



## **Effective Teaching and Evaluation Strategies: The Key to Outcome-Based Learning**

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**Abstract:** The outcome-based learning is emphasized in the education system for many years. There are two main pillars of outcome-based learning. The first one is effective teaching and the second one is good strategies for evaluation. Effective teaching involves many parameters that may be changed from time to time as a single teaching strategy will not be successful in all scenarios and for all the learners. The role of a teacher is to modify their teaching and evaluation strategies to achieve the goal of outcome-based learning. The strategies may depend on the nature of the course, class strength, learners' ability, etc. In this paper, a few ideas related to effective teaching and evaluation methods are suggested in view of outcome-based learning. The various methods that can be implemented to improve the teaching-learning environment have been highlighted. A survey and feedback for these practices have also been given in support of the efficacy of these methods.

**Keywords:** Outcome-based learning, outcome-based education, student learning, quality education, Bloom taxonomy.

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### **1. Introduction**

Outcome-based education (OBE) and outcome-based learning (OBL) are not new to the education system. The existence of these terms is long back but their definitions and notions are extended from time to time. These objectives have been redefined with a bigger context for fulfilling the needs of the modern era. The OBL mainly focusses on students' learning that can be measured quantitatively. Therefore, the best practices around the globe are being exercised to attain the clear objective of students' learning. The role of a teacher is to organize everything to enhance the learning processes among the students. The objective is not limited to the delivery of contents in the lecture only. It covers

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the organization of curriculum, instruction, methods of assessment, and many more. The learning outcomes should be clearly defined, and all processes are designed in such a way to fulfill the objectives. Outcomes are the clear results of the learning that are expected from the students after completion of a certain course. The outcomes are evaluated in terms of what students have learned and how the imparted knowledge is beneficial for them in actual doing rather than the mental processes such as attitude, belief, and other states of mind. In objective based learning, the whole focus moves around increasing the students' capabilities to the best level possible.

## **2. Literature Survey**

The critical issues of outcome-based learning, their models, implementations, and the short-term future have been highlighted by Spady (1994). As time progresses, different practices related to distance education have been done for outcome-based learning. Different models were suggested including distributed classrooms, independent learning, open learning plus class by Greenberg (1998). The learning and various methods of learning have also attracted researchers and educators. Earlier, the information sources were limited. Teachers were the best information sources for a particular subject. Therefore, it was decided by the teachers what to learn for the students. Now, in the current era, information is free. Now, the students can learn the subject and the topics in which they are interested in. Thus, the whole learning processes and methods of learning are continuously changing. Even university curriculum is decided by the students' perspective. The learning processes are not limited to the classroom activities. The learning is now on paradigm shift. Students' learning is best described by Kolb that includes four different ways of learning namely concrete experience, reflective observation, abstract conceptualization, and active experimentation Kolb (1994). It was experienced that students learn less from traditional lecturing and more from fellow students. Project based learning was very famous among industries, but it is now popular in academia. A practice related to project-based learning was discussed in Lenschow (1998) in which the traditional lecturing was reduced by 20% and more emphasis was given to experiential learning. The support lecture was given on demand. A learning environment was created in which students can learn by themselves after forming a team. The choice of project often plays a vital role in students' learning. A few factors that are important in the selection of the project were highlighted in the same paper. Technology integration in higher learning is highlighted by (Rogers, 2000). The adaptation of technology in higher education is the need of the current era. The

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competition among the institutions and to prepare the students in global scenario are motivating factors to adapt technology. E-learning is now being promoted all over the world. Traditional classroom lecturing is being mixed with e-learning. The gap between theory and practice can easily be filled with the resources of e-learning as highlighted in (Clark, 2002). The paper also covers the myth related to e-learning and indicates the significant advantages. Various ways have been identified to achieve outcome-based learning in (Davis, 2003). It also highlights the advantages and disadvantages associated with OBE. The bloom's taxonomy is revised in (Forehand 2005) that highlights the process of learning. The old version of bloom's taxonomy has been compared with the new version. One-to-one mapping has been done for better understanding. The new terms involve remembering, understanding, applying, analyzing, evaluating, and creating. Bloom's digital taxonomy has been presented in (Churches, 2008) that explains each term involved in Bloom's taxonomy in detail. Bloom's taxonomy has been used for the assessment and for the comparison of difficulty levels. In the work reported in (Thompson and others, 2010), the question paper of programming language has been analyzed and discussed following Bloom's taxonomy. Several differences have been discussed while analyzing the same question paper by six different institutions. The paper serves a basis for the understanding of a Bloom's taxonomy in connection with the setting of the question paper. Various movements and reforms have been discussed for effective classrooms (Cheng and Mok, 2008). The implications for an effective classroom have also been discussed. An overview on revision of Bloom's taxonomy has been presented in (Krathwohl, 2002). Bloom's taxonomy is used to evaluate e-learning through an exploratory study by (Halawi and others, 2009). A survey was conducted that reveals that instructional and individual factors do not play much role in learning. The implications to online teaching have been discussed in detail (Keengwe and others, 2010). Blended learning is also promoted in which face-to-face learning and online approaches both have been promoted. It was observed that blended teaching methodologies provide a great opportunity for students and enhance their learning skills (George-Walker and others, 2010). For better learning, the important parameters are highlighted as how students are engaged and available scope for experiential learning. The twenty first century skills and the implications in developing these skills in students are discussed in (Noweski Christine and others, 2012).

