

OBE Module for Placement of Undergraduate Program Students

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Abstract: The scenario of engineering education in India is changing through the National Board of Accreditation (NBA) process which has shifted its focus from output based education to Outcome Based Education (OBE). Purpose of monitoring the OBE is to manage the attainment of graduate attributes as required by many quality assurance guidelines. Maintaining right quality in education is essential for the overall growth of human race to sustain. Hence it can be said that, quality is not a choice but it should be mandatory. The purpose of this paper is to develop and test a model for understanding application of levels of Bloom's taxonomy and hence to determine its impact on student's learning process. This paper discusses on the impact analysis of OBE module designed and implemented for improving the employability of the undergraduate students. Choice of test modules for OBE module was done as per the common placement criteria of companies by conducting the sessions such as technical test, aptitude test, and the personal interviews. The pre-test in all three categories helped us to analyze the grey areas of students and design training accordingly.

The post test portrayed that, training based on results of pre-test could improve the performance of the students at apply and analysis level. Thus OBE based placement module has justified its importance in enhancing the ability level of students for quality placement.

Keywords: quality, outcome based education (OBE), National Board of Accreditation (NBA), blooms taxonomy, critical thinking.

1. Introduction

With the evolution of science, technology and engineering, issue on quality of education often arises. Qualitative analysis of education has become a critical issue in the 21st century. Scientists, technologists and engineers of all ages, students as well as senior professionals, encounter professional challenges in their professional and personal lives. Often, an answer to such challenges arises from brainstorming sessions and intense discussions[1]. What is the status of quality of engineering education on an average is a question? How quality can be improved consistently? Could quality in engineering education be sacrificed for global "competitiveness"? Here it can be said that, quality is not a choice but it should be mandatory. There are a variety of learning-teaching methods that can help to achieve the course outcomes according to Bloom's Taxonomy domains to ensure that students take responsibility for their own learning[2]. The measures of the student quality are based on levels mentioned in Bloom's taxonomy. Learning is an

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active process in which students construct new ideas or concepts based on their current knowledge. The ignited students can have creative thinking. Higher-order thinking by students involves the transformation of information and ideas which occurs when students combine facts and ideas and synthesize, generalize, explain, hypothesize or arrive at some conclusion or interpretation. Manipulating information and ideas through these processes allows students to solve problems, gain understanding and discover new meaning. When students engage in the construction of knowledge, an element of uncertainty is introduced into the instructional process and the outcomes are not always predictable; in other words, the teacher is not certain what the students will produce[3,4]. The teacher's main instructional task is to create activities or environments that allow them opportunities to engage in higher-order thinking. The Self-Appraisal Report (SAR) of June 2015 displayed by National Board of Accreditation (NBA) emphasizes on enhancing the skills of student through various teaching learning processes for Outcome Based Education (OBE)[5].

Keeping in view the OBE needs, this paper is aimed to design, build and test a OBE module for one of the important activity for engineering students i.e. placement activity taking the reference of Blooms taxonomy. Section 2 of the paper discusses on theoretical background, Section 3 on module development and structure, Section 4 explains on the implementation of the module whereas Section 5 highlights on experimental results and observation which is followed by conclusion in Section 6.

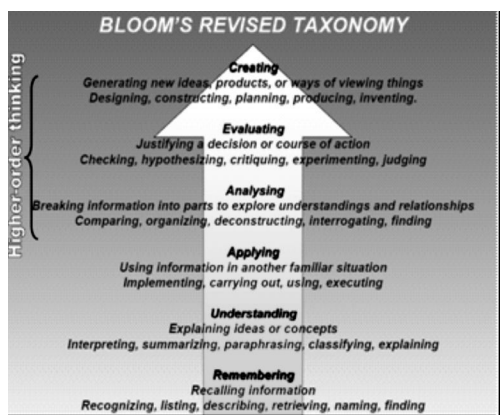


Fig.1 Blooms Taxonomy Levels

2. Theoretical Background on Bloom's Taxonomy

Bloom's Taxonomy supports Outcome Based Education and is a classification of thinking organized by level of complexity. It gives teachers and students

an opportunity to learn and practice a range of thinking and provides a simple structure for many different kinds of questions and thinking. We are all aware that, Bloom's taxonomy provides a way to organize thinking skills into six levels as shown in Fig. 1. These skills are from the most basic level to the higher order levels of thinking.

