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Enhancing Assessment and Appropriateness of Criterion-Referenced Assessment in Continuous Assessment in Sciences and Mathematics Classes

Ölçüt Bağımlı Değerlendirmenin Fen Bilimleri ve Matematik Derslerinde Uygulanan Sürekli Değerlendirmede Kullanımını ve Uygunluğunu Arttırma

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Abstract
This paper examines norm- referenced and criterion- referenced evaluation and accelerate their appropriateness into Criterion-Referenced Testing (CRT) and Norm-Referenced Testing (NRT). The paper also facilitates how these classical testing enhanced Continuous Assessment (CA) process in Senior Secondary School (SSS) Sciences and Mathematics. Two basic types of assessment strategies: Norm-Referenced Tests (NRTs) and Criterion- Referenced Tests (CRTs) were observed. The content selection of these tests were discussed, the steps involved in preparing criterion referenced tests were also identified. The rationale that prompted incorporating CRT strategy into CA process and how it (CRT) facilitated CA process in Sciences and Mathematics classes were discussed. Moreover, samples of CRTs were designed for Chemistry, Mathematics and Agricultural Science in Senior Secondary School one (SSS1).

Keywords: Assessment, continuous assessment, criterion-referenced tests, norm- reference tests, formative evaluation and test contents.

Öz
Bu çalışmada, norm referenslı ve ölçüt bağımlı değerlendirme incelenmekte ve bu değerlendirme çeşitlerinin Ortaöğretim Fen Bilgisi ve Matematik derslerinde sürekli değerlendirmeye olan katkısı araştırılmaktadır. Norm referenslı ve ölçüt bağımlı testlerin içerik seçimi tartışılmış ve ölçüt bağımlı testlerin oluşturulması aşamaları belirlenmiştir. Ölçüt bağımlı testlerin sürekli değerlendirme sürecine dâhil edilmesinin gerekçesi ve Fen Bilgisi ve Matematik sınıflarındaki sürekli değerlendirmeyi nasıl desteklediği tartışılmıştır. Ayrıca, Kimya, Matematik ve Ziraat derslerinde kullanılmak üzere ölçüt bağımlı test örnekleri tasarlanmıştır.

Anahtar Kelimeler: Değerlendirme, sürekli değerlendirme, ölçüt bağımlı değerlendirme, norm referenslı değerlendirme, süreç değerlendirme, test içeriği.

1. Introduction

Science and Mathematics are the backbones of technological growth, and this growth is crucial in the development of any nation, since development is inevitable in all areas of a society. Technological growth is built upon adequate instructional strategies in Sciences and Mathematics; this tolerates growth and development. The responsibility of a teacher is to monitor the progress of both the class and the individual students in order to make good decisions about

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where to start teaching. Among the functions of a teacher in the formal educational system is also to serve as a judge. The process of passing an accurate judgment within the confinement of laying down objectives, rules, and regulations in classroom setting is known as evaluation. The quality of these decisions can strongly influence the effectiveness of classroom instruction. Effective teaching as mentioned by Robert (1997) requires that students' progress be monitored through a process of both formal and informal assessments. Informal assessments include techniques such as questioning, observing students while they are working on specified tasks related to the school subject. Informal assessment procedures also give teachers immediate feedback about the effectiveness of the teaching methods being employed, and assessment techniques that guide the course of instruction are referred to as formative evaluation. Evaluation, in this context; is a process of fashioning data into interpretable forms. It focuses on a number of variables judged to be important and utilizes a number of techniques to gather data from multiple sources (Corbett & Wilson, 1991).

The evaluation process of learning is heavily dependent on teachers' skill, competence and dedication on the job. To Ajayi and Alani (1992), evaluation of learning is the strategy employed to measure the output of learning process and activity in terms of knowledge, thinking, reasoning, character reformation, and development. Hills (1976), suggests evaluation as a process of converting observations, attributes or performance into number.

Alrasian (1989), on the other hand, opines evaluation process as decision on classroom climate, instructional success, and pupils learning. This enables the teacher to collect, interpret, and synthesize information to aid in placement and value judgment of an individual or group in the classroom. The performance is assessed throughout the conduct of instructional program to achieve a number of purposes such as:

i. Measuring students' progress in area of curriculum.
ii. Assessing attitude (areas such as helping, managing aggressive behaviors and, displaying kindness).
iii. Diagnosing learning difficulties in order to identify needed assignments.
iv. Placing students in an approximate "level" with respect to assignments in each subject.
v. Measuring the mastery of each module and the completion of instructional objectives on enrichment tasks.

