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The Perception of Biology Teachers on the Use of Multiple Choice Questions (MCQS) In the Cameroon General Certificate of Education (CGCE) Ordinary Level (O/L) Biology

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Abstract

The study 'the perception of Biology teachers on the use of multiple choice questions (MCQs) in G.C.E. Ordinary Level (O/L) Biology' was carried out to find out the feelings of biology teachers on the use of MCQs, an innovation in the G.C.E. examination since the June 2009 session.

The instrument used to collect the data was a questionnaire made up of close ended questions. The investigator used the direct delivery technique to collect the data.

The key question that guarded the study was 'How do Biology teachers perceive the use of MCQs in Ordinary Level Biology?'

The findings revealed that Biology teachers have mastery in the construction of MCQs, appreciate its use in assessing students' learning and in the attainment of instructional objectives. They however experience some constraints in the construction of MCQs, and feel that they should be involve in decision-making on matters that concern MCQs.

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It was recommended that the officials of the G.C.E. Board and the Regional Delegations of Secondary Education should organize more seminars on the construction of MCQs. In addition, education authorities should recruit more Biology teachers so as to reduce the work load of teachers and give them more time to be able to construct MCQs.

Key words: Perception, multiple choice questions (MCQs), Ordinary Level Biology.

Introduction

Many school systems and educators are responding to calls for reforms in assessment, by proposing a variety of alternatives to standardized testing. These proposals are diverse, controversial and apprehensive especially to the teachers who are the implementers of the change. In Cameroon, Law N^0 98/004 of 14 April 1998 section 39 states that 'Teachers shall be bound to teach, educate, provide educational guidance, promote the quest for scientific knowledge, carry out assessment and be of moral rectitude.'

Teaching according to Tambo (2003), refers to all activities done before, during and after interaction with learners in order to enable learning to take place. The purpose of teaching therefore is to improve the knowledge, behaviour or skills, and attitude of learners. Teachers want learners to increase the amount of knowledge they have and decrease the amount of forgetting. Teaching is also concerned with the behaviours, skills and attitudes of learners. It is therefore the concern of teachers to find out if learning actually takes place before, during, and after teaching. It is in this light that Smith and Rogan (2005) and Mbua (2003) look at assessment as one of the roles of teachers, a role which is strongly echoed in

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section 39 of law n^0 98/004 of 14 April 1998. This researcher is interested in finding out the perception of Biology teachers on the use of MCQ in O/L Biology with respect to the attainment of instructional objectives.

Airasian (1997) looks at assessment as the collection, synthesis and interpretation of information to aid the teacher in decision making. Tambo (2003) holds that assessment refers to the process of developing, administering and marking (scoring) tests and other assessment instruments for the purpose of finding out if learning took place during teaching. It is therefore obvious that any meaningful conceptualization of the teaching process has to recognize the interdependence between teaching and assessment.

One of the ways of assessing learners is by the use of pencil-and-paper tests or written tests. Tambo (2003) categorized written tests into two types: objective tests and essay tests, with multiple-choice questions (MCQs) being one form of objective tests. MCQ is a type of test in which a direct question or incomplete statement is presented, and a number of responses are given. The test taker is asked to choose for each item, the correct or best answer from the response options.

The perception of Biology teachers on the use of MCQs in O/L Biology as a better instrument for the assessment of learning than the use of short-answer structural questions is an issue of concern to this researcher.

In May 2005, the Cameroon General Certificate of Education Board, CGCEB, made public its intension to introduce MCQs in all subjects at both the Ordinary and the Advanced Levels. This intension was opposed by the Cameroon Teachers' Trade Union, CATTU, who argued that it was too hasty. According to Ornstein and Hunkins (2009), teachers should be one of the key players in curriculum

