Competency-Based Continuous Assessment Practices and Attainment of Mathematics Competence amongst Primary Six Pupils in Saa Subdivision of Cameroon

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Abstract:
One of the challenges in primary school, as an experienced season teacher and as a researcher, is the low attainment of Mathematics competence by pupils in both classroom evaluation and the certificate evaluation as compared to others school subjects. The researchers are thus, interested in the investigation of how Competency-Based continuous assessment practices influence the attainment of Mathematics competence amongst class six pupils in Saa subdivision of Cameroon. The researchers adopted the Survey research design for this study. Saa Subdivision has a target population of 480 class six pupils for the English-speaking subsystem education of both government and lay private schools, distributed in 4 English schools. A proportional stratified random-sampling population of 320 consisting of 160 boys and 160 girls were selected. Both questionnaires for class six pupils and a Mathematics competency test were designed and administered to the respondents for data collection. The reliability coefficient of 0.84 was established using Cronbach's alpha. Findings from the study showed that Continuous assessment practices, using the competency-based assessment, influences the attainment of Mathematics competence amongst class six pupils in Saa subdivision of Cameroon. After the statistical testing of Pearson Product Moment Correlation and Multiple Regression Analysis, the result was confirmed. The result of the analysis further reveals that the calculated Γxy -value of 0.30 is higher than the critical Γxy -value of 0.113 at .05 level of significance with 318 degrees of freedom. In addition, the p-value of 0.002 is lower than 0.05. With the result of this analysis, the null hypothesis was rejected. It indicates that continuous assessment practices, using the competency-based assessment improves the attainment of Mathematics competence amongst class six pupils in the Centre Region of Cameroon.

Keywords: Assessment, Competency-Based Continuous Assessment; Attainment of Mathematics Competence; Class Six Pupils

Introduction

A curriculum can be either content or competence based. According to Posner (1995), a content-based curriculum is based on rote memorization of factual knowledge, while competence-based curriculum capitalises on competence-based learning which focuses on understanding the concepts, skills and competencies. Content-based curriculum was ineffective as the graduates, upon completion in final year of their primary schools, failed to demonstrate the skills and competences that fully addressed local, national and global market demands. The Cameroon government recommended the Ministry of Basic Education (MINEDUB) at the beginning of 2018/2019 academic year for the adoption and the immediate implementation of competency-based pedagogic approach, of course, which is of competency-based education (CBE). John Harris

and Stephen Keller (1976) posit that, the major development effort in competency-based education should not depend on the design of instructional materials, but in design of appropriate performance assessments. In the same perspective, Katie Larsen McClarty and Matthew, N(2015 p.3) emphasise that most programs in Competency-Based Education(CBE) models include two common elements: (1) competency framework and (2) competency assessments.

According to them, competency framework stands for skills, abilities, and knowledge needed to perform a specific task, while information can be gathered about learner's progress through many ways. This can be done through: observation checklist,s learner's self-assessment, daily practical assignments, samples of learner's work, learner's willingness to participate and contribute in projects/conferencing, oral and written quizzes, portfolios, and willingness to be involved in class and school activities. Competency assessments determine the degree of mastery with an award of credit or marks to a task performs by the learner. However, the Ministry of Basic Education in Cameroon has provided a format for gathering, processing and recording marks pupils obtain in all activities for their records, but no indication of the percentage marks of continuous assessment as compared to some countries. The format does not make provision for recording the progress of pupils with needs, particularly lower attainments. However, continuous assessment practices in Cameroon have the characteristics of both curriculum-based assessment and criterion-referenced assessments.

Lewis (2001) and Norwich (1993 p. 66) referred to curriculum-based assessment as the process of assessment involving task analysis, objectives setting and criterion referencing. Curriculum-based assessment however, contrasts with Criterion-referenced assessment where the pupils' performance in each area assessed by the test is compared with a stated criterion or level of mastery (Frederickson, 1992). Possibly the greatest shortcoming of criterion-referenced measurement is the relative lack of attention that is given to questions of validity of the measures.

