2. Transforming India Through Implementation of Outcome Based Education

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Education is the manifestation of the perfection already in man.

Swami Vivekananda
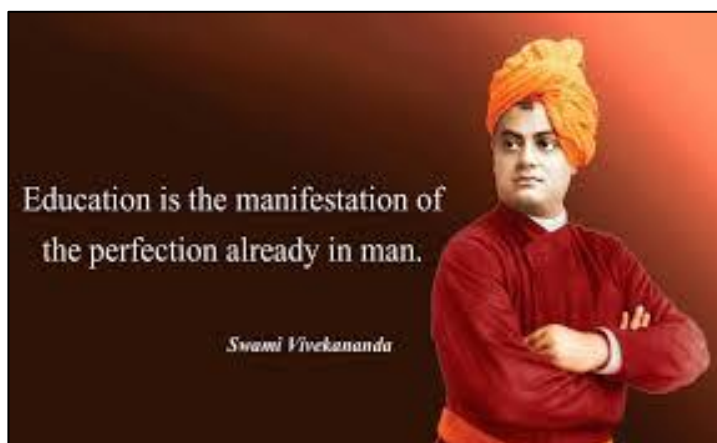
Abstract:

Education means studying to obtain a deeper knowledge and understanding of a variety of subjects to be applied to daily life. It is a known fact that education has the power to change our entire life. Learning changes our thinking capabilities and perception. Education helps to change society for the better. Society consists of various kinds of people with different mindsets. Knowledge gained through education is powerful in helping us make the right decision and walk the right path. The "Outcome-Based Education" (OBE) model is being adopted at a fast pace in education institutions. it's considered an enormous breakthrough to enhance education across the world.

Outcome-based education is a student-centered that focuses on measuring student performance through outcomes. Outcomes include knowledge, skills and attitudes. Our education is sort of a lady with over ornaments who is unable to steer simply because of the load she carries of the ornaments.

Outcome-based education has many intrinsic benefits which must make it an attractive concept for educationalist involved in curriculum planning, curriculum developers, teachers, and students. The need for outcome-based education has been there for decades.to develop the curriculum with inclusion of learning practices and focus on the students. This paper attempts to describe the significance of outcome-based education.

Keywords:

Higher education, outcome-based education, student centric learning, learning outcomes, Bloom taxonomy.

2.1 Introduction:

Education is an important and powerful tool in one's life[1-4]. It is the key to success in the future and to have many opportunities in our life. Education has many advantages for people.

For instance, it illuminates a person's mind and thinking. It helps students to plan for work or pursue a higher education while graduating from university. Having education in an area helps people think, feel, and behave in a way that contributes to their success and improves not only their personal satisfaction but also their country. Outcome based education provides a framework for focusing and organizing the curriculum around predetermined and clearly defined student learning outcomes.

It has been viewed as a significant paradigm shift in educational philosophy and practice which underscores a learning-based model focusing on what students know and can do as a result of a learning experience.

Furthermore, when learning outcomes are stated in clear and specific terms, the faculty are able to align curriculum and pedagogy such as module design and delivery as well as assessment tasks and activities with the intended outcomes[5-10]. OBE has been adopted by educational institutions worldwide. OBE is a student-centered approach to learning that focuses on achieving specific learning outcomes.

In an OBE curriculum, the learning outcomes are defined in advance and the entire curriculum is designed to achieve those outcomes. The OBE system laid more emphasis on learning outcomes (program outcomes) which are based on the graduate attributes of 21st century.