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development, implementation, and evaluation. Doll and Oliva as cited by Ornstein and Hunkins (2009), suggest a bottom-up approach to curriculum issues; in which the teacher plays a major role. Mbua (2003) talks of teacher participation in decision-making. Hoy and Miskel (1996) have also supported the desirability and influence of teachers' participation in decision-making in educational organizations. In addition, section 37 of law nº 98/004 of 14 April 1998 says that the teacher shall be the principal guarantor of the quality of education. This researcher also seeks to find out the extent to which Biology teachers feel they are involve in decision-making with respect to the use of MCQs. Section 11 of Law Nº 98/004 of 14 April 1998 emphasizes that the state shall formulate and implement educational policy, with the assistance of regional and local authorities, families as well as public and private institutions. Ornstein and Hunkins (2009) look at the place of Board of Education in Curriculum Development. According to them, many state Boards of Education make formal recommendations and issue guidelines regarding what the curriculum should contain and how it should be organized. In Cameroon, in late 2005, the minister of Secondary Education introduced MCQs in GCE Examinations. It was in line with this ministerial decision that the Regulations and Syllabuses for General Education Subjects (2007) published by the CGCEB indicated that MCQs was to be used in paper one of all subjects at both the Ordinary and the Advanced Levels from June 2009 session. Worthy of note is the fact that Advanced Level Physics paper one has been multiple-choice questions even before the CGCEB could come up with this reform.

However, this innovation was not completely receptive by all stakeholders. Biology teachers see the policy with different lenses due to the fact that of all types of objective test questions, MCQs are the most difficult and time-consuming

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questions to design. In addition, it requires the teachers to re-orient their teaching towards complete syllabus coverage and mastery of programme content.

It is against this backdrop that this researcher seeks to find out how Biology teachers perceive the use of MCQs in GCE Ordinary Level Biology.

THEORETICAL AND CONCEPTUAL FRAMEWORK

Based on the thematic aspects of this study, the following: motivational, cognitive and behavioural theories were considered.

Content and process theories of motivation have been used to guide this study. These include; Maslow's Theory of Hierarchy of needs, Hezberg's Two-factor Theory, Vroom's Expectancy Theory and Goal-Setting Theory. This is because these theories have direct implications to the topic being investigated.

Maslows hierarchy of needs is based on the assumption that "only when people have satisfied the most basic needs can they strive to meet higher needs." Hezberg's Two- factor theory holds the view that the work environment comprises of two factors: the satisfiers known as the motivating factors and the dissatisfiers known as the hygiene factors, where the satisfiers are the key motivators for improving work performance (Glickman, 1985).

Vroom's (1964) expectancy theory is based on the assumption that motivation is a voluntary process in which decisions lawfully relate to psychological events that go with behaviour and that forces in the individual and the environment combine to determine behaviour. The theory builds on these assumptions with the concepts of

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valence, instrumentality, and expectancy. All of this is defined below in the lens of Norman, (1988).

Valence: refers to the perceived positive or negative worth or attractiveness of potential outcomes, rewards, or incentives for working in an organization.

Instrumentality: refers to the perceived relationship between incentive and a given level of performance.

Expectancy: refers to the subjective probability, that a given effort will yield a specified performance level.

The Goal-Setting Theory developed by Locke and Latham (1990) as cited in Mbua (2003), the intentions to achieve a goal, constitute the primary motivation force behind work behaviour.

The extent to which Biology teachers are motivated with respect to the use of MCQs, has an effect on the way they perceive the use of MCQs in O/L Biology.

Cognitive theories used in this study include Bloom's taxonomy in the cognitive domain, Piaget's Theory of cognitive development, and Bruner's Theories of instruction and discovery learning.

Bloom's (1956) taxonomy of educational objectives provides a frame work with which educational objectives could be organized and measured. He categorized cognitive behaviour into six hierarchical levels. These are: knowledge, comprehension, application, analysis, synthesis and evaluation. According to

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Bloom et al (1971), evaluation is the highest level of intellectual functioning and it involves all the other cognitive skills.

Piaget's Theory of cognitive development talks of how children perceive and use knowledge (Luma, 1983). Piaget's stages of child development include the sensory motor stage (0-2), pre-operational stage (2-7), concrete operation (7-11), and formal operation (11-16) (Santrock, 2001). Piaget also said that the assessment of learners is an important aspect in the teaching-learning process.

Jerome Bruner emphasized on meaningful learning in two theories: the theory of instruction and the theory of discovery learning (Tchombe 1997, 2004). According to Bruner, the goal of teaching is not just to impart knowledge but also to promote the general understanding of the structure of the subject matter or the discipline (Santrock, 2001). Bruner's theory of instruction prescribes what teachers should do to help learners perform better, no matter the nature or format of the assessment instrument. He emphasized the use of assessment and feedback, which are important elements in the teaching-learning process (Biehler and Snowman, 1986).

In his theory of discovery learning, Bruner states that the teacher should provide conditions for discovery learning by giving test questions to students and asking them to find out the answers.Tchombe (1997,p.94) confirms this by emphasizing that 'the process of questioning or testing will help in the attainment of instructional goals.'

