

Benefits and challenges of Open Book Examination as Assessment Model for Engineering Courses.

Kantipudi MVV Prasad¹

¹Department of Electronics & Communications Engineering, SOE, RK University, Rajkot, Gujarat, India

mvvprasad.kantipudi@rku.ac.in.

RajaniKanth Aluvalu²

²Department of Computer Science & Engineering, Vardhaman College of Engineering, Hyderabad, Telangana, India

rajnikanth.aluvalu@vardhaman.org.

Abstract: Indian technical education system is producing a great number of engineering graduates for the entire world. The large numbers of Indian engineers are working globally in diverse fields of industry. Globalization led to high competition among business organizations. Business organizations are in need of engineering graduates with innovative thinking. To produce industry ready graduates' radical changes in terms of pedagogy and assessment is required in Indian education system. Higher education is supposed to equip students with intellectual abilities and skills. To meet the global challenges, RKU currently focusing on activity-based learning and quality assessment methods under the umbrella of Academic and Operational Audit Services and Assessment Advisory Council committees. This paper describes an Assessment Advisory Council committee approved assessment approach. Fruitful results achieved and challenges faced by faculty for student's internal assessment to avoid rote learning are discussed.

Keywords: Higher education, Educational equity, globalization, active learning.

1. Introduction:

Assessment is one of the important components in the education system to understand knowledge possessed by the student in a particular course [1]. Assessing the students learning has become the biggest challenge for universities. In Indian Higher education system, it is identified that there is a huge gap between learning objectives and assessment patterns [2]. In an educational community, diverse set of people will have different opinions on assessment component. Assessment procedures were differing from the educator to educator based on their adaptability & theory. But, based on the nature of the assessment in a course has a profound effect on the way that student learn. Hence a crucial aspect of a successful teaching and learning system is student assessment (e.g. Snyder 1970 and Becker 1968). Most of the universities initiated implementing outcome-based education, where assessing outcomes play a vital role.

1.1 Outcome-Based Education:

Traditional Assessment methods are able to test the students based on rote learning, which is not that much useful to measure the student learning based on the regular teaching hours. Traditional assessment methods help us in evaluating lower levels of Bloom's taxonomy and fail to assess students learning in higher Bloom's levels. OBE demands to assess course learning outcomes (CLO's). Traditional assessment models fail to evaluate the attainment of CLO's. Implementation of OBE in educational institutions is required to change their assessment models [1].

The majority of universities in India are following traditional assessment model. Most examinations are time constrained paper based closed book examinations. More than 90% of the questions begin with keywords like define, explain, list, describe, and differentiate. These keywords are used to assess lower levels of learning, memorized by students. Faculties are restricted to follow predefined question paper format and examination model to assess their course. Most faculties express their inability to assess the students on CLO's due to constrained pre-defined system. Faculties should be granted with freedom to design their own assessment model in synchronization with their CLO's to evaluate the student learning.

1.2 Assessment methods:

Traditional Assessment methods are able to test the students based on rote learning, which is not that much useful to measure the student learning based on the regular teaching hours. These methods are totally based on remembering kind of thing. So, these methods are not that much useful for the proper assessment of current generation students. Alternative assessment techniques (modern assessment strategies) are more suitable for the current generation students to check their skill set and continuous learning in regular teaching hours.

Formative Assessment: This is a regular assessment conducted at the end of session, chapter, unit to evaluate

learning periodically. This helps the instructor to understand the learning happened, and can take any corrective measures if required to improve the learning. The major purpose of this assessment is to identify the areas that need improvement. Formative assessment includes a short quiz, oral questioning, take home assessment etc. The assessment is based on session/unit objectives. Conducting formative assessments is a very good practice to prepare the students ready for summative assessments and ensure students achieve learning goals.

Summative Assessment: This assessment is conducted at the end of the course to validate the students learning on course goals and objectives. The result of these assessments is used to award course certificate or earn credits for getting program certificate. We cannot accommodate any corrective measures on students learning based on the feedback received from the assessment. However, we can incorporate changes in our instructional method for the next batch of students. After the summative assessment, no more formal learning takes place, other than incidental learning. Most universities and colleges award program degrees based on the result of summative assessments.

New age universities started accommodating fraction of marks/credits from formative assessments along with summative assessment to award program degrees.

Traditional examination patterns and questions asked are not helping us to evaluate the course learning outcomes. The fitness of question papers with respect to the course learning outcomes is very low.