The graduate attributes include deep knowledge of the discipline, critical thinking, problem solving, teamwork, communication skills, leadership qualities, ethics and life-long learning. The required knowledge and skill set for a particular engineering degree is predetermined

and the students are evaluated for all the required outcomes during the course of the program. The focus is on what students should know and be able to do at the end of the program, rather than just covering a list of topics.
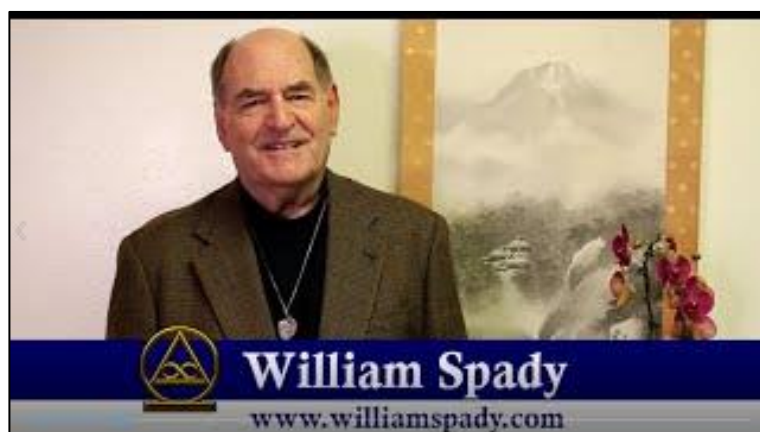
Things we can do because of learning are called outcomes of learning. Outcome based education was propounded by **William Spady** in the 90s to bring the focus of formal education to what the students learn rather than what they were taught. OBE is a system of education giving priority to purpose, accomplishments and results.

The OBE model measures the progress of the graduate in three parameters, which are:

- Program Educational Objectives (PEO)
- Program Outcomes (PO)
- Course Outcomes (CO)

Program Educational Objectives (PEO) are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to understand.

2.1.1 Some Important Aspects of The Outcome Based Education:

1. **Course** is defined as a theory or practical subject studied in a semester. For E.g. Engineering Chemistry.
2. **Course Outcome (CO)** Course outcomes are statements that describe significant and essential learning that learners have achieved and can reliably demonstrate at the end of a course. Generally, three or more course outcomes may be specified for each course based on its weight age.
3. **Programme** is defined as the specialization or discipline of a degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish leading to the awarding of a degree. For Example:
B.E., Mechanical Engineering
4. **Programme Outcomes (POs)** Program outcomes are statements that describe what students are expected to be able to do by the time of graduation.

5. **Program Educational Objectives (PEOs)** The Programme Educational Objectives of a program are the statements that describe the expected achievements of graduates in their career and also in particular, what the graduates are expected to perform and achieve during the first few years.

6. **Programme Specific Outcomes (PSO)** programmed Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline.

7. **Graduate Attributes (GA):** The graduate attributes, 12 in numbers are exemplars of the attributes expected of a graduate from an accredited programmed.

2.2 The 12 Graduate Attributes in Outcome Based Education:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science and an engineering specialization for the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, literature, and analyse complex problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and environmental considerations.

4. **Conduct investigations of complex problems:** The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline. that may not have a unique solution.
   For example, a design problem can be solved in many ways and lead to multiple possible solutions. (like cost, power requirement, durability, product life, etc.) which need to be defined within appropriate mathematical framework.

5. **Modern tool usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools with an understanding of the limitations

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional responsibilities and norms of the engineering practice.

9. **Individual and teamwork:** Function effectively as an individual and as a member or in a team in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with effective reports and design documentation, make effective presentations and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering principles and apply these to one's own work, as a member in a team to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need to engage in independent and life-long learning in the broadest context of technological change.

2.3 Developing Assessment Strategies for OBE Curriculum:

Assessment is an integral part of any OBE curriculum. It is essential to have a well-defined and structured system in place that ensures that the curriculum objectives are being met. Assessment strategies should be aligned with the learning outcomes and should measure the students' ability to demonstrate the competencies that have been identified in the curriculum. A good assessment strategy should be designed in a way that it provides a comprehensive picture of the student's understanding and proficiency of the subject matter. The assessment should be both formative and summative, with formative assessments being conducted regularly to provide feedback to both the students and the instructors on the progress and areas that need improvement.