The educational system of Cameroon since 1960 up to date has been examination-oriented. All the teaching and learning are centered on passing final examinations. In 2006, the new pedagogic approach (NPA) was instituted with the adoption of the traditional norm-referenced testing, otherwise called the new vision evaluation. The downside of this approach is that students are encouraged to exercise rote memorization of facts and cramming of information, rather than acquiring problem-solving skills. Sally Johnstone and Louis Soares(2014 p.12) emphasize that competencies must be clearly defined, measurable, and related to the knowledge or skills needed for future endeavors, such as additional education or employment. A change in the teaching, learning and assessment approaches was a necessity, thus:

- Competencies are specific to a particular course.
- Subjects are no more to be taught as a subject with more emphasis on theory, but must prepare the learners to develop competences.
- Teaching objectives shifted to expected learning outcomes based on stating competencies.
- A shift from exercises to tasks;
- Emphasis is laid on integrations activities and remediation depending on the integrated learning theme (ILT) of each month.
- Organize culmination events, that is, presentation of projects and assessment every Thursday and Friday of the four weeks.
- Learners' assessment shifted from norm-referenced assessment to criterion-referenced assessment, through integrations situations/real-life situations. Marking guides are well-elaborated based on the selected criteria. According to Harlen (2006b), the same criteria for all pupils are used

criterion-referenced approach because the purpose is to report attainment in a way that is comparable across pupils.

- Assessment should be organized in three forms: oral, written and practice *(Cameroon Primary School Curriculum English Subsystem - Level III: Class 5 & Class 6 p.23).*

Through the integration of assessment activities into instructional practice, teachers become able to integrate assessment with their instructional practices. Teachers are likely to incorporate assessment-learning framework largely, and certainly provide evidence related to how assessment information is applied to inform and guide in the selection of teaching methodology for individual learner.

To this end, educationists have introduced a method of evaluation known as continuous assessment. In John. O et al (2018 p .8), Abbas (2009) defines ordinary continuous assessment as an on-going test device which is comprehensive and that includes the three domains of learning. In the same light, Ogunnyi, (2005) emphasizes that CA is a formative evaluation procedure concerned with finding out, in a systematic manner, the over-all gains that a student has made in terms of knowledge, attitudes and skills after a given set of learning experience. Kellaghan and Greany (2003) emphasise that the kind of assessment is subjective, informal, immediate, ongoing, and intuitive, as it interacts with learning as it occurs in continuous assessment, the teacher pilots and grades the assessment of all the learners' activities organized in the classroom (Paris et al., 1991). According to AOle E.B et al (2018 p. 5), many teachers and learners view Continuous Assessment (*as* learning) as merely assessment of learning (summative), setting aside assessment for learning (formative). According to Ignatious Njobvu (2018), Obioma and Babajide (2013), many teachers misapplied continuous instruments leading to more continuous testing, instead of continuous assessment. According to Aggarwal (2011), CA is not simply continuous testing. CA is more than giving a test; it involves every decision made by the teacher in class to improve students' achievements. The researchers is interested in the investigation of how competency based continuous assessment practices influence the attainment of mathematics competence amongst class six pupils in Saa subdivision.

One of the purposes of continuous assessment (CA) is to boost the quality of education by ensuring that learners do not wait for the end of the term to exert study efforts. It promotes quality of learning throughout a period of time. In this respect, the CA is more important than the final examination, as it awakes learners to learn progressively and helps them to retrieve knowledge acquired so far (Carrillo and Pérez, 2012; and Logan et al., 2014). Thus, teachers not only use continuous assessment to identify pupils' learning needs in the content of the curriculum, they also use continuous assessment to compare pupils' performance against specific standards set for their classes.

