the questions	0.00	0.00	8.00	2.00	**0.50**
3	The CAs were systematically administered on the students	0.00	0.00	4.00	4.00	**0.40**
4	In a term, the CAs were **comprehensive** which contain wide range of instruments; test/assignment/observation/practical etc	0.00	18.00	4.00	2.00	**1.20**
5	In a term, the CAs were **cumulative** and are scheduled and conducted at regular intervals and over a period of time.	32.00	9.00	4.00	1.00	**2.30**
6	**Cognitive** domain applied in questions	64.00	0.00	0.00	1.00	**3.25**
7	**Affective** domain applied in questions	16.00	0.00	0.00	3.00	**0.95**
8	**Psychomotor** domain applied in questions	48.00	0.00	0.00	2.00	**2.50**
9	In a term, the CAs involved **cooperative learning** such as group assignment/practical etc.	0.00	0.00	0.00	5.00	**0.25**
10	In a term, the number CAs contains some aspect of practical activity.	48.00	0.00	0.00	2.00	**2.50**
						1.43

The ten (10) statements used to measure and test the standard of questions in Biology CA and frequency of its administration. On the overall mean scores, item 6: the use of cognitive domain, item 8; psychomotor domain and item 10; evidence of practical activity in the CA recorded mean score ≥2.5 indicating high level of CA goodness. However, mean scores ≤ 2.4 were recorded in the rest of the items 1 to 5, 7 and 9 which are relatively low. Thus, depicting either the questions in the CA is poor or need improvement **table 4**. It has been noted that the affective domain is completely absence on Biology CA.

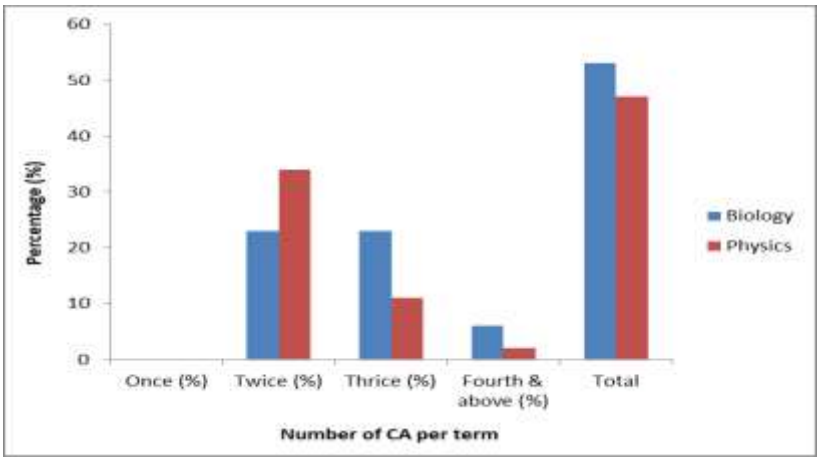
Table 5: **Validation of Physics Continuous Assessment (CA) and frequency of its administration**

SNO	Items	V	G	N	P	Remarks
1	There is more 60% of content coverage of syllabus per term	0.00	0.00	12.00	2.00	**0.70**
2	There is clear instruction in the questions	32.00	0.00	4.00	2.00	**1.90**
3	The CAs were systematically administered on the students	0.00	9.00	8.00	2.00	**0.95**
4	In a term, the CAs are **comprehensive** which contain wide range of instruments; test/assignment/observation/practical etc	0.00	36.00	0.00	1.00	**1.85**
5	In a term, the CAs were **cumulative** and are scheduled and conducted at regular intervals and over a period of time.	0.00	0.00	12.00	1.00	**0.65**
6	**Cognitive** domain applied in questions	64.00	0.00	0.00	1.00	**3.25**
7	**Affective** domain applied in questions	48.00	0.00	0.00	2.00	**2.50**
8	**Psychomotor** domain applied in questions	16.00	0.00	0.00	4.00	**1.00**
9	In a term, the CAs involved **cooperative learning** such as group assignment/practical etc.	0.00	0.00	0.00	5.00	**0.25**
10	In a term, the number CAs contains some aspect of practical activity.	0.00	0.00	0.00	5.00	**0.25**
						1.33

The sets of statements which measures the standard of questions used in Physics' CA and frequency of its administration. There are mean score ≥2.5 on item 6: and 7 for used of cognitive and affective domains respectively. Whereas, the rest; items 1 to 5 and 8 to 10 recorded mean score below ≤ 2.4 indicating questions are either poor or need improvement **table 5**. The psychomotor domain was observed in Biology CAs while it is completely absence in the Physics' CA. Thus, contrary to the Federal Government expectation that CA should be comprehensive mechanism for grading students' performance which stress not only on cognitive but must capture all the domains of learning [32]. [33]Coll regards CA as not only systematic but regular methods of determining change in the behavior of the learner at all the domains of learning experience.

