Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.6, No.25, 2015

The Practice of Student Assessment: The Case of College of Natural Science, Addis Ababa University, Ethiopia

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Abstract

This study attempted to assess the practice of student assessment in the College of Natural Science of Addis Ababa University, specifically aimed at investigating whether or not science instructors are well aware of test blue-print, general principles of evaluation and rule of test construction as anticipated in the new education and training policy as well as examining assessment methods, criteria, techniques employed and challenges of science instructors in conducting assessment of their courses. Forty-five participants were drawn through multistage sampling techniques. A descriptive survey design was employed and data were gathered from participants through both close-ended and open-ended questionnaire. Quantitative data were interoperated as percentage and qualitative data were analyzed using verbal interpretation. The result of the study indicated that the majority of the science instructors do not have clear conception of test blue print, the general principles of evaluation, specific rules of test item construction and item analysis procedures. Finally, the study recommends that the college instructors need to be reoriented with why and how to apply various alternative assessments, the general principles of evaluation, the specific rules of test item construction, how and why to prepare a table of specification, why and how to conduct item-analysis, and the use to be made of evaluation results.
Key words: Assessment practice, test blue print, test item construction

INTRODUCTION

Assessment is one of the professional competences with which teachers need to be acquainted and through which the problems of educational programs and reliable data about the status of an educational system can be obtained. It is also defined as the process of gathering information from a variety of sources, using a variety of methods that best address the reason for evaluation, and is contrasted with testing, which is limited to administration and scoring of tests (Gronlund, 1981; Ogunniyi, 1984; Gage and Berliner, 1998; ICDR, 1999; Eggen and Kauchan, 2001). Some evidence shows that the quality of assessment techniques employed determines largely the quality of student learning (Brissenden, 1996). This seems to be likely since assessment by itself is considered as an integral part of the instructional process. Not only this, it may also be true because assessment usually starts with learning and ends along with it. In spite of this, at many points during the instructional process, teachers need to make several decisions about how well their students are learning and how effective their instruction has been, where these assessment decisions require adequate, reliable and accurate data (Cone and Foster, 1991; Spiller, 2009).

Similarly, numerous literatures indicates that assessment of student learning has a variety of forms, namely, traditional assessment, continuous assessment, self-and-peer assessment and performance assessment (Gronlund, 1981; Ogunniyi, 1984; Gronlund & Linn, 1999; Gage and Berliner, 1998; ICDR, 1999; Eggen and Kauchak, 2001; Stiggins, 2004). In view to this, the traditional tests (both formative and summative) have long been used to assess a large number of behavioral or learning outcomes related to knowledge, understanding, and thinking skills that belong to the set of cognitive domain in learning institutions (Eggen and Kauchak, 2001). However, these traditional testing methods measure only limited outcomes of student learning and they have been of limited value for guiding student learning (Gage and Berliner, 1998). From this standpoint, frequent assessment that is linked to well-planned goals is believed to encourage learners to pace themselves and keep up with their studies (Gronlund and Linn, 1999; Elton, 2002). Generally, effective assessment practices involve four components, namely, designing assessments, preparing students, administering assessments, and analyzing the results (Eggen and Kauchak, 2001; Dunn, 2002; Frye et. al., 2006; Vaughan, 2001; Shavelson, 2007; Webber, 2009). What a critical analysis of the above points makes clear is that only be, selecting or developing instruments and methods that are simple to use, require little extra time or effort, and still provide the necessary data for a specific learning outcome.

A test blueprint, also known as test specifications, consists of a matrix, or chart, representing the number of questions I want in my test within each topic and level of objective. The blueprint identifies the objectives and skills that are to be tested and the relative weight on the test given to each. The blueprint can help me ensure that I am obtaining the desired coverage of topics and level of objective. Once I create my test blueprint I can begin writing my items!