Instructional objectives specified by Bloom (1959), could be organized and measured into three domains; namely: cognitive, affective and psychomotor.

> The **cognitive domain** includes those objectives that deal with the recall or recognition of learning materials and the development of intellectual abilities and skills. The taxonomy categorizes behavior in this domain into six hierarchies from simple to complex. These six categories in ascending level are knowledge, comprehension, application, analysis, synthesis, and evaluations.
>
> The principle behind the hierarchy is based upon the assumption that each level is an extension of all the previous levels. For instance, what I do not know I cannot comprehend or understand, and what I do not understand I cannot apply, etc.
>
> The **affective domains** include the objectives that place emphasizing on attitudes, interest, values, and the development of appreciation and adequate adjustment. On the other hand, the **psychomotor domain** deals with physical motor or manipulative skills.

If teachers are to achieve positive and desired student performances, there is a need for change and innovation in their instructional strategies that revolve around these three domains and adoption of adequate evaluation process (Corbett & Wilson, 1991*;* Robert, 1997). The required change in performance of learners necessitated highly facilitating pedagogical and content specific based learning and adoption of well-structured evaluation (Shulman, 1986). Accordingly, there are two (2) methods of evaluation for this purpose namely; norm-referenced and criterion-referenced.

1.1. Norm-Referenced Evaluation (NRE)

Norms transform the raw scores into a meaningful scale derived from performance of a large numbers of students distributed over a wide area. They are expressed in relation to school or institutional grade, age, and percentile. It is to be norm referenced because it tends to decide whether any score is good or bad on a norm -referenced measure by seeing where the score stands in the distribution of scores on the measure. Norm -referenced evaluation, therefore, is a decision made about individual or group by comparing the performance of such individual or group with those outside his or their region or locality, but they are placed on the same psychometric scale. NRE is useful when guiding students into the areas of greater satisfaction through highest or superior performance. It can best be adopted to motivate students to enjoy the satisfaction of outstanding achievement (Anastasi, 1988).

1.2. Criterion-Referenced Evaluation (CRE)

Criterion in pedagogical process refers to specified performance standards set by teachers for their students. It is used to assess the mastery level of learner attainment in a unit of instructional diet. Criterion-Referenced Evaluation (CRE), therefore, is a reliable decision about whether individuals have reached a targeted level of performance. CRE evaluates the effectiveness, quality of instruction in comparison with the effectiveness of different instructional procedures.

1.3. Differences between NRE and CRE

The following are the major differences between the norm-referenced and criterion-referenced evaluations.

Homogeneity of Test Items: The norm-referenced test item will tend to be homogeneous while criterion-referenced item will not. They are homogeneous in the sense that people who score well on one item will tend to score well on others vice versa. The criterion-referenced test, on the other hand, will not be homogeneous because all the items that many people know before instruction will be deleted (since they need not be taught what they already know) (Adedokun, 2016).

Distinct Style of Teaching: Robert, (1997), suggested that extensive use of criterion exercise in the form of brief criterion-referenced tests will tend to produce distinctive style of teaching. Testing activities will be prominent and consume large part of the instruction time. Since some students reach mastery sooner than others, this style of instruction will invite individual pacing, and this, in turn, will create problems in trying to keep track of where each student is and what he should learn next (Bond, 1996).

Difference in index difficulty Level of Items: For norm-referenced evaluation, test terms are selected for a final form by choosing items of optimum difficulty level and maximum discrimination index, using total test score on an administration after instruction as the criterion. For criterion-referenced instruments, items are selected for a final form by choosing items based on two testing: one before the instruction and one after the instruction and two difficulty levels are involved.

2. Purposes of study

The aim of this paper, therefore, is to highlight the features of evaluation, identify significance of NRT and CRT, and the procedure involved in using CRT strategy in facilitating CA in classroom. This paper further discusses CRTs and NRTs, selection of test content, and also discusses CA, the need to use CRT strategy. In addition, steps (guidelines) in designing CRTs for Sciences and Mathematics classes were identified and samples of CRTs testing in Chemistry, Agricultural Science and Mathematics were also provided.