It is found and analyzed that the students are clearing traditional examinations with good score in our course and are failing to clear competitive examinations conducted by recruiters. Surveys say that the questions raised in traditional examinations are not challenging and do not require the complete learning of course material to clear the examination. However, questions raised by recruiters are challenging. To overcome this it is decided to change the assessment pattern to challenge students learning.

Practicing OBE will help to improve learning and achieve course learning outcomes. Implementation of OBE will be complete only when we conduct OBE standard assessments. OBE demands to ask questions of higher blooms level to evaluate learning. Various Surveys are conducted and found various modern assessment techniques available to evaluate the learning of students. We have come across open book examination where students can bring in books or folders to the examination hall. This model will help to evaluate the application, analysis, and evaluation skills i.e. higher levels of Bloom's taxonomy, rather than a reproduction of memorizing answers [3].

This helps faculty to make the students ready to cope with situations having limited time to consult. The examination

also helps us to improve the students' ability to identify and bring with them the right kind of material.

1.3 AAC at RK University:

RK University (RKU) being new age private university has started refining teaching and learning, Assessment process to prepare globally competent students. RKU had established Assessment Advisory Council (AAC) to promote innovative assessment methods to fulfill desired learning outcomes of the course. As the learning needs and outcomes of each course vary, the pedagogy of teaching also varies. However, assessment methods have remained stringently same over time. We, at RKU, have recognized the need to shift the orientation of these assessment patterns to match the learning needs of the course. Valuing the important role of faculties in this process, RKU encourages & invite all faculties to design innovative assessment methods that would suit the pedagogy of teaching and learning needs of the students. The role of AAC is to guide all faculties to develop innovative assessment methods and approve them for actual practice [4].

2. Open Book Examination:

Taking advantage of AAC at RK University to improve learning and to challenge the students learning in the course Time constrained open book examination for continuous internal examination is designed and applied to AAC. The idea is to challenge the students learning and modify instructional methodology based on feedback received from the examination to improve their learning.

The proposed assessment model is time constrained open book examination, where students are allowed to carry textbooks, printed notes to the examination hall. This practice is common in foreign universities. It is mostly unheard of in Indian Education system [3]. When we speak about OBE, it looks Radical and puzzling to those who are used to conventional examinations, it is ideally suited to teaching programs that especially aim at developing the skills of critical and creative thinking.

The proposed model is applied to AAC for approval. Modifications are employed to the proposed model based on reviews received from the committee. Committee major concerns include the type of questions asked and student's readiness for appearing Open book examination, which is very new for them. Committee accepted the goals of conducting Open book examination and appreciated for coming up with modern assessment model.

In this paper, the implementation of "Open book examination"(OBE) is explored .The success of OBE depends on the student's ability to understand the question, identify inherent issues, application of various techniques, principles, etc. while answering questions with the help of supporting reference material carried by the student to the examination hall. OBE will be the solution for faculty

expecting higher-order thinking from students by inference from reference material [5].

Objectives of OBE:

- Application of knowledge.
- Evidence of trained mind.
- The Capacity of autonomous learning.
- Skills needed in employment and real life situations.

3. Implementation

Planned to conduct OBE assessment for Continuous internal evaluation-I(CIE-1). Duration of the examination is 1 hour 30 minutes and is conducted under the supervision of the instructor or an allocated supervisor. The students are restricted to carry only one textbook from the one prescribed in the curriculum and a scientific calculator. Conducting summative examinations with OBE will not help us. Because we do not have formal teaching after final examinations. After CIE examinations we have formal teaching hours, where we can clarify the concepts based on the feedback received from the examination.

Implementation of OBE is a masterpiece. Students were not aware of OBE examination earlier. When we have announced at the beginning of the semester about the plan of Conducting OBE in 2014-15, The first challenge we faced is students were found tensed and are in stress. To overcome with this we have shared few model question papers with them and also had conducted one mock OBE examination. Mock examination helped the students to understand the OBE examination model.

Oral feedback from students on Mock OBE examination has been taken. They said time management is key in OBE and students should be well versed with the material they carried to the examination hall. They mentioned that the material is helping them to read and analyze the literature and answer the questions. They mentioned instead of memorizing the answers, they should be familiar with the concepts.

Students are giving OBE examination from two academic years and they are familiar with the examination model. We personally believe that conducting OBE will not be the right choice for all subjects. OBE works fine for application oriented, research oriented and problems related subjects. OBE helps students improve their analytical skills.