As per this, lower level questions are those at the remembering, understanding and lower level application levels of the taxonomy. Usually questions at the lower levels are appropriate for the following.

- Evaluating students' preparation and comprehension.
- Diagnosing students' strengths and weaknesses.
- Reviewing and/or summarizing content.

Higher level questions are those requiring complex application, analysis, evaluation or creation skills. Questions at higher levels of the taxonomy are usually most appropriate for the following [3]:

- Encouraging students to think more deeply and critically.
- Improving Problem solving ability.
- Encouraging discussions.
- Stimulating students to seek information on their own.

3. Steps in Module Development

The OBE module was developed keeping in view the placement activity for Final year students. In the first step, the students were filtered based on university results to suit to the cut off of a particular company's requirement. It was focused to carry out the impact analysis of students for every sub module activity carried out. As shown in Fig. 2 on structure of OBE module, top level planning emphasized on overall development of the student, taking the level of ability of student as an input to the module. Choice of tests was done based on company requirement. Overall Plan consisted of two main tests viz., pre-test and post training test. Assessment method adopted was direct and indirect assessment methods.

A. Pre-test

It was divided into three categories of tests viz., a) Technical test b) Aptitude test c) Mock Interview. Technical test: It was assessed based on multiple choice quantitative test in Core subjects like communication, signal processing, electronics and

power electronic devices and test on knowledge of project to be carried out in the final year. The Aptitude test incorporated logical reasoning, time, power, rate calculation, statistical probability and percentage calculations. Mock Interview focused on communication, body language, leadership, Resume writing. Test questions were designed such as to answer following essential questions.

- What is important to our students with respect to company's requirement.
- What is the deep learning, and understanding.
- The necessary skills.
- Prerequisite knowledge (prior knowledge).
- Prerequisite skills.
- Skills and knowledge to be embedded into the project.

B. Post Test

After finding the grey areas of students through pre-test, training was given in the relevant fields needed for improvement. The structure and pattern of post-test was kept similar to pre-test and impact was analysed. The impact analysis was conveyed to the higher authorities for further action.

C. Structure of OBE Module

Module structure was built to identify grey areas of students and to support it with the necessary actions to achieve improvement. Technical Questions were set referring to levels of Blooms Taxonomy such as remembering, knowledge and apply to evaluate and identify the preparation of students and also to find strengths and weaknesses. Higher level question answering relating to analysis, evaluating and creating were set to test the deep and critical thinking, problem solving capabilities of students through project knowledge.

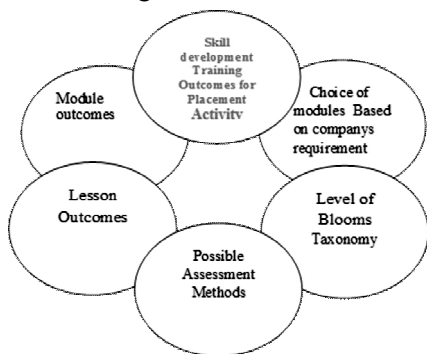


Fig.2 Structure of OBE Module for Placement

To analyse the learning levels of students, the assessment tools for evaluation was carried out by introducing Bloom's Taxonomy. The test questions were set to cover various learning levels of Bloom's Taxonomy. The mapping of the test questions helped to maintain the quality of questions since it puts a constraint on the teacher to set questions that covers all learning levels and indirectly assess students for these learning levels. The technical questions were set mapping to different levels by keeping in view the knowledge and skills required for employability.