3. Assessment Tools Adopted for NRE and CRE

The tools that can be used to assess learning ensuring in a structured instructional process, and on the objectives specified by Bloom (1959) are numerous. Based on the aims of this paper, tests were chosen as the main focus.

Test is a tool used to evaluate interactive process in a class, to ascertain the level of attainment of stated objectives that are in line with the stated domains of learning.

Tests can be categorized into two groups: Norm- Reference Tests (NRTs) and Criterion- Reference Tests (CRTs). These tests differ in terms of their intended purposes, the way in which content selection is done, and interpreting the scores of the students. There is a great need for an assessment instrument, which leads to a more explicit interpretation of test scores.

Criterion- Referenced Tests (CRTs) are intended to measure how well a person has learned a specific body of knowledge and skills (Bond, 1996). A criterion-referenced test is a test that provides a basis for determining a candidate's level of knowledge and skills in relation to a well-defined domain of content. Often one or more performance standards are set on the test score scale to aid test score interpretation. In education, CRTs are usually used to determine whether a student has learned the material taught in a specific grade or course. An algebra CRT would include questions based on what was supposed to be taught in algebra classes. It would not include geometry questions. An Example of CRT, as a standardized CRT, taken by the students is Joint Admission and Matriculation Board (JAMB) examination in Nigeria. The performance level or "Cut-Off" score is usually set by a committee of experts in various Universities while in a classroom teachers set the passing score. Sometimes one kind of test is used for two purposes at the same time. In other words, in addition to ranking test takers in relation to a national sample of

students, CRT might be used to decide if students have learned the contents they have been taught as well as assess mastery and rank students or schools based on their scores.

Norm- Referenced Tests (NRTs) are designed to highlight achievement differences between and among students to produce a dependable rank order for the students across a continuum of achievement from high achievers to low (Stiggins, 1994). Norm-Referenced tests ascertain the rank of the students, while criterion referenced test determine what test takers can do, and what they know, not how they are compared to others (Anastasi, 1988).

CRTs report how well students are doing relative to a predetermined performance level on a specified set of educational goals or outcomes. Educators may choose to use a CRT when they wish to see how well students have learnt the knowledge and skills, which they are expected to have mastered. This information may be used as one piece of information to determine how well the student is learning the desired objectives and how well the school is teaching these objectives available in the curriculum. As sited by Akpan (1997) criterion - referenced testing would provide more valid data for guidance purpose, in CRT, students that have problems would be identified at the end of each unit test in a subject. In CRT, diagnosis of the problem becomes eminent and the remediation becomes possible. CRT reveals whether the students have accomplished the objectives of a particular unit or not, this, therefore, calls for the selection of test contents appropriately.

4. Selection of Test Contents

Test Content is an important factor in choosing between an NRT test and a CRT test. The content of a NRT test is selected according to how well it ranks students from high to low achievers (Bond, 1996). In contrast, the contents of a CRT test is determined by how well it matches the learning outcomes. The content selected for the CRT according to Bond, is based on its significance in the curriculum while that of the NRT is chosen by how well it discriminates among students. When test content is adequately selected this will facilitates CA using CRT strategy.

5. The Rationale for the need of CA and how to facilitate CA using CRT strategy in Sciences and Mathematics Classes

CA refers to the process of investigating the status of an individual or group, usually with reference to the expected outcomes. It refers to the strategies used to find out what students have gained from learning activities in terms of knowledge, thinking and reasoning, character development. It is, thus, a systematic and an objective method of determining the extent of a learner's performance as well as expected positive changes in learner's behaviors (Ogunsemowo, 1996).

CA is influenced by the learning process starting from the first day of the learning at school until the end of the term. Because of the need of CA to guide and shape students in their learning, it requires a systematic (process) strategy like CRT. The CRT is a needed strategy to facilitate CA process in classes because it (CRT) is capable of minimizing if not eliminating most of the major weaknesses of the CA practices in classroom. For example, the use of non-standardized tests as CA tests, by the subject teacher. With CRT, the rationale underlying the introduction of CA would be met. As mentioned by Ogunsemowo (1996) and a joint effort of Ojerinde and Falayajo (1984).