The perception of Biology teachers with respect to the use of MCQs probably has to take into account the level at which educational objectives can be classified and measured, the developmental stage of the learners, and the nature of instruction in order to meet the needs of MCQs.

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Behavioural approach to learning has resulted to learning types such as classical conditioning. This began with an accidental discovery by Ivan Pavlov. Although Pavlov worked with dogs, classical conditioning can also be used to understand a wide variety of issues concerning human behavior. Classical conditioning is a form of learning in which a previously neutral stimulus (NS) is paired with an unconditioned stimulus (UCS) to elicit a conditioned response (CR) that is identical or similar to the unconditioned response (UCR), (Lahey, 2003). Biology teachers had been using short-answer structural questions in paper one Biology before the decision of the CGCEB to change the format. As such, the minds of the teachers' were already conditioned on the type of questions to set with respect to Biology paper one. The degree to which the process of *extinction* takes place in the minds of these teachers, may consequently effect their perception on the use of MCQs in O/L Biology.

Considering the fact that assessment and evaluation play very important roles in the teaching-learning process, the way teachers perceive the use of MCQs as one of the ways of assessing the learners, is also very important. According to Ngoh and Mbangwana (2001), the term evaluation is synonymous to tests, examination, assessment and even measurement. These terms are often used interchangeably because all of them aim at measuring educational outcomes and to measure students' performances or progress.

According to Tambo (2003), multiple choice questions are a type of test in which a direct question or incomplete statement is presented and a number of possible responses are given. The test taker is asked to choose for each item, the one correct or best answer from suggested alternatives. The items of a multiple choice are

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often colloquially referred to as 'questions,' but this is a misnomer, owing to the fact that many items are not phrased as questions. For example, they can be presented as complete statements or mathematical equations. Thus the more general term 'item' is the most appropriate label.

Anuchem (2010) describes four types of MCQs, namely;

1) The simple multiple choice questions; in which the stem is a question, statement or incomplete statement. The test taker is expected to choose amongst the options, one answer that best fits the stem.
2) The classification question; in which a series of MCQ are set using identical responses labeled A, B, C, D or E. Each response may be used once, more than once, or not at all.
3) The multiple completion questions; this type of questions use a stem together with four responses numbered 1-4. One or more of the responses are correct. The test taker is required to decide which of the response (s) is (are) best, then choose the letter corresponding to the best answer using a given code or direction.
4) Assertion and reason; each question consists of a statement in the left-hand column, followed by a statement in the right-hand column. The candidate is expected to decide whether each of the statements is true or false. Then choose the letter corresponding to the correct answer using a given code or directions.

Tambo (2003) says the most familiar and less complicated types are;

- The question variety
- The correct or best answer variety

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- The incorrect or worst answer variety
- The multiple-response variety
- The common principle or most inclusive variety
- The most dissimilar-answer variety, and
- The combined response variety.

METHODOLOGY

The design adopted for this study is the survey design. According to Nworgu (1992), a survey design is generally considered as one in which a group of individuals is studied by collecting and analyzing data from a selection of a few, which in turn is considered to be a representation of the entire group. This type of research design is characterized by lack of control, and the researcher being involved in this kind of study, was interested in identifying and describing how sample subjects felt at one point in time, without any attempt to control or manipulate them.

This study was carried out in the English speaking Regions in the Republic of Cameroon - the South West and the North West Regions.

The South West Region is divided into six divisions: Fako, Manyu, Meme, Ndian, Lebialem, and Kupe Manenguba. Each of these divisions is in turn broken down into subdivisions. This region has some important geographical features such as the Mount Cameroon, which is found in Buea, the capital of the Region. One of the important towns in this region is the sea side resourt town of Limbe, with its beaches. The population of the South West Region is heterogenous, made up of people from all over Cameroon and some neighbouring countries like Nigeria and

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Equitorial Guinea. The Region has the first English-speaking University in Cameroon - the University of Buea. Agriculture and fishing are the key livelihood occupations for the greater rural population. Besides Buea and Limbe, other important towns in this region include; Kumba, Manfe, and Tiko. The region has a good number of public, denominational, and lay-private secondary and high schools and colleges.

