Significant Role Of Outcome Based Education And Its Assessment In Enhancing The Teaching Learning Process In Engineering Education

K.Vidhya, A.Brunda

Abstract: The eventual endeavor of the teaching learning course of action is to make the learners outshine in the knowledge being transferred during the course, called as the outcome of the process. Any teaching learning session should have comprehensively well defined outcome that the learners should accomplish at the end of the session. Clearly focused outcome and effectively well-organized evaluation methods prepared with at most care by the instructor help him/her to check learner’s level of attainment in outcome precisely. Assessing (Formative and Summative) the level of attainment among learners helps the instructor to analyze the knowledge of each student in the particular subject matter conveyed. Outcome assessment also aids the instructor to self evaluate the effectiveness of the teaching sessions conducted. Formative assessment is highly imperative because based on which the instructor can know, is he/she progressing towards the goal. It also plays a key role in designing the fore coming teaching sessions and to enhance the content delivery mechanisms. Outcome assessment and the significance of outcome based education is discussed here.


1. INTRODUCTION
Outcome literally means the end product or result of any course of action. In this situation, it is what a learner should know or should be able to exhibit at the end of the session, course or program. Any session, course or program should have well structured and defined outcome before it does start. Outcome Based Education (OBE) is very similar to setting an aspiration and working towards it. Since an instructor sets clear goals before he/she starts teaching, it is easy to plan and design the sessions for effective content delivery. The Outcome Based Education means clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences (14). The most crucial mission here is educating the student about OBE and its significance in teaching learning process. It is the job of the instructor to make clear this strategy to the class room which has diversified students. The student should have the complete knowledge and importance of OBE without which it is exceptionally tough for any instructor to accomplish the task. Students awareness about OBE is the base above which they should be clear on the outcome to be achieved for that particular session or course. It focuses on student centric learning where the learning path is given in the hands of the students. Continuous learning is emphasized by developing skill and practices that enable lifelong learning and independent problem solving. A committee may be formed in the institution to make it uniform across different programs and to conduct induction program to both the faculty members and students. When expectations are transparent and visible to students, excellence becomes attainable by all Students.

Any undergraduate or postgraduate degree will have the following outcomes
Program Outcome (PO): Defines what a learner should know or should be able to demonstrate at the end of the program (Under Graduate or Post Graduate). PO assessment done only at the end of the degree. A program can have 1 to n number of outcomes. This can be measured through direct and indirect assessment. Direct assessment depends on the percentage of marks he obtained in the theory and laboratory courses and the quality of the project or thesis work he does by applying what he learnt so far throughout the course. The indirect assessment is done through the survey forms where the students analyze themselves and fill in the form. The challenge here is designing the survey form, it should be designed effectively such it should be able to interpret the level of outcome attainment by each student. The survey form should also collect the best practices followed by the department or the college so that it can be highly encouraged to follow in the future also. It should also have the fields like scope for improvement that is it should let the student to record what difficulty he faced in the teaching learning process and how it could be improved, so that the fore coming students may be benefited. The ultimate purpose of PO assessment is to check, have the students learnt completely what they are intended? Otherwise to what extent? Course Outcome (CO): Indicates what a learner should demonstrate at the end of the course. The program may have semester wise courses. Each course may have multiple outcomes. Course and course outcome should be designed and developed in accordance with PO, that is by attaining the outcomes of all the courses, a student should be able to attain the PO.CO can also be assessed through direct and indirect methods. The marks obtained by the student in the board exams and his performance in the practical sessions (is he able to complete the given project with the knowledge what he has gained through the course) are considered for direct assessment. Indirect assessment is done through survey forms. Survey forms plays a vital role and acts as feedback for the instructor and course designer to get the students perspective, continue the best practices followed and to

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design the fore coming Teaching learning sessions effectively. Unit Outcome (UO): Specifies the outcome to be attained by the learners at the end of each unit or module. This is performed to make sure that the students are progressing towards the course outcome. This can be done through question and answering session, Conducting quizzes tutorials etc. The above said methods may be followed to know the level of attainment for a group. This may help to plan the future sessions. But if instructor does want to make sure that all the students attained the UO, then he has to assess each student by giving individual assignment (to avoid plagiarism). Based on the quality of the assignment submitted the instructor can evaluate his attainment level towards UO. Those who lack can be taken care by giving additional inputs and special classes. The UO is very essential because without which the CO will not be met. Session Outcome (SO): Each Session should have a well defined outcomes, which should be communicated to the students. At the end of each session the instructor may have question and answering part (preferably objective questions), which may be conducted through gadgets like tablet or smart phone. It helps the student for self evaluation and the faculty as well in knowing the status of each student.