Constructive-alignment is a principle used for devising teaching and learning activities, and assessment tasks that directly address the learning outcomes intended in a way not typically achieved in traditional lectures, tutorial classes and examinations (Biggs and Tang, 2007). Constructive alignment was

devised by Professor John B. Biggs, and represents a marriage between a constructivist understanding of the nature of learning, and an aligned design for outcomes-based teaching education. Constructive alignment is the underpinning concept behind the current requirements for programme specification, declarations of Intended Learning Outcomes (ILOs) and assessment criteria, and the use of criterion based assessment. There are two basic concepts behind constructive alignment:

a) Learners construct meaning from what they do to learn. This concept derives from cognitive psychology and constructivist theory, and recognizes the importance of linking new material to concepts and experiences in the learner's memory, and extrapolation to possible future scenarios via the abstraction of basic principles through reflection.
b) The teacher makes a deliberate alignment between the planned learning activities and the learning outcomes. This is a conscious effort to provide the learner with a clearly specified goal, a well-designed learning activity or activities that are appropriate for the task, and well-designed assessment criteria for giving feedback to the learner.

The Ethiopian New Education Policy (ICDR, 1994) encompasses overall and specific objectives, implementation strategies, including formal and non-formal education, from kindergarten to higher education and special education. It emphasizes the development of problem solving capacity and culture in the content of education, curriculum structure and approach, focusing on the acquisition of scientific knowledge and practicum. Although this is in place, there are no up-to-date, comprehensive, and research data on the culture of student assessment in higher education institutions, whereas on the contrary, evidence shows that research data on the practice of student assessment enables the instructors to improve their practices and the University management to further modify and improve their institutional practices and services. In conclusion, given that no adequate research has ever examined this particular issue in the Ethiopian context, there is a crucial need to carry out research in this area.

In my role as a university teacher educator, it is necessary to design and develop instruments, which will help advance practice in key areas of assessment, learning and teaching. Given the context of new Ethiopian policy focus (ICDR, 1994); a key potential area for staff development work lies in the use of appropriately aligned assessment methods. To evaluate the current state of practice in this area, I have conducted primary research among tutors in the natural sciences. As a result of this evaluation, I have developed a “test blue print” specification table. This table will be introduced in a pilot study among colleagues in the natural sciences in an effort to improve practice in university teacher continuous professional development.” Therefore, it is with this in mind that I began to examine the practice of student assessment in the College of Natural Science of Addis Ababa University. In order to investigate this problem more systematically, the researcher formulated the following research questions:

- Are the science teachers well aware of the test blue print, general principles of evaluation and rules of test construction as anticipated in the new Ethiopian education and training policy (ICDR, 1994)?
- What assessment methods do science teachers use most often to assess pupil's learning progress in their courses?
- What criteria do science teachers use most in selecting assessment methods?
- How do science teachers improve the quality and effectiveness of their measuring instruments?
- What are the major barriers to science teachers conducting effective assessment in their courses?

The general purpose of the present study is to assess the culture or practice of student assessment in the College of Natural Science of Addis Ababa University. Specifically, the study intends to:

- Investigate whether or not science teachers have the necessary awareness, skills and attitudes of test construction.
- Examine assessment methods that science teachers use to assess pupil's learning progress.
- Explore the criteria used by science teachers in selecting assessment methods.
- Identify the techniques science teachers employ in improving the quality and effectiveness of their measuring instruments.
- Find out the major challenges that science teachers currently face in conducting effective assessment.

RESEARCH METHODOLOGY

This study was conducted in the College of Natural Science of Addis Ababa University. Forty-five participants were drawn for the present study from the target population through multistage sampling techniques. In this study, the researcher primarily employed descriptive survey design and information about the practice of student assessment was gathered from the participants through both close-ended and open-ended questionnaire. In order to analyze quantitative information which were gathered through close–ended questionnaire the researcher employed percentage. At the same time, qualitative data that were gathered through open–ended

questionnaire were analyzed using verbal interpretation.

RESULTS

The result of the current study is compiled and interpreted as follows. As it is indicated in Table 1, the majority of the participants, (67%) reported to have no clear conception of test blue print, the general principles of evaluation, and specific rules of test item construction. The information in Table 1 implies that their assessment of student learning is governed more by common sense and personal experiences.