In addition to traditional tests and exams, assessment strategies should also include performance-based assessments, such as portfolios, projects, and presentations. These types of assessments provide an opportunity for students to demonstrate their knowledge and skills in a real-world context, which is essential in an OBE curriculum. It is also important to ensure that the assessment strategies are fair, valid, and reliable. The assessment should be designed in a way that it measures what it intends to measure, and the results should be consistent over time and across different evaluators. Overall, developing effective assessment strategies is crucial in ensuring the success of an OBE curriculum. It provides valuable feedback to both the students and instructors, and ensures that the curriculum objectives are being met, leading to better learning outcomes for the students.

2.4 Following Are the Important Benefits of Outcome-Based Education:

Clarity:

Clarity about Programme outcomes, Course Outcomes, Programmer Specific outcomes, students Learning Outcomes, etc are communicated to all stakeholders in advance in direct or indirect ways. Wherein, what is expected from students and what is the responsibility of teachers is clearly stated. which helps students and teachers to have clarity about their roles, responsibility, and accountability towards Courses.

Flexibility:

Flexibility is available to teachers about how they teach and what they teach.

Comparison:

OBE helps them to compare their performance within the departments, College and University and also inter institutions comparison.

Involvement:

Apart from students and teachers, Parents, Management, Industries, and Government are also involved as outcomes are well defined and communicated.

2.5 Conclusion:

OBE is a powerful tool for improving student outcomes, enhancing institutional reputation and preparing graduates for success in their careers. By following the guidelines outlined in this book chapter, institutions can successfully design and implement curriculum that meets the needs of quality education. Outcomes for a higher education program are defined at three levels as program outcomes (POs), program specific outcomes (PSOs) and course outcomes (COs). The most important aspect of an outcome is that it should be observable and measurable. These are best written in a well-defined framework of taxonomy of learning. Bloom's taxonomy of learning identifies three domains of learning: Cognitive, affective and psychomotor. Revised Bloom taxonomy of cognitive domain has two dimensions: cognitive levels and knowledge categories. It is proposed that CO statements be written within a well-defined structure: Action, knowledge elements, conditions and criteria.The following suggestions can be useful to achieve excellence through learning outcomes. Curriculum is to be designed keeping in mind the requirements of industries. The curriculum should be made more flexible. Faculty development programs must be organized on regular basis. National Board of Accreditation should put more efforts to reach all institutions to educate them about NBA evaluation and assessment. AICTE should revise its policies on granting institutional approvals, faculty norms, student intake etc. It is high time to bring in huge change in Indian education system.

The future depends on what we do in the present.

Mahatma Gandhi
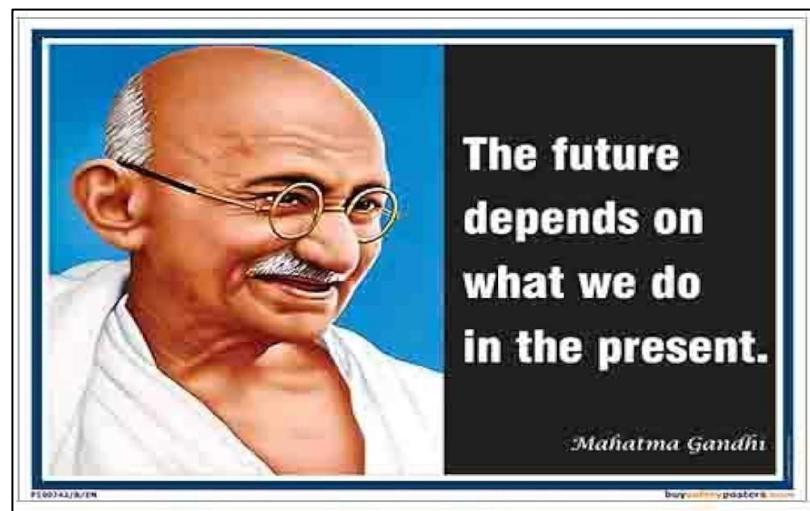
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