Leveraging The Assesment Methods For Outcome Based Education

Shreenivas B[1], Archana H R[2], C Gururaj[3], Ambika K[4]
[134]Dept. of Telecommunication Engineering, [2] Dept. of Electronics and Communication
BMS College of Engineering
Bangalore, India
[1]shreenivasb.tce@bmsce.ac.in, [2]archanahr.ece@bmsce.ac.in, [3]gururaj.tce@bmsce.ac.in, [4]ambikak.tce@bmsce.ac.in

***Abstract*—Migration of courses constituting higher engineering education into an OBE (Outcome Based Education) environment is a challenging activity with varied perspectives. Such migration involves graceful modulation to the curriculum, delivery mechanisms and the assessment criteria. These modulations are driven by modulated Course Outcomes which, invariably lands up asynchronously, with different motivations. A process frame work is believed to alleviate the difficulties in achieving successful migration and hence is formalized in this paper and presented. Here we attempt to leverage the use of technology in the conventional teaching system, which results in improved teaching-learning process. The focus on OBE is through the use of various assessment methods in a specific course.**

Keywords: Outcome based education; assesment methods; Graduate Attributes;Course Outcomes;Program Outcomes

I. INTRODUCTION

OBE system, aims at making the learning objectives clear to the student. It is assessed in the form of various skills which are acquired by the students at the end of every course. The National Board of Accreditation, (NBA), has provided guidelines through the Graduate Attributes (GAs), which are the abilities every engineering graduate needs to acquire during the learning process [4]. The usual assessment methods are: Internal assessments/Tests, quiz and semester end exams for individual courses.

Industry requirement changes with respect to individual domain which demands an equal level of improvement with higher abilities to be achieved by the students. The main aim of OBE is the reformation of curriculum, delivery methods, assessment and reporting practices in the field of education such that it reflects the achievement in higher levels of learning over the subject [5]. Assessment and evaluation form an integral part of the educational process. It is essential that, during and at the end of a course of study, both the course instructor and the students should evaluate the success in the attainment of the objectives of teaching and learning. Assessment and evaluation should be a continuous activity which should be designed simultaneously with curriculum development. To give the justification we have included the course end survey given by the students

In this paper we present some possible assessment methods that can contribute to improved learning abilities of the student and hence lead to an effective implementation of OBE system. We discuss some assessment methods, and utilization of technology for each assessment

II. COMPARISON OF ASSESSMENT METHODS

The traditional methods of assessment are given in Fig.1. Here we brief out each of these assessment methods which can further be enhanced in order to achieve a better OBE. The methods suggested are general and can be incorporated in any course.

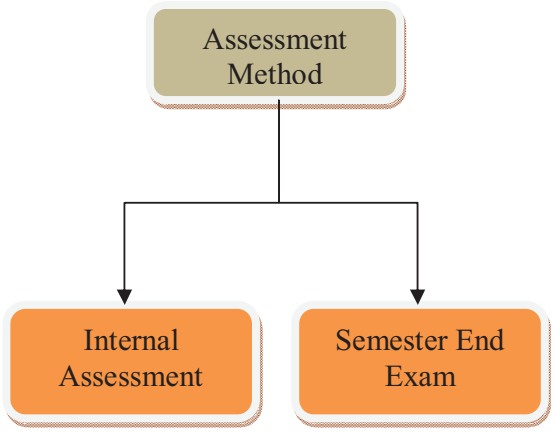

Fig.1. Different assessment methods for traditional technique

A. Internal Assesment And Semester End Exam

Internal assessment such as tests and quizzes are used for assessing the progress of the students. The course instructor incorporates the portions which are covered in order to prepare a question paper. The student would be then asked to reproduce or answer the questions based on the aquired knowledge during the teaching learning processMaintaining the Integrity of the Specifications

B. *Drawbacks of Traditional Assessment methods*

Evaluation of students on the basis of semester end examination is in practice in most of the courses. In this system the subject is taught by one person, the question paper maybe prepared by another and the student's answer scripts maybe evaluated by a third person. The course instructor who has taught the students may not have a direct role in evaluating the performance of the students. The practice of setting question papers and valuation of answer scripts creates very little interest and enthusiasm to improve the methods of teaching.

The traditional system of written examination urge the student to prepare for the examinations by memorizing the lecture notes and reproduce the same in examination and thus place a premium on notes learning.

Since the goal of the students is to clear the final examination, the teacher aims to prepare the student for it. In traditional methods the faculty is restricted to teach the prescribed syllabus and the student is subjected to unnecessary stress and fear on the eve of the examinations. The percentage of failure in the system is very high since the students are prone to memorize and reproduce the concepts rather than understanding it. With an intension to secure a pass the student is- likely to indulge in malpractice.

III. OUTCOME BASED EDUCATION

Outcome based education (OBE) is a process of restructuring the existing curriculum. OBE aims at facilitating the desired changes among the learners, by increasing knowledge, developing skills and/or positively influencing attitudes, values and judgment. OBE incorporates the concept which suits the best to determine what needs to be achieved [2].