4. Result analysis

CIE-1 examination is conducted as restricted Open book examination for the academic year 2014-15 and 2015-16. The feedback received from the examinations had proved improvement in student learning. Students enjoyed giving

Open book examination. Various parameters are considered for result analysis.

Below table-1 describes the Bloom's learning level of questions asked in OBE and CBE (Closed book examination). In CBE we have questions from the lower level of blooms taxonomy, whereas in OBE all the questions are from a higher level. From this, we can prove that OBE is more challenging when compared to CBE.

Table-1 Blooms Level Comparison.

Blooms Level Comparison (EC2016)		
Question Number	OBE	CBE
Q1	Application	Comprehension
Q2	Application	Knowledge
Q3	Analysis	Analysis
Q4	Application	Application
Q5	Analysis	Analysis
Q6	Application	Application

Below Table-2 and 3 shows a number of students attempted, average marks scored and highest marks scored with respective to each question in CBE and OBE examination. The results show that the average marks scored in OBE are less when compared to CBE. OBE examination has challenged students learning. Examination results helped us in modifying our instructional strategy and re-teach the required topics. This helped us in pushing the student learning to higher blooms level.

Table-2 Question wise Analysis CBE

CIE-I (Question wise Analysis) CBE(EC2015)			
	No of Students Attempted	Average Mark Scored for Question	Highest Marks Scored for Question
Q1	18	3.5	5
Q2	22	3.52	5
Q3	20	3.33	5
Q4	12	3.81	5
Q5	11	2.5	4
Q6	3	0	0

We have conducted CIE-2 in CBE. The below graphs represents a comparison of result analysis between OBE and CBE examination. The marks scored are more meaningful in OBE when compared to CBE. To have a better understanding of the benefits of OBE learning the performance of students in competitive examinations and

campus placements has to be analyzed. The pass percentage, average mark scored and standard deviation achieved indicates that the students are challenged. To have a better understanding of the benefits of OBE learning the performance of students in competitive examinations and campus placements has to be analyzed.

Table- 3 Question wise Analysis OBE

CIE-I (Question wise Analysis) OBE(EC2016)			
	No of Students Attempted	Average Mark Scored for Question	Highest Marks Scored for Question
Q1	54	2.53	5
Q2	23	2.86	5
Q3	38	3	4
Q4	31	2.67	4
Q5	7	2.85	4
Q6	14	3.42	5

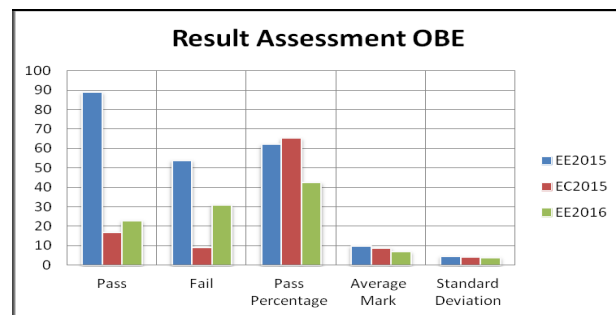


Figure-1 OBE Result Assessment

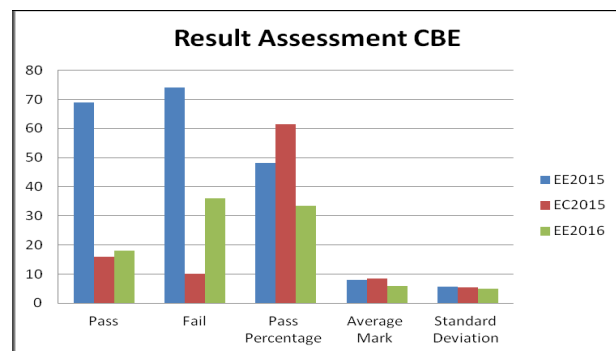


Figure-2 CBE Result Assessment

Conclusion

Assessments help to evaluate the learning happened in a course. Assessments should be planned to evaluate the course learning outcomes. It is highly difficult to evaluate learning in all the courses with the same traditional summative assessments. The education system should give freedom to the faculty to design his own formative and

summative assessments to evaluate the course learning. However, there should be a quality control mechanism to validate the assessment model planned. The assessment results should be compared with earlier results and if required new changes are required to be incorporated in the examination. Open Book examination will help the student in focusing on applying the available knowledge than memorizing the concepts to apply.

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