**3. Idea that needs to be implemented**

Most of the faculty often choose teaching subjects that are directly/indirectly related to their research areas. Even undergraduate students can solve the

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complex problems if they are motivated. Many a times students easily understand the topic/problem without knowing that the topic/problem and their solutions have been reported in the research papers. The topics of any subject can be mapped with some research papers so that the students can understand that enough opportunities are available in the research and undergraduate students can contribute to the research after completion of the course. Some students can be associated with the course instructor after completion of the course. This way both (instructor and student) will benefit. In current scenarios, the institutes are facing a problem with a smaller number of PhD students. Undergraduate students are the backbone of the institution. The idea is to indulge them towards the research. It can easily be done if we prepare and map the course curriculum with some research papers. All course curricula are developed following a collection of textbooks. These textbooks are a collection of research papers. The course instructor can easily identify the basic research papers from where the content came from. Students should have a clear idea that they are studying the contents developed by research. Students should have the confidence that if they are able to understand the research topics easily, they can contribute to research too. It was felt that fear of doing something often restricts us from achieving the goal. The same happens with the students. Instructor should motivate the students for research.

### **4. Efficacy of the evaluation strategies**

In the following section, the efficacy of the good evaluation strategy is presented. It is observed that good evaluation strategies often lead to better outcomes. A well-planned evaluation strategy is must for the outcome-based learning. In this section, the invention applied for one of the postgraduate courses namely “Embedded System Design” and the outcome of the invention has been presented.

#### **4.1 Intervention Applied**

An intervention has been applied to one of the PG courses titled “Embedded system design-PVL202” for first year students (VLSI Design) of Electronics and Communication Engineering Department of Thapar Institute of Engineering and Technology. The registered students in this course were 26. The credit of course was 4 that includes 3 credits for lecture and 1 credit for practical.

#### **4.2 Rationale**

The course has been chosen in view of improving the analytical skills of students, to challenge them to think novel and to learn the past and recent developments. This course includes theoretical as well as practical aspects

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which are applicable in real-time applications. The content of this course has given me the opportunity to motivate students to study with real interest. The course is related to ARM processor architecture, its programming and real time operating systems which are generally required in all embedded systems. Good programming skills and understanding of hardware are required to develop an embedded system product.

To achieve the goal, good assignments and quizzes are given to the students apart from taking mid-semester test and end-semester test. Assignments motivate them to study on a regular basis while quizzes are feedbacks whether they are learning or not. Assignments are designed in such a way that after completion students will acquire sufficient knowledge and confidence. To avoid copying assignments, each student has been given a different set of programs (of equal level) for which they must do simulations as well. The traditional method of giving the same assignment questions to each student is avoided.

### **4.3 Description**

An intervention was done for the improvement of student learning in four steps. In the first step, a quiz was given with a view to analyzing the performance of students after taking some lectures. The observation was made based on quiz results. Some students could not perform well in the quiz. The average mark obtained on the course was poor. It was felt that students need some challenging assignments to motivate them for regular study. In the second step, two challenging assignments have been given. Some weightages have been assigned in their final grades for sincere efforts. All students have put efforts to submit assignments. Students have submitted good assignments due to weightage in their final grades. In the third step, feedback was taken to know the merits and demerits of assignments. In the fourth step, a second quiz was conducted to know the improvement in the performance of students. The direct and indirect methods have been used to obtain feedback. In the direct method, the quiz and assignment marks have been analyzed. In indirect method, student's feedback on assignments has been received. Online feedback is taken to know the student's opinion. The following questions have been included. Was the assignment useful? How difficult the given assignment was? Was the assignment knowledge improving? The time given for the assignment submission was sufficient or not? Was the assignment interesting?

### **4.4 Observations and Learnings**

Assignments should be given frequently to motivate them to study on a regular basis. Two assignments were given to analyze the learnings. One in the beginning and one after mid-semester test. Rather than giving long assignments,

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small assignments could be given more frequently. All students have given feedback that the assignment was difficult. If assignments are given frequently, there will be an option to give some easy assignments.