THEORETICAL FRAMEWORK

This study is anchored on **the social constructivism orientation of learning.** The researcher agrees with the opinion expressed by Maree (1997) that each learning theory represents a particular view of knowledge, and valid to a certain extent. In regard to the social constructivist approach theory, there are two offshoots: the radical and social constructivism. They are explained in the following sections below.

(i) Radical Constructivism

The proponent of the theory is Jean Piaget. Piaget believed that learners construct knowledge by transforming, organizing and reorganizing previous knowledge and information. Piaget's model

implies that, teachers should provide support for students to explore their world and develop understanding. According to Von Glasersfeld,(1996, p. 18) in Jaworski, (1994 p.15) radical constructivism has two main principles, which state that:

(a) "Knowledge is not passively received, but built up by the cognizing subject;

(b) The function of cognition is adaptive and serves the organisation of the experiential world, not the discovery of ontological reality."

Piagetian versions of constructivism focused on individual developmental stages or processes (Eisenhart et al., 1996). In this regard, Piaget (in Bigge&Shermis, 1999 p.19) argues that the mental development of any child consists of a succession of four mental stages of learning as follows:

-Sensorimotor (birth to eighteen months or two years);

- **Symbolic** (from eighteen months to age seven or eight);

-Concrete -operational (from ages seven or eight to twelve years); in the concrete operational period, children learn to do what they had learnt previously through physical action**.**

- **Formal operational stage** begins from age twelve to fifteen years. Learners in the formal operational stage function on an abstract level, that is an adult level of thinking, and not bound by concrete experience.

The key processes in the stages of child development are ***assimilation*** and ***accommodation***. Assimilation consists of the modification of the input from the environment. In this process, new knowledge meshes with the child's existing insight. Accommodation consists of the change in the child's internal patterns of understanding to fit reality. In this process, existing internal insights are reconstructed to "***accommodate***' new information (Bigge&Shermis, 1999 p18).

ii. Social constructivism

According to Salema (2014), Lev Vygotsky(1896-1934) is the proponent of social constructivist theory. Vygotsky believes that learning could not be separated from social context, and learners construct knowledge through social interactions with others (scaffolding). According to him, scaffolding is the gradual internalization of knowledge, obtained by social interaction between a novice and a more competent peer or adult who provides a model. He views school as a perfect place to begin cultivating social interaction and learning through modelling appropriate social and academic skills (Salema, 2014). Vygotsky's model implies that teachers should create more opportunities for students to learn with the teacher, peers in co- constructing knowledge. In both Piaget and Vygotsky's models, teachers serve as facilitators and guides, rather than directors and moulders of children's training.

STATEMENT OF THE PROBLEM

Several authors nationwide and internationally enumerated challenges as a cause for poor educational achievements. Some of the challenges may be because pupils lack adaptability of Mathematics competences to solve not only daily real-life problems, but also given tasks with evidence, they lack adequate equipment to learn, illness, malnutrition, or income deprivation and teacher's lack of diverse assessment skills knowledge, poor teaching quality, as some teachers are not particularly well-educated. The government has so far tried to review school curricula and implemented the CBA from nursery to primary school levels of basic education in September 2018-2019 school year. Despite this, the problem persists. There is the need for an urgent adequate response and a comprehensive approach towards learners' new assessment in respect to the CBA, with hope to not only evaluate, but also improve on leaners to demonstrate learning in general and mathematics competence in particular. To achieve this, the researcher assesses the

competencies of class pupils six in Mathematics and investigates class six pupils' opinion on Competency continuous assessment practices practised by their teachers vis-a-vis their attainment of mathematics competence.

Research questions

The researchers formulated the following research questions:

1. How do Non-test techniques in Affective Domain influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision?
2. How do Non-test techniques in Psychomotor Domain influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision?
3. How do Test techniques in Cognitive Domain influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision?