Table 1: Awareness measure

No.	Item	Choice	No.	%
1	Do you have a clear conception of test blue print, the general principles of evaluation, and specific rules of test item construction?	A. Yes	**15**	**33**
		B. No	**30**	**67**
2	Do you know why it is important to use multiple methods of assessment?	A. Yes	**20**	**44**
		B. No	**25**	**56**
3	Do you think your policy of student assessment **'fits in'** with what is anticipated in the training and education policy of the country?	A. Yes	**18**	**40**
		B. No	**27**	**60**
4	Which of the following should be given the first priority in assessing student learning?	A. Determination and identification of the contents and objectives to be measured	**5**	**11**
		B. Selection of evaluation techniques	**18**	**40**
		C. Construction of test items	**12**	**27**
		D. Preparing learners	**10**	**22**

While significant proportions of the participants responded that they know reasons for using multiple methods of assessment, still the majority reported that they do not know the basic reasons of using test-blue print. What this shows is that there is lack of uniformity among the participants in the understanding they have regarding the importance of using multiple methods in the assessment of student learning. The same Table shows that the majority of the participants do not believe that their policy of student assessment, i.e. **one-time examination '**fits in' with what is anticipated in the general training and education policy, i.e. **continuous assessment**. Similarly, when asked '**Do you know why assessment methods should be aligned to what to be assessed?'** the majority of the participants said different learning outcomes demand different assessment techniques, while still some said they do not have clear ideas about the issue. Moreover, the majority of the participants reported that selection of assessment techniques is their first priority in their assessment procedures. This is of course in contrast to what the general principles of evaluation states. According to these principles, the first priority should be given to the clarification of the learning targets to be measured, where the techniques to measure it is secondary.

The data summarized in Table 2 shows that the majority of the participants reported to have prepared their test items not on the bases of a test blue print, the general principles of evaluation, and specific rules of test item construction. This means that they use their own experiences and old traditions to develop test items instead of scientific procedures. A high proportion of participants reported that their assessment mostly gives emphasis to the cognitive outcomes. At the same time, some instructors from the departments of biology, chemistry and physics, where laboratory works are common, reported that their assessment gives much emphasis to skills outcomes. What it implies is that the notion of variety is non-existence in their assessment of student learning. Similarly, when asked **'What assessment methods do you use most of the time to assess student learning outcomes?**' the majority of the participants reported they frequently use the traditional paper-and-pencil tests as a technique of assessment which, of course, is more appropriate for measuring cognitive areas while neglecting many behavioral changes in the affective and psychomotor domains of greatest importance.

Table 2: Practice measure

No.	Item	Choice	No.	%
1	Do you prepare your test items on the bases of test blue print, the general principles of evaluation, and specific rules of test item construction?	A. Yes	13	29
		B. No	32	71
2	Which of the following learning targets are commonly assessed in your course?	Cognitive areas	26	58
		Affective areas	6	13
		Psychomotor areas	10	22
		All aspects of behaviors	3	7
3	On which of the following criteria do you select assessment techniques or instruments for your course?	How accurately they measure	6	13
		How easy they are to score and construct	18	40
		How convenient they are to use		
		How objective results they provide	12	27
		The ability level of the learner	4	9
		Their appropriateness to the intended objectives	5	11
4	How do you check the content adequacy or representativeness of your test?	By preparing test items based on a table of specification	12	27
		By increasing the number of items in the test	25	56
		By relating course content, test content, and instructional objective	8	17
5	What mechanisms do you employ to improve the quality and effectiveness of your assessment instruments?	By analyzing and interpreting feed-back information	12	27
		By taking suggestions and comments from students	15	33
		By conducting item analysis	5	11
		By making panel discussions with colleagues and staff members	13	29
6	Do you think your assessment methods are aligned with curricular contents and learning outcomes in the course?	A. Yes	18	40
		B. No	27	60
7	What is your major purpose for assessing student learning?	A. Grading	18	40
		B. Giving regular feedbacks	8	17
		C. Diagnosing learning errors	10	22
		D. Modifying instruction	9	21

The majority of the participants reported that they select their evaluation procedures based on their easiness for scoring and constructing. This means, the selection of assessment methods based on their appropriateness to the intended learning outcomes seems either secondary or completely neglected, which of course is contrary to what is anticipated. Furthermore, the data summarized in Table 2 above clearly depicted that, quite a large proportion of the participants said that they check the adequacy or content validity of their tests by only increasing the number of items in the test. This shows that the tendency to relating course content, test content, and specific instructional objectives as well as preparing test items based on a table of specification is found at its inception stage.