An urgent call for adopting the CA in classes can be summarized in the following:

1. CA helps to prevent exam anxiety, fatigue, or any other possible factors that may affect student's performance badly.
2. CA helps teachers and parents monitor students' progress from a specific time to another.
3. It allows more objective evaluation of the learner performance. The student would be noticed, tested, and evaluated on several occasions; thus, the typical performance of a student can be captured and rewarded accordingly.
4. It ensures even distribution of students' output. CA prevents student procrastination. It helps to ensure systematic arrangement and execution of topics.
5. Student's score in C A actually influence student's academic activities as to what he or she should do to improve on his/her performance.
6. CA helps to expose problematic areas, through the use of CA, the problematic areas are spotted and remediated.
7. CA helps to ensure more objective assessment of the individuals' performances. Thus, the effect of sickness, anxiety, negative emotions or any other psychological problems are eliminated.

6. Guidelines (Steps) in Designing CRT for Mathematics and Science

Education is not a process of putting the learners under teacher's control, rather it is a process of putting them in absolute control of their own learning. A CRT is a test in which every single question refers back to pre-stated criteria

(objectives). These criteria are explained to the students in order to inform them related to what they should perform or master at the end of the course or assignment so that they take the control of their own learning process and monitor it.

1. Criteria - Ways to describe criteria:
    a. What are you trying to accomplish?
    b. What do you want the student to learn?
    c. Other terms for criteria – Objectives rotated with the three domains of learning and specifications.

In this step, CRT designer is expected to state the accomplished goals (objectives). For example:

Subject: Mathematics
Topic**:** Fraction
Objectives: by the end of the lesson learners should be able to:

- ✓ Arrange fractions in ascending and descending order of magnitude.
- ✓ Simplify fractions using arithmetic operations (+, -, /,*).
- ✓ Simplify fractions using BODMAS.
- ✓ Simplify fractions using word process.

2. How to write a criterion -referenced test?
    a. The teacher reads the first criterion and then writes two or more questions specifically directed to criterion number.
    b. If the teacher has more than one criterion or objective, then the process is repeated until all criteria or objectives have some types of assessment.

3. What do criteria govern? While writing the questions, remember to use Bloom's taxonomy and all the levels of higher order thinking skills.
    a. What questions would you write on the test?
    b. How many questions would you write on the test?

7. Activities at Various Cognitive Levels of Learning (LoL) on Bloom's taxonomy

Bloom's taxonomy of learning objectives are used to define how well a skill or competence is learned or mastered. Each content aspect on the table was calculated by the cognitive Levels of Learning (LoL). Allocation of LoL for each content to be tested, is determined by the number of the various cognitive levels of LoL allocated to each sub-topics as specified on the Table 1.) It shows what is aimed to test among the LoL. In this case (Table 1), 20% was allocated to the first 3 LoL, (20% x 3 = 60%) the allocation was as a result of cognitive contents tested on each level. The last 3 were allocated with 13.3% each (13.3% x 3 = 39.9% approximately 40%). These allocations were as a result of what was tested within specific cognitive level. For example:

LoL	**Number of Allocation**			
Knowledge	20/100	X	30/1	= 6
Synthesis	13.3/100	X	30/1	= 4

To obtain allocation for each content level against LoL, the researcher distributed the total number of each LoL on each content level, based on the interest. For example, knowledge has the total of 6 and is being distributed to content, thus, simple equation =1, linear substitution = 1, inverse operation = 2 and quadratic substitution = 2.

Table 1
Table of Specification

Contents	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation	**Total**
Simple equation	1	2	2	1	1	1	**8 (26.7%)**
Linear Substitution	1	2	1	1	1	1	**7 (23.3%)**
Inverse Operation	2	1	2	1	1	1	**8 (26.7%)**
Quadratic Substitution	2	1	1	1	1	1	**7 (23.3%)**
Total	**6 (20.0%)**	**6 (20.0%)**	**6 (20.0%)**	**4 (13.3%)**	**4 (13.3%)**	**4 (13.3%)**	**30 (100.0%)**

4. Mastery/Results.
   a. Can a learner show mastery of criteria or objectives?
   b. If the student answers the assessment correctly, then the student shows mastery of that criteria or objectives.
   c. If a student answers the assessment incorrectly, this shows that the student has not demonstrated mastery of that criterion.
   d. To demand results of students, the teacher must share the results of the lesson with the students, and then teach the students to perform those results.