Furthermore, item 4: on the comprehensive nature of CA which must contain wide range of instruments. Both Biology and Physics CA past questions were found to be grossly deficient. This is contrary to standardized CA where the frequent use of valid and reliable techniques such a test, assignment, observation, questionnaire, interview, checklist, among others to obtain information on students upon which judgment are made [34]. And it is similar to the previous finding showed that most teachers fall short in the usage of different CAs strategies because teachers restrict themselves to tests and assignments only [35]. Learners' assessment makes used of a good variety of ways of evaluation for the purpose of guiding and improving learning and performance [33][36]. Moreover, other flaws include the inadequacy of instructions on all the CA. A standard CA is not systematic but comprehensive which is free from any ambiguity and easily understand by learners [5]. Clear instructions such as the number of questions to answer, time allowed for questions to be answered and other relevant guide were observed to be entirely omitted on the CAs of both subjects.

Figure 1: **Bar chart depicting comparison in number of continuous assessment per term**



The CA conducted twice is comparatively higher representing 34% in Biology and 23% in Physics. This is closely followed by the CA conducted thrice having 23% and 11% for Biology and Physics respectively. However, the general comparison in percentage of CA conducted per term recorded 53% in Biology which is higher than 47% in Physics **figure 1**. It should be noted that CA is a tool used for cumulative judgment to be made about learners' performance. The information derived from this purpose is use to guide and shape a students' learning from time to time [25]. And not to be administered just twice but it should be as frequent as possible. This may enable teacher capture all the learning domains in several forms, [34] tests, assignments, practical, observation etc.

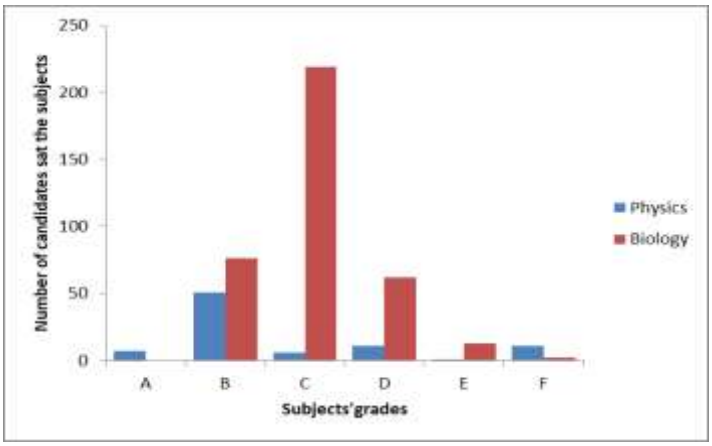
Table 6: **Patterns, roles and percentage of Continuous Assessment administered by Biology and Physics teachers**

(A) CAs are recorded in a progressive manner	**Biology**	**Physics**	**Percentage (%)**
Yes	51	47	98
No	2	0	2
Total			**100**
(B) The number CAs conducted are adequate	**Biology**	**Physics**	**Percentage (%)**
Yes	38	45	83
No	15	2	17
Total			**100**
(C) CAs stresses the area of student's strength and weakness and they are communicated as appropriate measures are taken accordingly.	**Biology**	**Physics**	**Percentage (%)**
Yes	43	47	89
No	11	0	11
Total			**100**

The responses of Biology and Physics teachers indicated 98% of Continuous Assessments (CAs) are administered in progressive manner per term while 2% of the teachers conducts it un-progressively **table 6(A)**. However, detail examination of Biology and Physics syllabi and the copies of CAs past questions provided per term by the teachers revealed that majority of the teachers administered the CAs un-progressively as in **figure 1**.

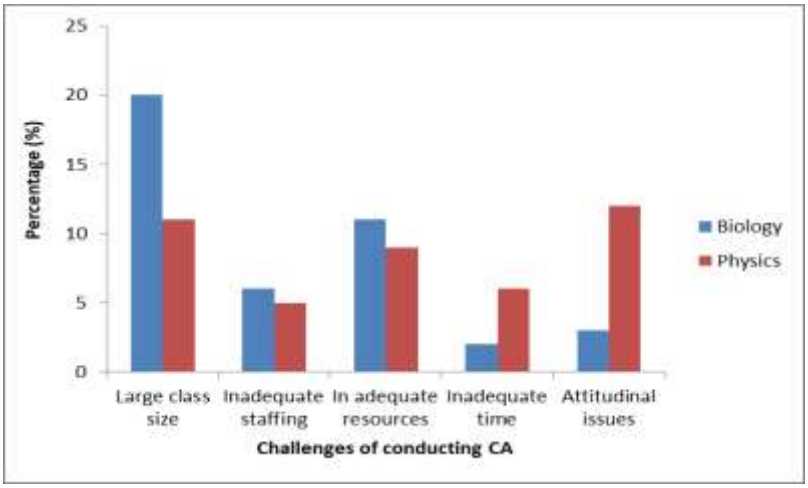
Eighty three percentage (83%) responses of Biology and Physics teachers showed the number of CAs administered per term to be adequate. While, 17% of the teachers responses are to the contrary **table 6(B)**. Nevertheless, the analysis of the copies of CAs past questions provided per term by Biology and Physics teachers indicated the opposite as majority of the teachers administered CAs twice which are inadequate as in **figure 1**. Moreover, 89% responses of Biology and Physics teachers recorded the use of CAs to stresses the area of student's strength and weakness, giving immediate feedback and taking appropriate measures accordingly. And only 11% of the teachers do not make use of CAs to take appropriate measures on student's strength and weakness **table 6(C)**. CA is considered as guidance oriented as it provides feedback to learners [37][5]. Thus is in line with the role played by CA on the improvement of teaching and learning.

