

45. A STUDY ON OUTCOME-BASED EDUCATION - ISSUES AND CHALLENGES

C. NIRMALA RANI Ph.D- *Full Time Scholar, PG and Research Department of commerce, St. Joseph's College of Arts and Science (Autonomous), Cuddalore-607001*

ABSTRACT

Outcome-based education, a performance-based approach at the cutting edge of curriculum development, offers a powerful and appealing way of reforming and managing medical education. The emphasis is on the product-what sort of doctor will be produced-rather than on the educational process. In study and unambiguously specified. These determine the curriculum content and its organization, the teaching methods and strategies, the courses offered, the assessment process, the educational environment and the curriculum time table. They also provide a framework for curriculum evaluation. A doctor is a unique combination of different kinds of abilities. A three-circle model can be used to present the learning outcomes in medical education, with the tasks to be performed by the doctor in the inner core, the approaches to the performance of the tasks in the middle area, and the growth of the individual and his or her role in the practice of medicine in the outer area.

Medical schools need to prepare young doctors to practice in an increasingly complex health care scene with changing patient and public expectations, and increasing demands from employing authorities. Outcome-based education offers many advantages as a way of achieving this. It emphasizes relevance in the curriculum and accountability, and can provide a clear and unambiguous framework for curriculum planning which has

an intuitive appeal. It encourages the teacher and the student to share responsibility for learning and it can guide student assessment and course evaluation. What sort of outcomes should be covered in a curriculum, how should they be assessed and how should outcome-based education be implemented are issues that need to be addressed. In the era of globalization, traditional education system is losing its relevance. In today's world, everything changes very rapidly and continuously. More skills are required to work with very fast developing technology. The educational institutions should produce graduates to cope with technological development. Thus to overcome the requirement, it is mandatory to shift from traditional education system to Outcome Based Education (OBE), which includes Program Outcomes (PO), Program Specific Outcomes (PSO), and Course Outcomes.

INTRODUCTION

With contrary to the fact that most teachers put the center of their attention too much on what they teach rather than on what their students learn, OBE emphasizes on what is expected from the student to finally achieve when they complete their course rather than how they achieved it. Outcome based education is defined as an approach to education in which decisions about the curriculum are driven by the outcomes the students should display by the end of the course-

professional knowledge, skills, abilities, values and attitudes- rather than on the educational process. It highlights the fact that you have to know the final destination of your journey before you start voyaging. Exploring new ways for designing tertiary education is a worldwide pursuit. There is a need for tertiary education to provide both professional knowledge/skills and all-round attributes to the graduates so as to enable them to face the diversified yet global demands of the 21st century society.

The attention now of different institutions of higher education in different nations is on students learning outcomes and assessment. The OBE comes in the form of competency-based learning standards and outcomes-based quality assurance monitoring. OBE is being recognized as the most important educational component of societies with knowledge based economy. OBE designed to achieve the predefined learning outcomes. OBE model of accreditation focuses on objectives and outcomes of an engineering programme. OBE starts with a clear picture of what a student should be able to do, design the curriculum, teaching-learning process and International Journal of Pure and Applied Mathematics assessment to ensure that the outcomes are attained. OBE model facilitates Continuous Quality Improvement (CQI).

TRADITIONAL EDUCATION SYSTEM

The traditional teaching style is often described as teacher-centered, lectures, curriculum centered, and formal in other words transmitting information from the teacher to the student. The traditional learning provides the learner with knowledge or skills, or both, but they are not coupled to a specific context – so the learning takes place in a vacuum and cannot be regarded as outcomes-based learning. It belongs to the input part of the learning process.

DEFINITION

Outcome-Based Education (OBE) is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.

SOME IMPORTANT ASPECTS OF THE OUTCOME BASED EDUCATION

1. Course is defined as a theory, practical or theory cum practical subject studied in a semester. For Eg. Engineering Mathematics
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 weightage.
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 predetermined objectives leading to the awarding of a degree. For Example: B.E., Marine Engineering
4. Programme Outcomes (POs) Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.
5. Programme 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 after graduation.
6. Programme Specific Outcomes (PSO) Programme Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline.

Usually there are two to four PSOs for a programme.

7. Graduate Attributes (GA): The graduate attributes, 12 in numbers are exemplars of the attributes expected of a graduate from an accredited programme. Knowledge levels for assessment of Outcomes based on Blooms Taxonomy.

LEVEL PARAMETER DESCRIPTION

K1 Knowledge It is the ability to remember the previously learned material/information

K2 Comprehension It is the ability to grasp the meaning of material.