Samples of Criterion referenced testing

Age: 12 - 15years
Class: Senior Secondary One (S.S.1)
Instruction: Answer the following questions. You are expected to obtain at least 95% of each unit in a subject before proceeding to next unit. If this is not obtained, you will continue to try it until this is attained.

Subject : Mathematics
Topic : Fraction

Stage A : Arrange the following fractions in ascending order of magnitude.
i. 7/24, 5/17, 2/7, 6/10
ii. $^{3}/_{5}$, $^{4}/_{7}$, $^{6}/_{13}$
iii. 2 1/3, 2 $^{3}/45$, 2 $^{7}/_{27}$

Stage B: Determine the greatest of:
i. 7/9, ¾, 10/13, 6/10
ii. 1/3, ½, 1/4
iii. $2^{1/3}$, $2^{3}/45$, 2^{7}

Stage C: Simplify
i. 1/3 + 1/3, ii. 1/3 + ½ iii. 2/3 + 1/5
iv. 2 2/3 v. 41/4 – 1 2/5
vi. 2 $1/_{5}$ + l $^{3}/_{6}$ vii. $4^{2}/5$ + 1¼
viii. $4^{2}/_{5}$ _ $l^{1}/4$ ix. $31/_{4}$ – l $^{2}/_{3}$
x. $4^{3}/_{5}$ – 2 $1/_{8}$

Stage D: Simplify
i. 2 1/8 + $l^{1}/4$ + $l^{2}/_{3}$ ii. $2^{3}/_{5}$ + $2^{2}/3$ - $l^{2}/_{3}$
iii. $4^{3}/_{5}$ - $2^{l}/_{8}$ + 1¼ iv. $2^{3}/_{5}$ + $2^{2}/_{3}$ - 5

Stage E: Simplify using BODMAS
i. 2 $^{3}/_{5}$ + (2 2/3 of 16½ - 5)
ii. 1 – ($^{1}/_{5}$ x $1^{2}/_{3}$) + (5 + 1 $^{2}/_{3}$)
iii. $\frac{2½ + 1^{1}/_{3} – 16}{1 ½ - 1 ^{1}/_{3}}$ iv. $\frac{4 ^{2}/_{3} \text{ x } ^{5}/_{6}}{1 + ^{5}/_{6}}$

Stage F: Simplify
i. Add $2^{l}/_{3}$ to the positive difference between 3½ and $1^{5}/_{6}$
ii. In an examination, 90 out of 300 candidates failed. What fraction passed?
iii. A boy has N16.00, he spent N3.20. What fraction of his original money does he have left?
iv. A flagpole 6.30m long is driven 1.4m into the ground. What fraction of the pole is above the ground?

Subject: Agricultural Science
Topic: Soil
Stage 1: What is rock weathering?
ii. Enumerate (3) processes involved in rock weathering?
iii. List agents of rock weathering?

Stage 2: List (2) major elements of climate
ii. List (4) types of chemical weathering.
iii. Name (3) types of rock

Stage 3: What is soil?
ii. State (3) types of soil
iii. List three characteristics of soil types in stage 3 (ii) above

Stage 4: What is soil profile?
ii. What is soil texture?
iii. List (4) components of soil
iv. State (4) types of soil organism
v. Write (5) importance of soil

Subject: Chemistry
Topic: Periodic Table
Stage 1: What is an atom?
ii. Write the atomic structure of a name element
iii. What are the components of an atom?

Stage 2: Define periodicity?
ii. Name any (10) elements on periodic table
iii. Write the atomic symbols for elements numbers 6, 10, 13, 15, 17, 19 and 20.

Stage 3: Calculate the atomic mass of the elements 10,13,16,19 and 20.
ii. Write the electronic configuration of elements 8, 10, 15, 17 and 20.
iii. Which of the following elements belong to which period and group in the periodic table, elements: 6, 9, 12, 17, 18 and 20?

Stage 4: Draw a periodic table using period and group for elements in stage 2 (iii) above.
ii. What are the properties of elements in the same group?
iii. State the characteristic of elements in the same period.

8. Difficulties of Criterion-Referenced Tests

1. The main problem of CRT is breaking down of the subject into units and how to determine the minimum level of acceptable performance.
2. Teachers are to be trained on how to teach for mastery, how to determine the acceptable performance in setting CRT, and also how to use the results of CRT in order to improve the learners, diagnose learners' problem, and provide remedy.