The majority of the participants reported having taken suggestions and comments from students as the main strategy to improve the quality and effectiveness of their assessment instruments. This means that the tendency to conduct **item analysis** to check the functional effectiveness of their measuring instruments is almost non-existence. When asked " **what should be done to improve the present system of assessment?'** the majority of the participants responded that teachers should be adequately trained in the concepts and procedures of modern assessment, the general principles of evaluation, the specific rules of test item construction, how and why to prepare a table of specification, how to conduct item-analysis, and the use to be made of evaluation

results.

Moreover, most of the participants replied that the notion of aligning curricular contents and learning outcomes with their assessment methods is not a common practice. Similarly, the majority of the participants replied that the purpose of their assessment mostly focuses on giving course grades. This means summative assessment is dominating. On the other hand, the practice of formative assessment that focuses on checking students' regular progress and teachers' day-to-day effectiveness is almost absent. This is again, contrary to what is anticipated in the new training and education policy of Ethiopia.

As Table 3 below reveals, the respondents ranked the conventional paper-and-pencil tests, performance tests, observational techniques, and self-report techniques from 1st to 4th, respectively. This means, in their assessment, still the paper-and-pencil tests and end-of-term examinations have been reported to dominate. These conventional paper-and-pencil tests are not adequate to measure learning outcomes in the affective and psychomotor domains. Behavioral changes in these categories demand alternative assessment, which requires the use of a variety of techniques for describing a complete picture of the pupil's achievement, which is already reported as used rarely in measuring the learners' progress.

Table 3: Rank ordering of the assessment methods used

Item	Choices	1st		2nd		3rd		4th	
		Fig	%	Fig	%	Fig	%	Fig	%
Rank order the following assessment techniques from the most frequently used to the least in your student assessment	Traditional paper-and-pencil tests	31	**69**	12	27	4	9	7	15
	Performance assessments	9	21	22	49	9	20	8	18
	Observational techniques	3	6	10	22	18	**40**	12	27
	Self-report	2	4	5	11	10	22	18	**40**

The majority of the respondents (Table 4) reported that large class size, lack of sufficient time to plan activities, and lack of adequate awareness on how to align assessment methods with learning targets are the major theoretical and practical challenges to effective student assessment in the Natural Science College.

Table 4: Challenges to Student Assessment

Item	Choice	No	%
What are the major challenges to effective assessment of student learning in your course?	Large class size	17	38
	Lack of adequate time to plan activities	15	33
	Lack of adequate resources	2	4
	Lack of adequate awareness on how to align assessment with learning targets	6	14
	Lack of adequate support and guidance from the department	2	4
	Lack of students' motivation and negative attitude towards alternative assessments	3	7

DISCUSSION

The findings of the present study revealed that the majority of the science instructors do not have a clear

conception of test blue print, the general principles of evaluation, and specific rules of test item construction. It seems likely that **common sense** and traditions govern their assessment of student learning. This of course is contrary to what is anticipated in the new training and education policy as well as the existing literature. The implication is that since awareness is the building block of the actual application, the present finding calls for urgent training to be provided to the teaching staff of the college. With regard to this issue, Gronlund (1981) strongly suggested that having an adequate conception about a table of specification and general principles of evaluation provide directions to the process and serve as criteria for appraising the effectiveness of specific procedures and practices.

Obviously, tests prepared without adequate planning can have technical defects and cannot bring accurate and complete information about the students' progress on which to base educational decisions. Good assessment always requires adequate and extensive planning so that the instructional objectives, teaching strategies, curriculum contents, textual materials, and evaluation procedures are all interrelated in some meaningful fashion (Gronlund & Linn, 1999). At the same time, lack of understanding of the importance of using multiple methods in the assessment of student learning as well as lack of congruence between the policy of student assessment in the university and the general training and education policy of the country, which are prevalent in this study, also affect the practice of assessment in higher learning institutions. This may be related to the fact that where the university policy relies too much on norm-referenced assessment, the training and education policy theoretically recommends the use of alternative assessments (such as continuous and performance assessment) since they are appropriate for measuring all the important behavioral outcomes not only in the cognitive domain, but also in the affective and psychomotor domains.