The North West Region is found in the Western Highlands of Cameroon. It is divided into seven divisions; Bui, Momo, Mezam, Menchum, Boyo, Donga-Mantum, and Ngoketunjia. Each of these divisions is in turn divided into subdivisions. Its population is heterogenous, made up of people from all over Cameroon and some neighbouring countries, particularly Nigeria. This region has one metropolitan town called Bamenda, which is also the capital of the Region. Other important towns are Kumbo, Nkambe, Ndop, Batibo, Wum, and Fundong. This region has just been blessed with the second English-speaking University in the country - the University of Bamenda. The region also has a good number of public, denominational, and lay-private secondary and high schools and colleges.

The population of the study, consists of all Biology teachers in public, denominational, and lay-private secondary and high schools in the Republic of Cameroon.

The target population of the study comprises of all 650 Biology teachers in public, denominational, and lay-private secondary and high schools in the English-speaking Regions of the Republic of Cameroon.

The accessible population consists of all the Biology teachers in public, denominational, and lay-private secondary and high schools in the English-

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speaking Regions of Cameroon, who were invited to mark the GCE Ordinary and Advanced Level Biology and Ordinary Level Human Biology in the Buea and Bamenda marking centers for the June 2011 GCE session.

Biology teachers from public, denominational, and lay-private secondary and high schools in the South West and North West Regions who were invited to mark O/Level Biology, O/Level Human Biology, and A/Level Biology in the 2011 marking session of the GCE were taken to be the accessible population. Out of the 172 teachers invited to mark O/L Biology in the Buea marking center, 47 came from the North West Region, 64 from the South West Region and the remaining 61 from the other regions. Out of the 73 teachers invited to mark O/L Human Biology in the Bamenda marking center, 28 came from the South West Region, 30 from the North West Region, and the remaining 15 from the other Regions. Out of the 92 teachers invited to mark A/L Biology in the Buea marking center, 38 came from the South West Region, 31 came from the North West Region, and the remaining 23 came from the other Regions. This made a total of 238 Biology teachers, who constituted the accessible population, distributed as shown on table 3.1 below.

Distribution of Accessible Population

Region	No of teachers invited to mark O/L Biology	No of teachers invited to mark O/L Human Biology	No of teachers invited to mark A/L Biology
South West	64	28	38

North West	47	30	31
Totals	**111**	**58**	**69**

Source: Cameroon GCE Board. List of teachers invited from the South West and the North West Regions to mark the June 2011 O/L Biology, O/L Human Biology, and A/L Biology in the Buea and Bamenda marking centers.

The sample size was made up of all the 238 Biology teachers who were invited from the South West and the North West Regions to mark O/L Biology, O/L Human Biology, and A/L Biology for the 2011 session of the GCE. Questionnaires to the 238 teachers were administered using the cluster sampling technique. In cluster sampling according to Nworgu (1990), the population is divided into units or sections. Using simple random sampling, a specified number of these units or sections is drawn. All elements in the units or sections drawn now constitute the sample. Nworgu further adds that the researcher concentrates his efforts only on those units or sections that have been drawn. Consequently, Only Biology teachers from the English-speaking Regions of the Republic of Cameroon were given questionnaires to answer.

Distribution of Sample

Region	**Number of teachers invited**	**Number of teachers selected (Sample Size)**
South West	130	130

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North West	108	108
Total	**238**	**238**

Instrumentation

The instrument used in this study is the questionnaire that was formulated by the researcher in consultation with the supervisor who went through it item after item. The questionnaire was used for data collection because it requires less time, it is less expensive, and can be appropriately used to collect the desired data from the sample. At the beginning of the questionnaire, there was an introductory note stating the research topic and the purpose of the questionnaire. In this note the researcher ended by thanking the respondents for the time spared to provide responses to the questions, and promised to keep their responses confidential and use them strictly for research purposes.

The questionnaire was divided into six sections: A, B, C, D, E, and F. Section A with five items was on the demographic profile of the respondent. Sections B to F contained items that are directed towards the verification of the specific hypotheses and the answering of the specific research questions: Section B of nine items was on research question one. Section C of ten items was on research question two. Section D of ten items was on research question three. Section E of five items was on research question four, while section F of three items was on research question five. The items were close-ended, with Likert-type response options ranging from strongly agree (SA) to strongly disagree (SD). The Likert-type close-ended items

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were used because of the ease of responding and the short time required to respond. Scales were assigned to the options as follows;

- Strongly agree = 4
- Agree = 3
- Disagree = 2
- Strongly disagree = 1
- Undecided = 0

Validity and Reliability

In order to ensure the validity and reliability of the instrument, the questionnaire was submitted to the supervisor for necessary scrutiny and corrections. The final version of the questionnaire was pre-tested among some class mates and Biology teachers. Further validation of the instrument was done as the researcher carried out a pilot study with the questionnaire by giving copies of it to 15 Biology teachers in Tiko subdivision of the South West Region. The respondents had no difficulty completing the items, and the responses indicated that the instrument measured what it was intended to measure. After the pilot study, the questionnaire was confirmed as valid and reliable by the supervisor before it was taken to the field.

