Review Article

Analysis of Student's Performance in Engineering Courses Based on Outcome Based Education

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Abstract

The current hot trend in education is outcomes-based education (OBE), which guides students in developing their professional careers and makes them more knowledgeable and creative. This might facilitate their healthy development within the context of their workplace. Gaining the skills outlined for outcome-based education via NBA calls for the use of the proper evaluation techniques. This is because the evaluation of graduate skills is crucial to the coaching learning system's efforts to improve the system and students' performance. This process will give the machine ideas for bridging the gap between coaching and completely results-based mastering methods. In the beginning, this paper outlines the foundations of final results-based training and introduces important implementation criteria. The paper then addresses important implications of implementing the framework for the practise and strategies of assessment and evaluation of college students' performance in engineering colleges.

Keywords: outcomes-based education (OBE), workplace, skills, coaching learning system's.

INTRODUCTION

OBE, or outcomes-based education, is a theory of education that centres an educational system's various components on specific objectives (outcomes). Each student should have succeeded in achieving the objective by the end of the educational experience. In OBE, there isn't a single predetermined method of instruction or evaluation; rather, all of the classes, chances, and tests should support students in achieving the predetermined outcomes [1]. Depending on the desired goals, the faculty member's function may change to include that of an instructor, trainer, facilitator, or mentor. At various levels, outcome-based methodologies have been incorporated into educational systems all throughout the world. The Washington Accord, which was established in 1989 as part of a worldwide push to acknowledge OBE, is an agreement to recognise undergraduate engineering degrees that were earned utilising OBE techniques [2]. Australia, Canada, Taiwan, Hong Kong, India, Ireland, Japan, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Sri Lanka, Turkey, the United Kingdom, Pakistan, China, and the United States are the countries that have signed the agreement in its whole as of 2017.

TRADITIONAL SYSTEM VS OBE

The three components that OBE incorporates—the theory of education, a systematic structure for education, and a particular approach to instructional practice—are what most separate it from traditional educational methods [3]. The entire educational system is organised in accordance with what is thought to be necessary for learners to successfully complete at the conclusion of their learning experiences [4, 5]. The key word in this paradigm is "outcome," which is also sometimes used to refer to "competency," "standards," "benchmarks," and "attainment targets." The same formal and informal methodologies used in the workplace to accomplish results are also used by OBE. The following competencies are prioritised while creating curricula and outcomes:Life skills, fundamental abilities, professional and occupational aptitudes, intellectual aptitudes, and interpersonal and individualised aptitudes.

BENEFITS
Clarity

The emphasis on results establishes a clear expectation of what must be done by the course's

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conclusion. Both the teachers and the students will be aware of what is required of them during the course. Over many years of education and when team teaching is involved, clarity is crucial. In order for children to advance, each team member or year in school will have a clear grasp of what has to be done in each class or at each level. Once an outcome has been chosen, those responsible for developing and planning the curriculum are expected to work backwards to establish what knowledge and skills will be needed to accomplish the outcome.

Flexibility

Teachers will be able to design their classes to meet the needs of their students if they have a clear understanding of what needs to be completed. OBE does not define a particular method of instruction, giving teachers complete freedom in how they instruct their students. By utilising a variety of teaching and evaluation strategies in the classroom, teachers will also be able to identify student diversity.[14] OBE aims to be a form of learning that is focused on the student. Study aids and group projects are only two of the strategies teachers might employ to support their students' learning. Teachers are there to guide and aid their charges in understanding the subject matter in any way required.

Students' involvement

A crucial component of OBE is student engagement in the classroom. To ensure that they fully comprehend the topic, students are asked to conduct independent learning. Students learn more when they feel more in control of their education, thus encouraging student involvement is a good idea. Parental and community involvement through curriculum development or curriculum revisions are further types of involvement. OBE outcomes are intended to be determined upon locally or within a school system. In order to maintain the quality of education in a community and to make sure that pupils are prepared for life beyond school, parents and community members are asked for their feedback.

Transparency

It creates transparency for both sides; the students know what to expect from a course, and the teachers know what to deliver or demonstrate through the course structure.