Figure 2: **Bar chart showing comparison of subjects' grades between Biology and Physics.**



The comparison of subjects' grades recorded Biology to have the highest grades C and B represented with 48% and 17% respectively. The grades C and B are comparatively lower in Physics having 1% and 11% respectively. In the other hand, grade A is relatively having ≤ 2% in both Biology and Physics **figure 2**. However, the scores obtained from CA cannot be used as yardstick for measuring students' academic performance [38].

Figure 3: **Bar chart showing problems associated with implementation of continuous assessment (CA)**



On problems associated with implementation of CA; large class size was the major challenge associated with CA administration represented by 20% and 11% in Biology and Physics respectively. The next highest challenge was attitudinal issues with 12% in Physics and 3% in Biology. These attitudes majorly have to do with students' nonchalant behaviour towards CA. Other challenges include in-adequate resources represented by 11% in Biology and 9% in Physics. This is in line with finding on insufficient material and stationeries for CA administration and lack of support from the Government as well as lack of uniformity of standards in different schools [39]. This is followed by in-adequate staffing for effective administration of CAs as a challenge having 6% in Biology and 5% in Physics **figure 3**. This agrees with previous findings which associated problems of implementing CA to the lack of materials required CA implementation in addition to lack of well trained teachers in CA administration [40]. It is also observed that there are no external bodies from the side of government task to regulate CA and its related activities. Thus, many schools are left to operate on their terms which lead to disparity in several aspects of the school system as seen in the case of CA implementation.

Hypothesis one: There is no significance difference between scores obtained from validation of past CA questions composed by male and female teachers.

Table 6: **Independent Samples test of of past CA validated by male and female teachers**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CA validation scores	Equal variances assumed	3.094	0.096	2.981	18	0.008	0.606	0.203	0.179	1.033
	Equal variances not assumed			2.981	11.644	0.012	0.606	0.203	0.162	1.050

Overall CA validation based on gender showed male (M = 0.995, SD = 0.599) scored higher than female (M = 0.389, SD = 232). Based on the results of independent samples t-test, t(18) = 2.981, p = 0.008, 95% CI [-0.178, 1.03]. The p value > 0.05, the Null hypothesis is rejected. Therefore, there is significant difference between scores obtained from validation of past CA questions composed by male and female teachers.

Hypothesis Two: There is no significance difference between scores obtained from validation scores of Biology and Physics past CA questions composed and administered in the class.

Table 7: **Independent Samples test for validation scores of Biology and Physics past CA questions**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
CA validation scores	Equal variances assumed	0.411	0.529	0.212	18	0.834	0.100	0.4716	-0.890	1.091
	Equal variances not assumed			0.212	17.852	0.834	0.100	0.4716	-0.891	1.091

The CA validation of biology (M = 1.430, SD = 1.102) scored slightly higher than CA validation of physics (M = 1.3300, SD = 1.001). Based on the results of independent samples t-test, t(18) = 0.212, p = 0.529, 95% CI [-0.89, 1.09]. The significant value > than alpha at 0.05 level of significance, the Null hypothesis is retain and concluded that there is no significant difference between scores obtained from validation of Biology and Physics past CA questions.

RECOMMENDATIONS

Based on the research findings and conclusions of the study, the recommendations are as follow:

- There should be additional classes and staff to address the issues of very large class size; teacher: student ratio which should be reduced to a manageable size. Thus, need for teachers to be recruited.
- Teachers should ensure students are well space during CA to handle possible students' malpractice during the CA.
- Teachers should ensure CA questions focus on the cognitive, affective and psychomotor domains of students' behaviour during and after teaching and learning.
- Ministry of education in the state should ensure that every school adapt standardized tests, assignment and other related instruments. The interpretation of the CA results must also be uniform across all schools.

- The government must set up a functioning supervisory body saddled with mentoring and monitoring of teachers on conduct of CAs to ensure that all their activities are in line with national standards as established by the National Policy on Education (NPE).
- It has been observed that almost all CA is still done manually in the school; the government should embark on CA software for students and make it the standard for all schools. It could bring about efficiency and accuracy of the CA results. The, electronic CA in form of software across all schools would solve several problems; lack of standardization, marking stress, loss of records and transfer of records.
- More resources to use for conducting CAs such as printers and printing materials should be provided.
- The CA results should be used to stresses the area of student's strength and weakness. Thus immediate feedback should be given to students as appropriate measures are taken accordingly.

CONCLUSION

The ability of science teachers to set –up valid and reliable continuous assessment have critical impact on students' academic assessment in the schools system. The use of cognitive domain was evident across the two subjects.

However, psychomotor domain was considered in Biology and absence in Physics whereas, affective domain was observed in Physics but absence in Biology. Government can play great roles in standardization and administration of CAs across schools in the state.

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