4. Implementation of OBE Module

The OBE module was designed mainly keeping in mind the placement activity of students. As shown in Fig.3 this process consisted of filtering the students based on cut off criteria i.e.60%. For understanding the impact analysis, two tests were organized viz., pre-test and post-test. Pre-test process incorporated technical, mock interview and aptitude test. The assessment helps to know the students ability which was judged in these specific areas. Then the training module was designed in all the required areas based on the pre-test assessment. This was followed by induction training for a period of three months. Then again the post test in the necessary fields similar to pre-test was conducted. Bloom's taxonomy was used in setting and assessment of the students for finding the suitability of students for placement activity.

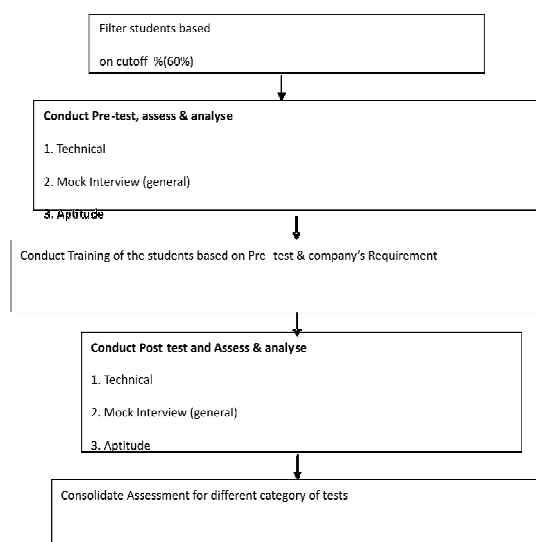


Fig.3 Flow Chart for Process of OBE Module

Level Question No.Total no. of questions with level Score for correct Attempt

Table 1 Technical Test Question Paper Analysis

Level	Question No.	Total no. of questions with level	Score for correct Attempt
Knowledge	1,11,13,15,16,18,20,21,4,14,36,40,42,43,44,45,46,47,48,50	20	386
Understanding	3,6,7,19,26,27,29,30,32,34,35,37,38,49	14	282
Analysis	2,8,9	3	266
Apply	5,10,12,17,22,23,24,25,28,31,33,39,41,53,54,58,59,60	18	32
Apply/Analysis	51,52,55,56,57	05	05

For evaluating aptitude level of students, pre and post aptitude tests were conducted. Each test consisted of 30 questions and each question carrying 1 mark and time duration allotted was 30 minutes. The factors which were to be interpreted on the basis of test results were speed of solving, accuracy, analytical discrimination. Here the evaluation was based on quantitative test i.e., direct assessment method.

Mock Test was conducted to evaluate five factors of every student in aspects such as communication skills, body language, resume writing, leadership and project knowledge. The evaluation was carried out using a subjective observation i.e. based on indirect assessment method. Five grading levels viz., Good (A), Average (B), Needs Improvement(C), Poor (D) and Worse (E) were adopted for indirect method of assessment.

5. Results and Discussion

A. Technical Test

It consisted of pre and post technical tests.

1) Pre Technical Test: Technical test question paper consisted of 60 questions. Table 1 shows the question number, their corresponding Bloom's levels and total number of questions at each level.

Table 2. Level wise Technical Question Attempt by Students

Blooms Level	No. of questions	Maximum Score for attempts	Score for correct Attempt	% of attempts
Knowledge (remembering)	20	720	386	53.6
Understanding	14	504	282	55.95
Apply	18	648	266	38
Analysis	3	108	32	29.6
Apply analysis	5	180	32	17.7

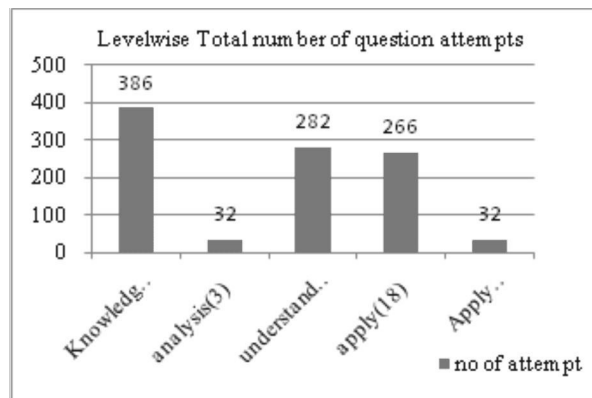


Fig.4 Overall Analysis Chart for 36 students

Technical Test Results are as shown in Table 2. The % of attempts by various students' shows that, ability of majority of students at apply and analysis level is poor and thus it indicated the need for more attention in training for the same.