Methodology

A survey research design was adopted in this study. The sample size population of the study was 320 primary six pupils from Saa sub division. A Questionnaire for primary pupils which consisted of 2 Parts: 1 and 2 was developed by the researcher and a mathematic competency test was administered to the primary six pupils. These instruments were used to collect data. Part 1 of the primary six pupils' questionnaire dealt with preliminary information of respondents. Part 2 of the questionnaire seeks pupils' opinions about their teachers' information on competency continuous assessment practices and attainment in mathematics competence amongst primary six pupils. Part 2 contained 3 sections. Sections A, B and C are made up of 10 items, all of positive response on four point Likert scale, ranging from Strongly Agree to Strongly Disagree following items scoring 4 -1(i.e. 4 for strongly Agree (SA), 3 for Agree (A), 2 for Disagree (D), and 1, for strongly Disagree (SD). The maximum score for all the items is 40 marks, while minimum score is 10 marks. Their teachers took total score of each item as the index Pupils' opinions on competency continuous assessment practices. The mean score of part 2 (M=3) and above for each scored items indicates agreement with the statement on the items, thus acceptance. While the mean score less than 3 indicates disagreement or rejection of the statement on each item. Cronbach's Alpha of 0. 84% was established, as the coefficient of reliability of the instrument; the content validity of the instruments was ensured by the researcher's PhD supervisor, an expert in Measurement and Evaluation. Three research questions were raised and reformulated into research hypotheses and they were tested and analysed using the Pearson Product Moment Correlation analysis.

Results and Discussion

In order to answer the above research questions and to investigate how competency-based continuous assessment practices influence the attainment of Mathematics Competence amongst primary six pupils in Saa subdivision, the following hypotheses are tested and analysed at 0.05 level of significance.

Hypothesis One

Ho1 Non-test techniques in Affective Domain do not influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

After the computation of the Pearson Product Moment Correlation statistical analysis technique, the result of the analysis is presented in **Table 1**.

Table 1: Pearson Product Moment Correlation analysis of the influence of the use of Non-test techniques in Affective Domain and pupils' attainment of mathematics competence (N= 320)

Variable	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	Γ_{xy}	p-value
Use of Non-test techniques in Affective Domain (X)	8685	241622	324236	0.30*	0.002
Attainment of Mathematics Competence (Y)	11725	497461			

p*<0.05; df=318; critical Γ_{xy} =0.113

The result reveals that the calculated Γ_{xy} -value of 0.30 is higher than the critical Γ_{xy} -value of 0.113 at .05 level of significance with 318 degrees of freedom. In addition, the p-value of 0.002 is lower than 0.05. Therefore, the null hypothesis was rejected and the alternative hypothesis retained. In conclusion, Non-test techniques in Affective Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

Since Non-test techniques in Affective Domain significantly influence the attainment of mathematics competence amongst class six pupils in Saa subdivision and the Γ_{xy} =0.30 was positive. This indicates that as Non-test techniques in Affective Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

Hypothesis Two

Ho2 Non-test techniques in Psychomotor Domain do not influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

After the computation of the Pearson Product Moment Correlation statistical analysis technique, the result of the analysis is presented in Table 2.

Table 2 : Pearson Product Moment Correlation analysis of the influence of the use of Non-test techniques in Psychomotor Domain and pupils' attainment of mathematics competence (N= 320)

Variable	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	Γ_{xy}	p-value
Use of Non-test techniques in Psychomotor Domain (X)	8685	241622	324236	0.30*	0.002
Attainment Of Mathematics Competence (Y)	11725	497461			

p*<0.05; df=318; critical Γ_{xy} =0.113

The result of the analysis reveals that the calculated Γ_{xy} -value of 0.30 is higher than the critical Γ_{xy} -value of 0.113 at .05 level of significance with 318 degrees of freedom. In addition, the p-value of 0.002 is lower than 0.05. Therefore, the null hypothesis was rejected and the alternative hypothesis retained. In conclusion, Non-test techniques in Psychomotor Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

Since Non-test techniques in Psychomotor Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision and Γxy =0.30 was positive. This indicates that Non-test techniques in Psychomotor Domain significantly influence the attainment of mathematics competence amongst six primary pupils in Saa subdivision.