### **4.5 Reflection**

An initiative has been taken after analyzing the performance of students in the quiz. To improve the performance and to provide them with an opportunity to learn. Two assignments have been designed covering the entire syllabus. The greatest challenge was to design an assignment in which students cannot copy answers. To avoid the chances of copying, each student has been given a different set of questions (of equal level) and sincere efforts are made. To ensure sincere efforts a justified weightage is given to assignments in the final grades. For novelty, they have been given freedom to submit some programs of their own choice and the justification is expected that how these small programs can be integrated to make a dedicated embedded system. Implication was to evaluate the assignments as all assignments are a different set of questions. Undoubtedly, the simulation result of those programs was helpful to judge the quality of assignment, but it was a challenging task. Initiatives were taken after analyzing the performance of students in the quiz. To improve the performance and to provide them with an opportunity to learn. Two assignments have been designed covering the entire syllabus. The greatest challenge was to design an assignment in which students cannot copy answers. To avoid the chances of copying, each student has been given a different set of questions (of equal level) and sincere efforts are put by the students.

### **5. Conclusions**

In this paper, effective teaching and good evaluation strategies have been discussed to enhance the learning outcomes. Several practices that are generally followed to improve the leaning skills of students have been discussed. A few ideas related to outcome-based learning have been suggested. To show the efficacy of good evaluation strategies, a case-study has also been presented that clearly indicates the improvement in the learnings of students. The data related to case-study that includes the response of the students has also been included in appendices.

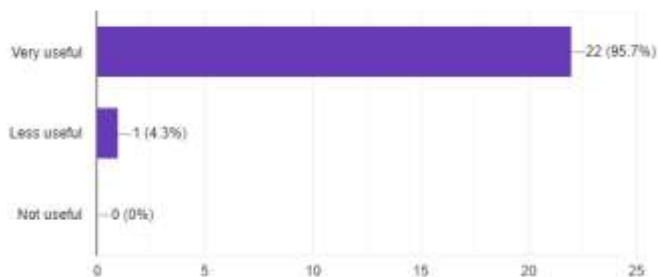
### **Appendices:**

#### **Student Feedback:**

Student feedback using questionnaire-based survey method.

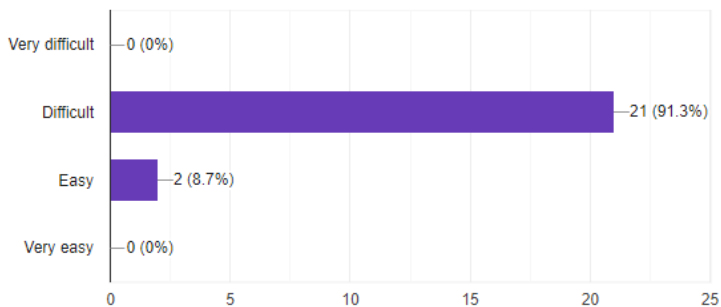
### Was the assignment useful?

23 responses



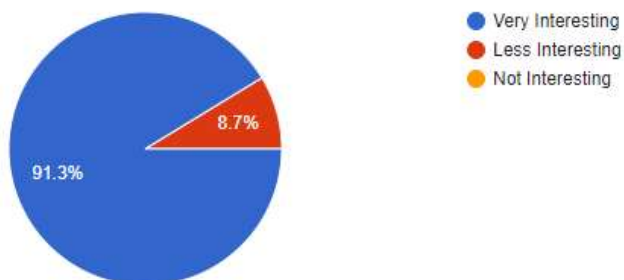
### How much difficult the given assignment was?

23 responses



### Was the assignment interesting?

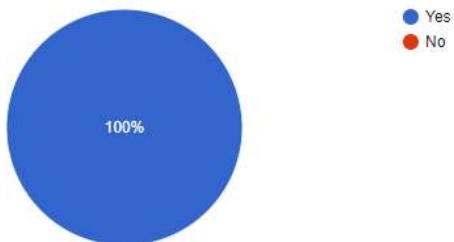
23 responses



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Was the assignment knowledge improving?

23 responses



The time given for assignment submission was?

23 responses

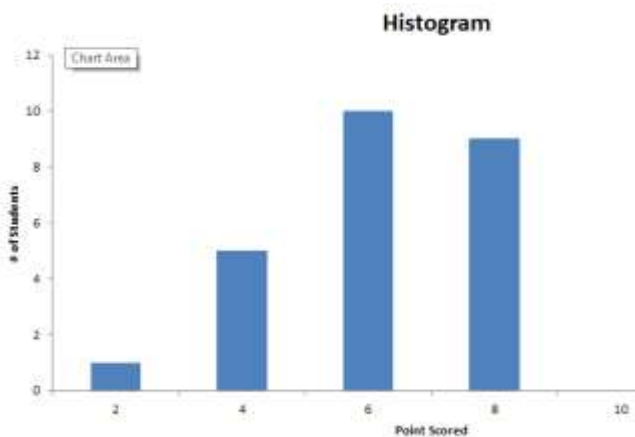


Result of Quiz before Intervention (Offline)

Average 5.36

Median 5.5

Range 2-8





Result of Quiz after Intervention (Online Quiz was conducted)



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