The overall result of the technical test based on levels of Bloom's Taxonomy conducted for 36 students is shown in Fig.4. It is observed from this that, the knowledge level of these students is high whereas understand and apply level is medium. The apply level followed by analysis level is low.

Figure 5 shows the ability of individual student at different Bloom's level which was found to be similar to the overall analysis graph shown in Fig. 4.

2) Post Technical Test: Post-test on technical was conducted during post mock test. It revealed that students have shown the improvement in the deep and thorough knowledge related to basics of technical subjects and their application fields as shown in the bar chart of Fig. 7

B. Mock Interview Test Results

Results of pre and post mock tests are as tabulated in Table 3 and Table 4 respectively. Analysis of pre-test

on Mock interview clearly indicated that, only few students were meeting the set criterion by scoring the grade 'A'. It is also indicated that, majority of the students needed to be nurtured to raise them to level 'A'. Figure 6 shows the overall pre test analysis of thirty-six students based on every trait of soft skills with the allotted grades obtained using the subjective observation.

Table 3. Mock Interview Pre-test

Observed parameter	A	B	C
Communication	4	10	17
Body Language	4	13	14
Resume	4	8	18
Leadership	4	8	17
Project	3	15	12

Table 4. Mock Interview Post Test

Observed parameter	A	B	C
Communication	3	15	12
Body Language	8	11	12
Resume	4	15	17
Leadership	4	13	15
Project	1	13	18