The findings of the present study also revealed that most of the instructors have reported to have not prepared their test items on the bases of a test blue print, the general principles of evaluation, and specific rules of test item construction, where, of course this lowers the reliability and validity of the test results. Similarly, it is found out that the practice of assessment in the College of Natural Science gives greater emphasis to the cognitive outcomes than to the affective and psychomotor outcomes. For example, the data shows that instructors frequently use the traditional paper-and-pencil tests as the major technique of assessment. Of course, there is a belief among educators that the conventional paper-and-pencil tests can appropriately measure quite a large number of simple learning outcomes in the cognitive domain. However, these traditional testing methods measure only limited outcomes of student learning and they have been of limited value for guiding student learning (Gage and Berliner, 1998). Critics argue that these methods are often inconsistent with the increasing emphasis being placed on the ability of students to think analytically, to understand and communicate at both detailed and "big picture" levels, and to acquire life-long skills that permit continuous adaptation to workplaces that are in constant flux (ICDR, 1999). In response to these criticisms, the use of alternative assessments or "direct measure of student performance through "**real life**" tasks" is growing in importance (Eggen and Kauchak, 2001). Thus, since many outcomes may be difficult to assess using only one measure, using multiple methods to assess student-learning outcomes seems to be of a paramount importance (Frye et al., 2006).

The result of the present study also indicate that instructors select their evaluation procedures based on their easiness for scoring and constructing, irrespective of their appropriateness to the intended learning targets to be measured. This finding is inconsistent with the existing literatures. For instance, according to Stiggins (2004), especially for higher education, the different assumptions about what ought to be measured that are embedded in every assessment instrument need to be clarified and carefully considered before specific tests are chosen to assess students' cumulative gains from college study. Generally, the heart of accuracy in successful classroom assessment revolves around matching different kinds of achievement targets to the appropriate assessment method (Dunn, 2002; Frye et al., 2006). This means, a key part of deciding on what assessment methods to use is knowing the intended learning targets (attitudes and perceptions, knowledge, skills) to be assessed (Stiggins, 2004). What this implies is that creating or selecting a test without having a test plan may result in mismatches between instruction and assessment.

Despite this, the present result also showed that the notion of aligning curricular contents and learning outcomes with their assessment methods is not a common practice among the instructors of the Natural Science College of Addis Ababa University. This finding is also inconsistent with the existing evidences. For instance, according to Brissenden (1996), curriculum, instruction, and assessment should be inextricably linked and bound together by the goals set for the course. Of course, some teachers may carry out unfocussed curriculum and assessment planning, and consequently view assessment as an activity tacked on the end of a unit for grading purposes. According to Webber (2009), when this is the case, the assessments do not provide valid inferences of student achievement or guidance for improved teaching and learning. Similarly, as revealed by the result of the present study, the tendency to conduct item analysis so as to check the quality and functional effectiveness of their measuring instruments is almost non-existence. With respect to this, teachers may use informal strategies, such as interpreting feedback information, in improving the quality and the effectiveness of their measuring

instrument due to lack of the skills and procedures of item analysis, lack of knowledge of statistical concepts, and/or the fear that it consumes much of their teaching time. There is also the tendency to check the adequacy or content validity of their tests by only increasing the number of items in the test. However, this seems to be supported by test blue-print, which helps instructors to relate course content with intended learning out comes and eventually specify the number of items required of each content and outcome areas. At the same time, the result of the present study showed that the major purpose for which most of the natural science college instructors conduct assessment primarily focuses on giving course grades, where assessment is believed to aim at evaluating the attainment of course goals, driving student learning or providing important feedback for both students and instructors (Brissenden, 1996; Frye et al., 2006). With respect to this, numerous literature shows that students learn more in classes where assessment is an integral part of instruction than in those where it is only meant for course grading and brief assessments that provide frequent feedback about learning progress are more effective than long, infrequent ones (Airasian, 1997; Stiggins, 2004).