OBE focuses on measuring the student performance, which are called outcomes. In contrast with traditional education, which mainly aims on the resources that are available to the student, OBE implementations often incorporate a host of many progressive pedagogical models and ideas. With OBE the students are required to demonstrate the skills and content they have acquired. In practice, OBE promotes curricula and assessment based methods on constructive education approaches.

A. *OBE* Assessment Techniques

Some of the OBE assessment techniques which were experimented for a curriculum course have been discussed. Few of the strategies which were followed in order to assess the ability of the learners are as shown in Fig 2.

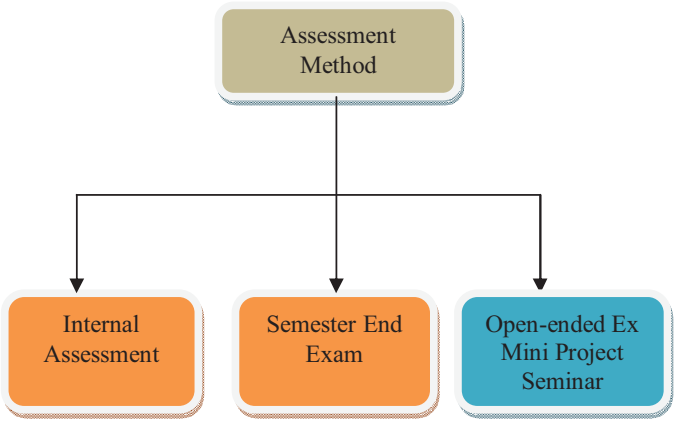

Fig.2. Different assessment methods for OBE technique

1) *Mini Projects*

Learners have unrealistic expectations of what can be achieved. In order to prepare them for their course, it is reliable to incorporate some mini-projects. We can determine a number of factors which might improve the effectiveness of the learners and hence reduce the phobia among the students and facilitate them to achieve the objectives of the course; the role of a course instructor takes a prominent position in recognizing the nature and difficulty of the students; and providing them sufficient time , support and guidance in the form of supporting documents.

The students must think about the project thoroughly before they start and develop a strategy for achieving the objective. The planning has to be based on a sound understanding of the course concepts. If their objectives are executed successfully they must interpret their results and inform the same to the course in charge. To implement the plan, they need to distribute the work load effectively amongst the group members. In order to ensure that each member is actively participating with the group member's regular assessments including presentation and questionnaires have to be carried on by the course instructor.

2) *Open-ended Experiments*

An open-ended experiment is a platform where the students are given the liberty to come up with their own experiments related to course they have studied, along with the prescribed laboratory experiments

Open ended experiment motivates the students to think out of the box and come up with their own design and back them with explanations, both theoretically and logically.

In this method course instructor may facilitate the students regarding the ideas in which students can come up with their own design. The students would then have to come up with their own strategies to back the theory and logical explanation. This will provide an opportunity to the students to explore the knowledge within them.

3) Seminar

The students may be given technical papers/journals in the respective course domain and may be asked to give a seminar on the topic. This helps the students in upgrading their knowledge and they get to know the recent trends in that particular domain. Also the communication and presentation skills of the students are improved due to this exercise. The students may also be asked to give a brief report about their presentation which covers the written communication skill domain.

IV. COMPARATIVE ANALYSIS OF TRADITIONAL TECHNIQUE AND OBE TECHNIQUE

This section presents a comparative analysis of traditional technique and OBE technique. The course selected is titled "Fundamental of Image Processing" which is a course under a 4-year, 200 credits Undergraduate programme titled Bachelor of Engineering in Telecommunication Engineering. . The Course Outcomes (CO) are listed in TABLE I. The TABLE II depicts the Program Outcome (PO) attainment through the course outcome when a traditional teaching environment is employed. It may be noticed from TABLE II and Fig. 3. That the number of program outcomes attained are minimal in nature. It also provided less opportunity for the students to implement their innovative ideas. TABLE III indicates the program outcome attainment through OBE technique. The significant parameters that can be observed are the higher number of program outcome attainment. Fig. 4 indicates the graphical analysis for the program outcome attainment through the course outcome. The additional course outcome 7 dealt with implementation with open-ended experiments for every individual student which enhanced their creative thinking capabilities.

TABLE I: Course Outcomes for Fundamental of Image Processing Course

CO1: Ability to apply the knowledge of signal processing to understand image processing procedures and thereby obtain the shortest distance between given pixels of an image
CO2: Ability to apply arithmetic knowledge of mathematics to analyze various image enhancement techniques
CO3: Ability to apply arithmetic knowledge of mathematics design and illustrate the Histogram processing technique applied on an image
CO4: Ability to apply Fourier knowledge of mathematics to analyze and design filters for image transformation and image restoration
CO5: Ability to analyze properties of Unitary transforms and KL–transforms
CO6: Ability to work as an individual to conduct experiments using Matlab engineering tool to perform image processing
CO7: Ability to work as an individual and as a team-member to design, formulate and implement experiments on image processing through conduction of an Open-Ended experiment using MATLAB software