Procedures for Data Collection

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The researcher administered some of the questionnaire while others were administered by a friend. The researcher visited the Buea GCE Marking Center, where he met and introduced himself to one of the Assistant Chief Examiners for 'O' Level Biology. This Assistant Chief Examiner then gave him the opportunity to talk to the teachers (O/L Biology Examiners). He also met and introduced himself to the Chief Examiner for 'A' Level Biology, who also gave him the opportunity to talk to the teachers (A/L Biology Examiners). The researcher administered the questionnaire to the respondents on the spot. Some of the respondents completed the questionnaire on the spot and returned it to him while others asked him to pass and collect the completed questionnaire on a later date. The friend assisted the researcher to administer the questionnaire to 'O' Level Human Biology Examiners in the Bamenda GCE Marking Center without any difficulties.

Questionnaire return rate

Two hundred and thirty eight copies of the questionnaire were administered. The table below shows the return rate of the copies administered.

Questionnaire return rate

Region	Nº Administered	Nº Returned	% Returned
South West	130	128	98.46
North West	108	107	99.07
Total	**238**	**235**	**98.74**

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The above table shows that out of the 238 copies of the questionnaire administered, 235 were returned, giving a percentage returned of 98.74%.

Method of Data Analysis

The Likert-type items were analyzed using the statistical package for the social sciences (SPSS) version 12.0 for windows, using descriptive statistics (more specifically simple frequencies, percentages and means). For inferential statistics, the chi-squared (x^2) was used to test whether or not opinions on the issues raised in the questionnaire depended on the teacher's working region (South West or North West).

Findings

The findings of this research show that:

1. Biology teachers have some mastery in the construction of MCQs in Ordinary Level Biology.
2. Biology teachers do experience constraints in the construction of MCQ test items in Ordinary Level Biology.
3. Biology teachers look at MCQs as an adequate means for assessing students' learning so far as ordinary Level Biology is concern.
4. The use of MCQs helps Biology teachers to attain the instructional objectives in Ordinary Level Biology.
5. Biology teachers are not adequately involved in decision making on the use of MCQs in GCE Ordinary Level Biology.
6. Biology teachers have a positive perception of MCQs in GCE Ordinary Level Biology.

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Conclusion

This is supported by the fact that Biology teachers have mastery on the construction of MCQs, think that MCQ is a better assessment instrument, and that the use of MCQs enhances the attainment of instructional objectives.

A reasonable proportion of Biology teachers however experience some constraints with respect to the construction of MCQs, especially as it is generally time consuming and difficult to construct a good MCQ test/examination. In addition, some Biology teachers have not attended seminars on the construction of MCQs, and some do not have access to didactic materials that deal with the construction of MCQs.

With the use of MCQs, candidates can have the correct answer by guessing, by working backwards, or by the process of elimination. This problem is resolved by using the formula connecting the guessed and the corrected scores, and by raising the pass mark.

Some Biology teachers are not motivated enough to construct and use MCQs. The findings revealed that some teachers are too committed due to much work load in their various schools such that they do not have enough time to construct and use MCQs as they would have loved. Some who try to construct do not have enough material in terms of papers and/or ink, to produce the quantity needed by the teachers and students.

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Hopefully, if the different education authorities put in a little more in terms of seminars, didactic materials, and the control of work loads of teachers, the perception of Biology teachers on the use of MCQs in O/L Biology will likely become more positive.

Recommendations

After the findings, the following recommendations are offered to help educational policy makers and all other educational stakeholders:

1. More seminars should be organised on the construction and use of MCQs for both new and old teachers.
2. More Biology teachers could be recruited so as to reduce the work load of the existing ones. This would give Biology teachers more time to be able to learn how to construct MCQs.
3. Biology teachers should be educated on test item analysis, and encouraged to use it each time they construct and use MCQs.
4. Biology teachers should be motivated to construct and use MCQs by providing them with the necessary didactic materials and/or equipment for the construction and use of MCQs.

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