9. Conclusion

In **c**riterion-referenced evaluation approach, teaching strategies are structured so that reasonable goals are set for achievable performance, and criterion of "mastery" is preset for all learners. This was identified in this article as one of the features of evaluation that enhances CA and also helps teachers and their learners function as partners in trying to achieve the target objectives (goals) as suggested by Stiggins (1994). Mastery in this context is a situation in which the teacher plans for every learner's to be able to answer every item on their tests correctly.

On the other hand, Stenmark (1991) opines that some students will take longer time in mastery, which means teachers will not simply teach the answers to the items, but use the items, as part of CA. They teach so as to arrange question items to be included in the test with the order specified by Bloom (1959) (that is, knowledge, comprehension, application, analysis, synthesis, evaluation) and can be answered correctly. Despite the fact that no one should fail in CRT approach, it is only that mastery is attained at different times by various groups of student. The CRT is not raised or lowered because some learners are slow or because a class of fast learners comes along. In this approach as suggested by Adedokun, (2006), test is not designed or modified so that it remains at a constant difficulty level regardless of the degree of skill developed by the learners.

However, CRT approach to instruction tends to assist the learners to learn to be responsible to their own learning. This combines measurement with clearly specified objectives, alternative routes to learning and rates of learning, which varies from student to students. As a result of these responsibilities, Akpan, (1997) states that the teacher can no longer march the students; therefore, each student should take greater responsibility for his own success.

Evaluation should be used to facilitate continuous progression in a class, but not by forcing every individual to do well. This was in conformity with Alrasian (1989) that, decision in classroom climate, instructional success, and pupils learning is what evaluation revolves around. This enables teachers to collect, interpret, and synthesize information to aid in placement and value judgment of an individual or group in the classroom. Evaluation restructure, reposition and refocus the position of an individual having been tested severally through continuous assessment (CA). Ogunsemowo, (1996) defined CA in line with the three domains of learning as suggested by Bloom (1959) as process of investigating the status of an individual or group, usually with reference to the expected outcomes. It refers to the strategy used to find out what the students have gained from learning activities in terms of knowledge, thinking, reasoning, and character development.

However, the assessment process demands a systematic and an objective method to determine the extent of a learner's performance, also expected positive changes in learner's behavior through appropriate referenced testing (Ogunsemowo, 1996). Norm and criterion referenced evaluations are applicable in all subject areas and in the three domains of learning. Falayajo (1984) supports the adoption of CA in teaching because it aids objectivity in the evaluation of the learner. The learner has the opportunity of being noticed, tested, and evaluated on several occasions; nevertheless, the typical performance of a student can be captured and rewarded accordingly. These would be more appropriate with the use of reference testing.

Introduction of CRT strategy into CA process will go along the way to change the attitudes of learners towards learning, and it enhances assessment process in Sciences and Mathematics classes. This paper has provided information in the area of CRE and NRE. The paper also suggested and identified the power and value of CA and its appropriateness in adopting reference testing as well as the condition for the preference of one over the other.

A close look at the rational that calls for the introduction of CA were not adequately accomplished, but with the adoption of CRT, strategies could be incorporated into the CA practice, and all the rationale would be satisfied. In CRT student's problematic areas would be identified at the end of each instructional unit, and diagnosis of the problem becomes eminent, and CRT assists remediation of such problem. However, in CA practice, it is only when the results of the final examinations are out that parents and students would realize that the marks the students were having in school were deceitful. With adoption of CRT while conducting CA, such results showed the position of the learners, which took part in the examination. This showed the appropriateness of CRT in CA. Bond (1996) assertion was corroborated with one of the objectives of this paper. In other words, CRT encourages using various of instructional methods in a single teaching unit if teacher realized that a particular method adopted does not go well with students. Introduction of CRT will reduce examination malpractice because emphasis is placed on hard work in order to attain the criterion. With criterion - referenced testing, it is possible to identify learners' strengths and weaknesses.

Adoption of CRT in CA goes a long way to boost teaching and learning effectiveness, since learning is said to be effective when learners make correct perceptions of realities or when they conceptualize, accurately, unperceived learning experiences, which ultimately result in a desired or anticipated behavioral change in learner's domains of learning (Robert, 1997). Enhancing adequate assessment in CA, therefore, requires CRT strategies to foster meaningful and clear formulation of instructional objectives within the context of expected learner behavior.

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