CONCEPTS OF OBE IN ENGINEERING

The Outcome-Based Education (OBE) approach is currently being quickly embraced by engineering institutes in India [6]. Enhancing technical education in India and assisting Indian engineers in competing with their international counterparts is seen as a huge step forward. A crucial demonstrative tool for student-centered instruction, outcome-based education (OBE) focuses on evaluating student achievement through outcomes. The purpose of the quality assurance and improvement process is to ascertain whether the specified educational goals adhere to a high standard of quality. The focus of the outcome-based education (OBE) system is on quantifying what students are capable of doing, and one of the important elements is student learning outcomes. Potential employers evaluate recent engineering graduates based on the skills and competency required on the job, rather than only the knowledge they have learned in school. Verifiable declarations of what students are expected to know, understand, and be able to perform are provided by learning outcomes. The learning outcomes approach places less emphasis on the teacher's objectives and more on what the learner has accomplished and can demonstrate at the conclusion of the learning activity. The distinction between a teaching activity's purpose and its learning outcome is made by the student-centered approach [7]. Traditional educational programme objectives discuss the anticipated outcomes of teaching and learning from the perspective of the teacher. Programme Educational Objectives (PEO), Programme Outcomes (PO), and Course Outcomes (CO) are important elements of outcomes-based education. The broad statements that outline the career and professional successes that the programme is preparing its graduates to achieve are known as programme educational objectives. Programme outcomes are declarations that outline the knowledge and skills students should have by the time they graduate. Course outcomes are the things that students should understand and be able to do upon completion of a course. PEOs, POs, and COs must work together to achieve their individual goals. The key constituents of OBE is represented in Fig 1.

Programme Outcomes

Programme Outcomes are succinct declarations of what students should understand and be able to perform upon graduation. These are associated with the abilities, information, and behaviours that students develop as a result of the training. NBA's programme results for programme accreditation are based on participants' initial capacities, competence, skills, etc. These criteria—which go by the name Graduates Attributes—vary according to the discipline and academic level. The attributes for the graduates are Engineering knowledge, Problem Analysis, Design /Development of Solutions, Conduct Investigations of complex problems, Modern Tool Usage, The Engineer and Society, Environment and Sustainability, Ethics, Individual and Team work, Communication, Project Management and Finance and Lifelong Learning [8].
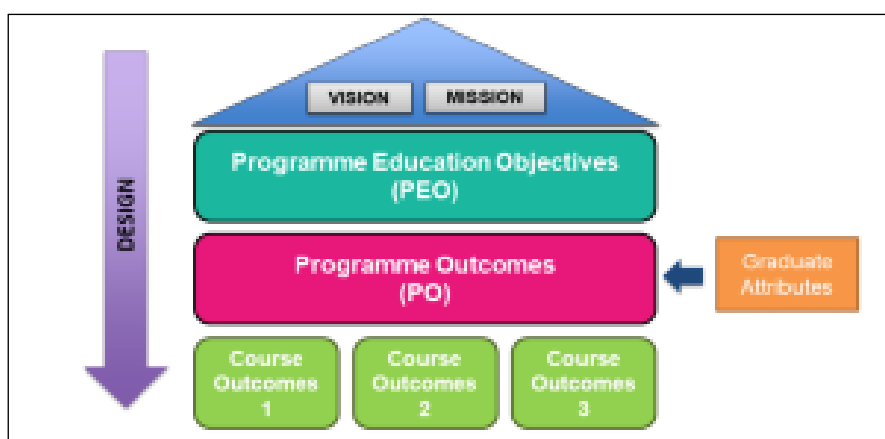
Figure 1: Key Constituents of OBE

Programme Educational Objectives (PEOs)

The statements that explain the expected accomplishments of graduates in their careers, as well as what the graduates are expected to do and achieve within the first few years after graduation, are the educational objectives of an engineering degree programme. Programme's educational goals basically respond to the inquiry: Why does the Programme exist at all?