The findings of the present study also revealed that large class size, lack of sufficient time to plan activities, and lack of adequate awareness on how to align assessment methods with learning targets are the major theoretical and practical challenges to effective classroom assessment. This finding is consistent with the existing body of theoretical knowledge. For instance, in the light of their finding, Oguniyi (1984) and ICDR (1994) strongly suggested that, more than other considerations, effective classroom assessment requests small class size, sufficient time for planning activities as well as adequate awareness and training on the procedures of assessment.

Conclusion

Based on the discussions of the findings made above, the researcher draws the following conclusions:

1. The findings of the present study revealed that the majority of the science instructors do not have clear conception of a test blue print, the general principles of evaluation, specific rules of test item construction, and item analysis procedures.
2. With respect to the actual practice of assessment, the present findings show that:
   - Most of the science instructors do not prepare their test items on the bases of a test blue print, the general principles of evaluation, and specific rules of test item construction.
   - Assessment in the College of Natural Science gives greater emphasis to the cognitive outcomes than to the affective and psychomotor outcomes.
   - Instructors frequently use the traditional paper-and-pencil tests as the major technique of assessment.
   - The instructors select their evaluation procedures based on their easiness for scoring and constructing, regardless of its appropriateness to the intended learning outcomes.
   - The notion of aligning curricular contents and learning outcomes with their assessment methods is not a common practice.
   - The tendency to conduct item analysis to check the quality and functional effectiveness of their measuring instruments is almost non-existence.
   - The major purpose of their assessment mostly focuses on giving course grades, instead of improving student learning.
3. Similarly, the findings of the present study also indicated that large class size, lack of sufficient time to plan activities, and lack of adequate awareness on how to align assessment methods with learning targets are the major theoretical and practical challenges to effective assessment

Based on the conclusions made above, the following suggestions are made:

1. The college instructors need to be reoriented with why and how to apply various alternative assessments, the general principles of evaluation, the specific rules of test item construction, how and why to prepare a table of specification, why and how to conduct item-analysis, and the use to be made of evaluation results.
2. The college instructors need also to be trained in why & how to select assessment methods, how to align the curricular contents and learning outcomes with the assessment methods, & the general purposes of assessment.
3. The college administration needs to coordinate resources and create conducive environment in which the instructors can apply effective classroom assessment of student learning.

Practice I shall take forward

This journal article provided me with the details of a test blue prints and its challenges that exist in Natural Science College. Therefore, it is mandatory to develop the practice of using table of specification in which learning objectives are aligned with the content to be tested as indicated in Table below (Table 5). The test blueprint lists the goals and objectives in the left-hand columns, and the outcome behaviors we are using across

the top row. In the example below, goal one and its two objectives represent "knowledge" behaviors or outcomes. The task, then, is to identify assessment items that help us measure those outcomes. I have selected supplied response, matching, and true/false questions. Each of these item types is useful for measuring lower-order student "knowledge." Since goal one seeks lower-order outcomes, I weight these questions lower than goals three through four which represent higher-order outcomes. Continuing with the example, goal four represents an "evaluation" behavior or outcome. I select the interpretive exercise as an appropriate assessment type to measure these higher-order student abilities.

Table 5: Table of Specifications

Goals	Objectives	Items Assessing Knowledge Objectives	Items Assessing Comprehension Objectives	Items Assessing Application Objectives	Items Assessing Analysis Objectives	Items Assessing Synthesis Objectives	Items Assessing Evaluation Objectives	Weighting
Goal 1: The students will know...	Objective 1-1: Name...	supplied response						1
	Objective 1-2: List...	matching, true/false						1
Goal 2: The students will use...	Objective 2-1: Translate...			supplied response				1
	Objective 2-2: Practice...			multiple choice				2
Goal 3: The students will create...	Objective 3-1: Produce...					performance assessment		3
Goal 4: The students will rate...	Objective 4-1: Assess...						interpretive exercise	3
	Objective 4-2: Choose...						interpretive exercise	2

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