Hypothesis No 3

Ho3 Test techniques in Cognitive Domain influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

After the computation of the Pearson Product Moment Correlation statistical analysis technique, the result of the analysis is presented in Table 3.

Table 3: Pearson Product Moment Correlation analysis of the influence of the use of Test techniques in Cognitive and pupils' attainment of mathematics competence (N= 320)

Variable	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	Γ_{xy}	p-value
Use of Test techniques of Cognitive Domain (X)	8685	241622	324236	0.30*	0.002
Attainment of Mathematics Competence (Y)	11725	497461			

p*<0.05; df=318; critical Γ_{xy} =0.113

The result of the analysis reveals that the calculated Γ_{xy} -value of 0.30 is higher than the critical Γ_{xy} -value of 0.113 at .05 level of significance with 318 degrees of freedom. In addition, the p-value of 0.002 is lower than 0.05.The null hypothesis was rejected and the alternative hypothesis retained. In conclusion, Test techniques in Cognitive Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

Since Test techniques in Cognitive Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision and the Γ_{xy} =0.30 was positive. This indicates that Test techniques in Cognitive Domain significantly influence the attainment of mathematics competence amongst primary six pupils in Saa subdivision.

Summary of Results

- As Non-test techniques in Affective Domain significantly improves, the attainment of mathematics competence amongst primary six pupils in Saa subdivision increases.
- As Non-test techniques in Psychomotor Domain significantly improves, the attainment of mathematics competence amongst primary six pupils in Saa subdivision increases.
- As Test techniques in Cognitive Domain significantly improves, the attainment of mathematics competence amongst primary six pupils in Saa subdivision increases.

Conclusion and Recommendations

The overall results of the analysis reveals that the calculated Γxy -value of 0.30 and positive is higher than the critical Γxy -value of 0.113 at .05 level of significance with 318 degrees of freedom. In addition, the p-value of 0.002 is lower than 0.05. This indicates that, as Continuous assessment practices, using the competency-based assessment improve, the attainment of Mathematics competence amongst primary six pupils in Saa subdivision of Cameroon increases.

In order to boost further the attainment of mathematics competence amongst primary six pupils using competency-based continuous assessment practices. Continuous assessment is not simply continuous testing. Continuous assessment is more than giving a test; it involves every decision made by the teacher in class to improve students' achievement.

As far the government is concerned, through the Ministry of Basic Education, the educational authorities should revise the teacher training colleges' curricula in order to equip better pre-service teachers with necessary skills for the implementation of competence-based approach in general, and competency-based assessment in particular. One of the important aspects of continuous assessment is the availability of valid and reliable tests, which could be used in all schools. There is a need to construct these tests following established procedures and practices. The assessment policy makers should provide a certain percentage or quota of continuous assessment marks for both classroom and official evaluations, so that both teachers and pupils would be engaged to respect the scheduled timetable of examinations and routine classroom assessments. Continuous assessment does not solely depend on formal tests. Continuous assessment may take different forms such as formal questions given to students during class, take-home assignments/exercises and recapitulation exercises. The educational authorities should design remedial strategies to help pupils with needs, particularly lower attainments in Mathematics.

Since curricula change and introduction of new approaches for teaching, learning and assessment are inevitable, the responsible educational authorities should conduct regular training for in-service teachers too in order to enable them acquire up-to-date teaching and the assessment skills as required by the changes introduced in the 2018 school curricula.

Apart from the skills of test construction measuring cognitive aspects of learning, teacher should also be able to measure the learners' affective attributes such as attitudes, motives, interests, values and other personality characteristics. This could be done through teacher training institutions so that teachers are equipped with such skills as part of their training and certification.

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