A PEO is:
- An explanation of the industries or fields in which the graduates find work
- Graduates' readiness for higher education

Programme Specific Outcomes (PSOs)

At graduation, students ought to be able to perform these tasks. The PSOs are unique to each programme. The department that offers the programme creates PSOs. A department typically has two to four PSOs.

Course Learning Outcomes

Course outcomes are more specific assertions that outline what students should know and be able to do at the conclusion of each course or subject. The COs are more focused on the subjects and are typically defined by the faculties after contacting higher authorities, whereas the POs outline the departmental outcomes. The COs are more akin to statements that refer to the abilities, information, and conduct that students gain while doing a particular course within a programme. They all contribute to the programme's results. They must be mapped to the POs, though not always to the same one. A PO can be mapped to two or more COs, and a CO can be mapped to one or more POs.

ASSESSMENT TOOLS

The main requirements for any outcomes-based qualification are a clear understanding of the program's goals and objectives, as well as teaching strategies capable of supporting the development of the required competencies, as well as assessment procedures capable of reliably monitoring whether the established targets are met or not. As a result, the Institution should guarantee that the programs it offers provide a cohesive assembly of discipline-specific and complementary knowledge areas, as well as integration of needed skills and values. Furthermore, as the student continues through the program, enough opportunities for the development, demonstration, and assessment of needed abilities must be offered to ensure effective preparation for the world of professional practice and lifelong learning [9]. To assess the Program Educational Objectives (PEO), Program Outcomes (PO), and Course Outcomes (CO), a variety of Assessment Tools are used. Employer and alumni surveys are commonly used to determine program educational objective success. End-of-course surveys, instructor evaluation reports, department performance reports, student exit surveys, alumni surveys, and Student Advisory Committee surveys can all be used to assess program objectives. Course objectives can be assessed through assignments, mid-course and end-of-course surveys/feedback from students, faculty surveys, and so on. Rubrics can be used to assess students' performance in practical assignments and projects, particularly group projects. Given that grades have traditionally been used to assess students' learning, a number of studies have been done to establish a correlation between grades and achievement of Learning Outcomes. Students with good grades reported improved learning outcomes, however, the association was smaller than expected. As a result, grades and learning outcomes could be viewed as complementary assessment methods. While grades primarily assess subject knowledge, Learning Outcomes assess transferable abilities.

ATTAINMENT OF POs

One of the metrics used to assess PO achievement is the evaluation of achievement of a present set of COs. Every course includes a defined set of COs that may be mapped to the POs and utilized to offer quantitative monitoring of how well direction

outcomes are carried out. The CO mapping is done statistically, and the mapping matrix is made available in the course syllabi. The assembly of COs using the method of assessment via examination machine is a clean standard for attainment of POs. Oblique size includes route-stop surveys, venture-based learning assessments, doing open-ended experiments, taking competitive examinations for better education, and so on.

ATTAINMENT OF COs

Continuous internal evaluation is used as a direct measure and the course-end survey is used as an indirect measure in the evaluation of COs. Two guides instances were taken into account in order to explain the achievement calculating system used. Utilizing both direct and indirect assessment tools, the overall success of the students' performance toward achieving the COs is measured. His/ Her performance in the Continuous internal evaluation and Semester End Examination are included in the direct evaluation.

CONCLUSION

OBE is an educational strategy that is taken into account while developing, implementing, and evaluating curricula as opposed to an activity that takes place within the curricula. It guarantees high levels of learning for all students based entirely on the accomplishment of truly clear results with an emphasis on the suitability of each learner's developmental stage and ensuring active and experience-based learning. In Indian engineering institutions, there is an urgent need to adopt outcome-based education. The government and NBA need to increase awareness among all the stakeholders and train teachers and other support personnel on how to implement OBE at all academic stages (from creating Learning Outcomes to delivering instruction and assessing student progress). It is also essential to shift teachers', parents', and students' mindsets away from grades so that Learning Outcomes

are given the weight they deserve in the evaluation systems. Only with the combined efforts of all the stakeholders—students, teachers, businesses, and the government—who stand to benefit from the implementation of outcomes-based engineering education can it be successful.

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