Once these PO and CO have been set, then the instructor could set the unit and session outcome in accordance with the CO. All the above discussed outcomes should be intimated to the students well in advance before the start of each. All the session outcomes should contribute to Unit and all units to Course and all courses to program. The fig.2 depicts the above said outcome hierarchy

**Fig 2. Hierarchy of outcome**

Setting the outcome and working towards it has many more advantages in both faculty and students perspective [10].

- **Clarity:** The focus on outcomes creates a clear expectation of what needs to be accomplished by the end. The classes and test plans may be towards the outcome.
- **Flexibility:** With a clear sense of what needs to be accomplished, instructors will be able to structure their lessons around the student's needs.
- **Commitment:** Since what finally to be achieved is clearly specified, students will be dedicated to the learning process. Many times in traditional method students do not know what to be done that's the reason they show lack of interest in learning. Since learning path is given to the students, it makes the learning interesting.

### 2. ASSESSMENT

Assessment is the systematic basis for making inferences about the learning and development of students. It is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase students' learning and development. It is also the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know. The Assessment may be

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**Framing the Outcomes**

Setting the outcomes is the significant job here. Lots of brainstorming sessions should have conducted among the subject matter experts and institution head especially in setting the PO and CO. Under graduate and Post graduate will have different goals to be achieved. Similarly each program in the institution will have its own outcomes. Importantly each outcome should be measurable. Key hint is, it should start with an action verb. The institution heads may follow the given steps in setting the program and course outcomes:

- Conduct brainstorming session with subject matter experts, stakeholders (Students, Parents, Employers)
- Frame the Program Outcomes
- Once the POs are framed, then it should be submitted to the approval committee which may be comprised of academicians and industry experts with enriched knowledge and experience

<table>
<thead>
<tr>
<th>Outcomes to be Framed</th>
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<tbody>
<tr>
<td>Program Outcome 1 to N</td>
</tr>
<tr>
<td>Course Outcome 1 to N</td>
</tr>
<tr>
<td>Unit Outcome 1 to N</td>
</tr>
<tr>
<td>Unit Outcome 1 to N</td>
</tr>
</tbody>
</table>

**Fig 1. Framing PO and CO**
3. ROLE OF ASSESSMENT IN OBE
In Outcome Based Education (OBE) assessment is noteworthy, without which the OBE cannot lead towards success. At most care should be taken in designing the assessment. Assessment methods should be suited to the all background of students and based on prior experiences in the assessment method. More than one assessment method should be used to ensure comprehensive and consistent indications of student performance. While setting the assessment method the instructor should have some points in mind like, Students are from different Background and Knowledge levels, So Single assessment method will not be suitable for all the students. Assessment should be planned accordingly and it is a key challenge for any instructor. The instructor should also make clear the students how their responses or the information they provide will be judged or scored. Comments and constructive feedback should be a part of assessment so that the students can understand and use them for improvement. Test results are useful tools for measuring the effectiveness of instruction and learning. The assessment may also be categorized as Formative Assessment (FA): is diagnostic assessment, where students are continuously monitored and given feedback. It identifies the areas to be strengthened. It shows the pathway towards the growth. Formative assessment is done constantly. The session outcome and the unit outcome come under the formative assessment. The instructor keep on tracking the performance of the students in the test conducted at the end of every class for assessing the SO. As discussed before assessment method may be direct like question and answering, Objective questions, role plays, conducting exams etc., The faculty should give feedback to each and every student about their performance, so that the students can improve and achieve the Session Outcome. If the same happens for all the session outcomes ultimately the unit outcome will be achieved. The same procedure should be done for the unit outcome also. Here the assessment method may vary and should be at elevated level than the methods followed for SO. Here also in addition to the above said direct methods indirect methods like collecting oral or written feedback from students can be planned. The direct methods are used only to check the outcome attainment level of each student but indirect in addition to that the quality of the teaching session can be known and the instructor can know whether student have got what they have expected, otherwise what is the gap between expectation and reality and how it can be fulfilled in the future sessions. Several effectively designed formative assessment with proper evaluation and feedback from faculty leads each and every student towards achieving the specified outcome and to succeed in the summative assessment.