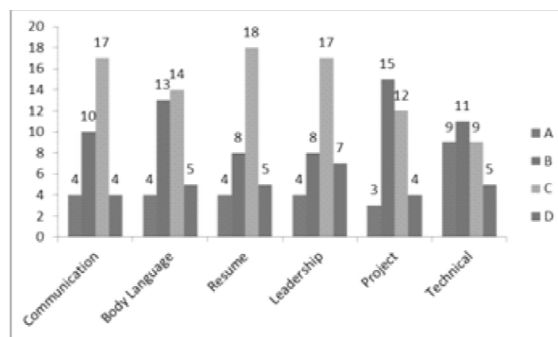


Fig 6 Mock Interview Pre test Analysis

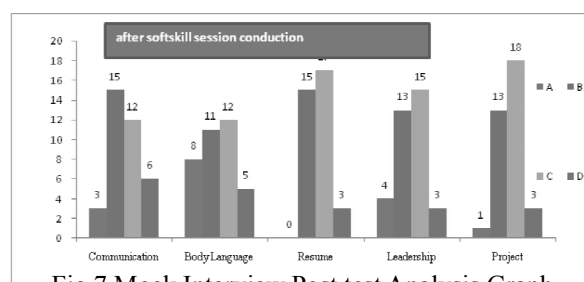


Fig.7 Mock Interview Post test Analysis Graph

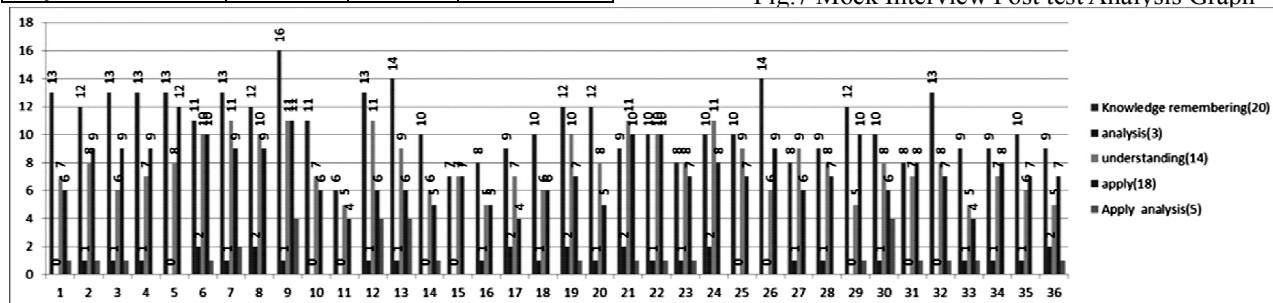


Fig.8 Aptitude pre and Post Test Analysis Graph

Table 5 Results of Pre & Post Aptitude Test

Student Seat Number	Aptitude test no.1(Pre-Test) (out of 30)	Aptitude test no. 2 (Post-Test) (out of 30)	Student Seat Number	Aptitude test no.1(Pre-Test) (out of 30)	Aptitude test no. 2 (Post-Test) (out of 30)
1.	12	12	19	12	16
2	8	8	20	16	16
3	16	16	21	7	9
4	18	18	22	15	11
5	12	10	23	12	9
6	16	16	24	9	9
7	15	18	25	11	9
8	14	18	26	11	16
9	19	17	27	11	18
10	7	7	28	10	17
11	8	6	29	10	15
12	18	18	30	9	10
13	17	17	31	7	12
14	12	8	32	17	17
15	10	13	33	8	10
16	9	12	34	12	14
17	9	10	35	13	14
18	11	15	36	8	10

From the post test analysis on mock interview shown in Fig. 7, it can be clearly seen that, the students have been benefited by conduction of soft skill trainings. Many students showed improvement from, grade C(needs improvement) to B grade(average). More importantly satisfactory improvement has been noticed in the project aspect. Also it is noticed that, there was drastic improvement in resume writing.

C. Aptitude Test

Table 5 shows the quantitative results of pre and post aptitude tests corresponding to before and after training effects. Out of thirty six students, nineteen students shown improvements in their aptitude marks, eight students retained their earlier marks and nine students were found to score less than earlier. This may be attributed to the difficult level of questions set for the post test. Figure 8 shows the graph of aptitude test before and after training sessions.

6. Conclusions

Placement and employability of the students are crucial issues. This paper has helped us to understand application of OBE module for placement of UG students. This paper has focused on the impact analysis technique for checking the employability of the final year students. In this activity, we firstly tested the ability of students by setting different test modules in line with company's requirement subsequently conducting and assessing the module outcomes based on Blooms' taxonomy. Direct and indirect assessment indicated that, prior to training students are fair at knowledge and understanding level but somewhat poor at apply and analysis level. Accordingly training was conducted for enhancing the weak areas observed during pre-test analysis. Post-test carried out after training helped us to check the amount of level induction. Post test portrayed that, training could improve the performance of the students at apply and analysis level. Thus OBE based placement module has justified its importance in enhancing the ability level of students for quality placement. The future of this OBE module would be to explore design and test such similar modules various on engineering subjects.

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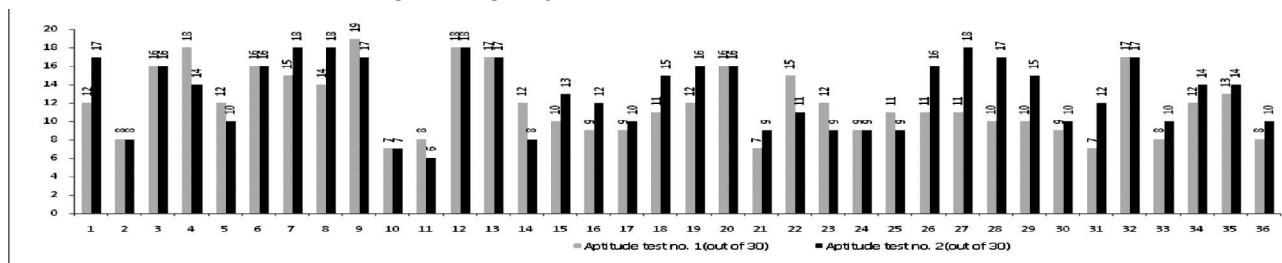


Fig.8 Aptitude pre and Post Test Analysis Graph