TABLE II. Computation of CO PO attainment using traditional method

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	45	91										
CO2		82										
CO3		91										
CO4	49	63	87									
CO5	32											
CO6					60				99			

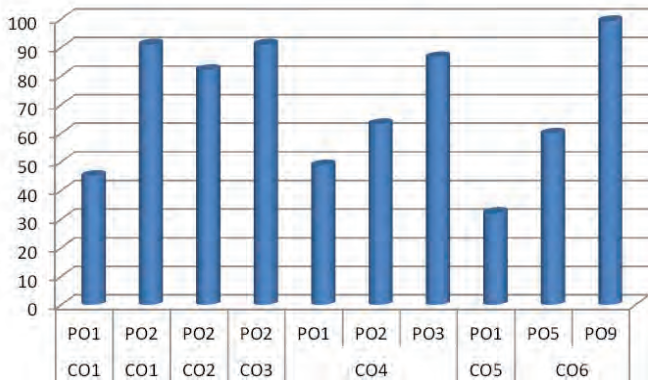

Fig. 3. Graphical analysis of CO PO attainment using traditional method

TABLE III. Computation of CO PO attainment using OBE techniques

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	85	80	80									
CO2	39	82	80									
CO3		82	80									
CO4		57	39		54							
CO5	39	0										
CO6		71	71		80			90	80	71		
CO7		85	85	85	85			51	85	68	85	

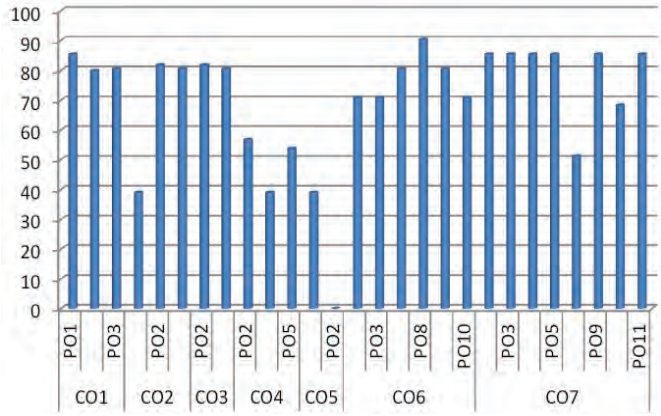

Fig. 4. Graphical analysis of CO PO attainment using OBE techniques

V. CONCLUSION

The traditional technique was tried for few years and was replaced by OBE technique for the past three years. The notable achievement in the OBE is the effective Teaching Learning Process. It can also be noticed that the students achieved more program outcomes through the OBE technique when compared to the traditional technique. Specifically Program Outcomes 4, 8, 10 and 11 were additionally accomplished due to implementation of the OBE technique. The Program Outcome 4 dealt with data synthesis and interpretation, which is the highest program outcome that can be achieved through theoretical assessment. The program Outcome 8 dealt with the professional ethics to be followed in engineering practice and this was one more program outcome that was additionally introduced. Program Outcomes 10 and 11 are related to the effective communication skills and project and finance management respectively. These POs help in better skill development of the students. Also the students developed innovative ideas which were implemented through open-ended experiments. These additional program outcomes assessed the students in achieving better employability parameter.

ACKNOWLEDGMENT

The authors acknowledge the support and encouragement of the management of BMS College Engineering, Bengaluru. The authors also acknowledge IUCEE, for the series of webinars conducted on Outcome Based Education and TEQIP-II for the support extended in pursuing research.

REFERENCES

[1] Jenny Lewis, 'The use of mini-projects in preparing students for independent open-ended investigative labwork',Biochemical Education Elsevier 27 (1999) 137-144

[2] Virtual Academy: The Course Outcomes (COs) in Outcome Based Education (OBE); B.Kanmani; BMSCE, http://iucee.com/virtual-academy/2014-webinars/

[3] http://www.nbaind.org/Files/General%20Manual%20of%20Accreditation.pdf

[4] Outcome Based Education Available at: www.jfn.ac.lk/OBESCL/MOHE/OBE-Articles/.../3.OBE-EAC.pdf

[5] Tomás de J. Mateo Sanguino, César Serrano López, and Francisco A. Márquez Hernández, "WiFiSiM: An Educational Tool for the Study and Design of Wireless Networks", IEEE Transactions on Education,Vol. 56, No. 2, pp 149-155, 2013

[6] B Kanmani and Mallikharjuna Babu, 'Leveraging Technology in Outcome Based Education', International Conference on Transformations in Engineering Education, ICTIEE-2014, Hubli, January 16-18, 2014

[7] http://www.abet.org/changed-definitions-for-program-educational-objectives/

[8] http://www.washingtonaccord.org/APEC/Documents/Singapore_A3.pdf

[9] https://www.ieee.org/education_careers/ education/ accreditation/ ctaa/ ieee_role.html

[10] http://www.abet.org/changed-definitions-for-program-educational-objectives/

[11] http://www.bmsce.in/sites/default/files/SCHEME%20AND%20SYLLABUS%20FOR%202012%20BATCH%20ONWARDS_0.pdf