Summative Assessment (SA):
Occurs mostly at the end of a course or semester. The primary purposes are to determine the knowledge, skills, and attitudes that have developed over a period of time, to summarize student progress. At the end of the course assessment will be done to check whether all students have attained the intended outcome. Students those who attain the outcomes of all the courses obviously attain the program outcome. In direct assessment the students outcome attainment is evaluated based on the marks he get. A program can have N number of outcomes, then how to check which outcome is attained or to which level. To avoid this confusion the following ways may be followed

- Firstly, the courses of the program should be categorized and grouped under each PO, the sense is that the grouped course contents enable the students to know or demonstrate which is said in that PO. Marks obtained in those courses may be consolidated to decide whether a student has achieved that PO or not.
- Next, each course has multiple outcomes, so the content should be mapped with each CO, during assessment the question paper should be such that each question is assigned to any one of the CO and all the course outcomes are given with equal importance. While assessing the instructor will get the marks obtained by the students for each CO. It makes the job of the instructor easy in analyzing the attainment of outcome.

Here in assessing both CO and PO the indirect method may also be used. The strengths of indirect assessment have been discussed already. Instructors may design their own survey form or may follow any other standard survey forms. A sample course survey form is given in table 1..

<table>
<thead>
<tr>
<th>Table 1. Course Survey form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you been aware about the Outcome Based Education (OBE)?</td>
</tr>
<tr>
<td>Are you been informed about the Outcomes to be attained for this course before the start of the course?</td>
</tr>
<tr>
<td>Is there correlation between the content of the course and the Outcomes specified?</td>
</tr>
<tr>
<td>Can the knowledge gained through the course content be applied for real world scenarios?</td>
</tr>
<tr>
<td>Were you comfortable in understanding what you were intended to through the teaching learning methodology followed?</td>
</tr>
<tr>
<td>Are you willing to give suggestions to improve the TL method that could be an input for fore coming sessions?</td>
</tr>
<tr>
<td>Were you happy with the assessment methods?</td>
</tr>
<tr>
<td>Whether your assessment methods had focus on measuring the Outcome accomplishment?</td>
</tr>
<tr>
<td>Was the instructor informed you about the assessment methodology that would be followed?</td>
</tr>
<tr>
<td>Theory Course: Are you confident enough to say that you have attained the outcome?</td>
</tr>
</tbody>
</table>
course outcomes specified?
Lab course: Are you able to develop an application with the knowledge gained?

<table>
<thead>
<tr>
<th>If you rate yourself for the Outcome attainment based on the knowledge gained through the course, which would you choose</th>
<th>&lt; than 50 %</th>
<th>51 - 70 %</th>
<th>71 - 90 %</th>
<th>&gt; than 90 &amp;</th>
</tr>
</thead>
</table>

Similarly the survey form (Indirect assessment) for the Program Outcome may have questions like:

- Do the program outcomes are clearly specified and focused?
- Are the PO are updated?
- Do you think that the OBE works well?
- Do you think that the program could have one more purpose (Any outcome could be added)?
- In your perspective whether the curriculum and the Program outcomes are synchronized?
- Do you think the syllabi are obsolete and that didn’t help you in attaining the program outcome? If so list those.
- Have you learnt what you are supposed to?
- Are you happy and comfortable with the Teaching methodologies followed?
- List a few teaching methodologies which made you to learn the concepts and to attain the outcomes easily.
- According to you which assessment method is very effective and accurate in measuring the outcome?
- Are you confident enough that you can develop any working model based on the knowledge you gained through the program?
- The knowledge you gained through the course will help you to learn and update the upcoming technologies in the future (lifelong self learning) – Yes / No
- Are you confident enough that you can do research to provide innovative solution to the real word problems in your domain?

The above listed are a few examples of questions that may be added in the Program Outcome survey form. The coordinator may also add some more questions specific to the program domain. The forms are collected from all the students and consolidated for proper understanding. The interpretation made may be useful in designing the fore coming curriculum, TL sessions and assessment methodologies.

4. CONCLUSION

The ultimate aim of any undergraduate or postgraduate program is enrich the students with the knowledge what the program is intended to equip. To avoid the confusions with the fuzzy statement “what a program is intended to equip”, a list of clearly focused outcomes are given. It is very similar to defining the scope or setting the boundary for any program. So any program should have its own outcomes. This helps the instructor as well as the students to work towards a definite target. When working towards the target, it is very much important for both the faculty and students to know whether they are progressing towards the goal. So carefully designed and proven assessment methods should be followed which suits for a diversified group of students to evaluate the level of attainment of the outcomes. If all the students are in the same pathway towards the goal then it can be proceeded, otherwise the issue can be solve by giving appropriate feedback to the students and taking special care for the slow learners. In this scenario the students should also given with an opportunity to express their comfort ability with the current method followed otherwise some measures should be taken immediately. So with the focused outcome and with the proven assessment methods all the students can be made to achieve the Outcomes of the program.

REFERENCES


[23] Principles for Effective Classroom Assessment, Louis Volante Brock University http://brock.scholarsportal.info/journals/brocked/home/article/viewFile/74/75