K3 Application It is the ability to use learned material in new and concrete situations

K4 Analysis It is the ability to break down material/concept into its component parts / subsections so that its organizational structure may be understood

K5 Synthesis It is the ability to put parts/subsections together to form a new whole material / idea / concept / information

K6 Evaluation It is the ability to judge the value of material/concept/statement/creative material /research report) for a given purpose

THE 12 GRADUATE ATTRIBUTES IN OUTCOME BASED EDUCATION

1. Engineering knowledge

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

2. Problem analysis

Identify, formulate, research literature, and analyse complex engineering 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 cultural, societal, 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. that require consideration of appropriate constraints/requirements not explicitly given in the problem statement. (like: cost, power requirement, durability, product life, etc.)which need to be defined (modeled) within appropriate mathematical framework. that often require use of modern computational concepts and tools.

5. Modern tool usage

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, 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 and the consequent responsibilities relevant to the professional engineering practice

7. Environment and sustainability

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication

Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write 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 and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

DEFICIENCIES OF TRADITIONAL EDUCATION SYSTEM

✓ It was a rigidly structured curriculum process without any stakeholder participation in the decision-making process.

✓ It laid an emphasis on academic education which resulted in the development of skills being neglected.

✓ It was an inflexible and prescriptive curriculum.

✓ It was norm-referenced whereby learner achievement was compared to that of other learners and this resulted in excessive competition.

✓ Here is a gap between formal education and training for a career.

✓ Testing of learner achievement in terms of symbols or marks were often not a true reflection of the learner's actual performance.

✓ The emphasis was on differentiation in the form of a broad

variety of subjects.

✓ A teacher-centered, rather than a learner-centered classroom approach, was applied.

✓ It was a content-based curriculum whereby the teacher instructed and the learner memorized.

✓ Lack of collaboration and group learning

✓ Improper alignment between objectives, activities and assessments

✓ Lack of emphasis on soft skills needed in jobs like

✓ communication skills

✓ interpersonal skills

✓ Analytical skills

✓ Working attitude etc.

OUTCOME-BASED EDUCATION (OBE)

To compete in a global economy in a highly technological era, a country requires a workforce that:

- can solve problems
- is committed to ongoing learning
- is creative
- has above-average communication skills
- is in line with new technological developments
- is flexible
- can participate in management processes and decision-making and
- can work interactively.

OBE is a flexible, empowerment-oriented approach to learning. It aims at equipping learners with the knowledge, competence and orientations needed for success after they leave institution. Hence its guiding vision is that of a competent future citizen. Success at education institution level is of limited benefit unless learners are equipped to transfer academic success to life in a complex, challenging, high-technology future. OBE deals with the input- as well International Journal of Pure and Applied Mathematics Special Issue 1484 as the output processes. The key principle of OBE states that all activities (teaching, assessment, etc.) are geared

towards, not what the teacher is going to teach, but what the outcome of that teaching should be, what the learner is supposed to do and at what standard.

DEFINITION OF OUTCOMES-BASED EDUCATION

OBE is a comprehensive approach to organizing and operating a curriculum that is focused on and defined by the successful demonstrations of learning sought from each learner. The term clearly means focusing and organizing everything in an education system around "what is essential for all learners to be able to do successfully at the end of their learning experiences". OBE ultimately implies emerging with a vivid idea of what is important for learners to be able to do (determining the outcomes), thereafter developing the programmes for learning, implementing it and assessing the learner on a continuous basis to ensure that learning has ultimately taken place. The outcomes-based approach to education requires.

- Developing a clear set of outcomes organized into the system's subjects and
- Establishing conditions and opportunities within the system to enable and encourage learners to achieve these outcomes.

THE SHIFT FROM CONTENT-BASED EDUCATION TO OUTCOME-BASED EDUCATION

The aim of education is to prepare learners for life in society and for performing tasks. It is the intention of the outcomes-based approach to focus as much on the process of learning and the final outcome or result, as on the knowledge and skills. In this way, the process of achieving outcomes during the process of learning can be related directly to the way in which outcomes are achieved in the world of work. The outcomes-based approach requires a mind shift in the curriculum process and the way in which the learner should be empowered for the achievement of outcomes.

TABLE1. COMPARISON OF TRADITIONAL AND OUTCOME BASED EDUCATION

Traditional	OBE
Learners are passive.	Learners are active
The approach is exam-driven.	Learners are assessed on an ongoing basis.
Rote-learning is encouraged.	Critical thinking, reasoning, reflection and action are encouraged.
The syllabus is content-based and divided into subjects.	Content is integrated and learning is relevant and connected to real-life situations
Learning is textbook/worksheet-bound and teacher-centered	Learning is learner-centered; the teacher facilitates and constantly applies group work and team work to consolidate the new approach.
The teacher sees the syllabus as rigid and non negotiable.	Learning programmers are seen as guides that allow teachers to be innovative and creative in designing their programmes.
Teachers are responsible for learning and motivation depends on the personality of the teacher.	Learners take responsibility for their own learning and are motivated by feedback and affirmation of their worth

The purpose of OBE is to increase the knowledge and skills of the learners. By introducing OBE, opportunities may arise for people whose academic or career paths were stifled due to their prior knowledge not being assessed and certified, or because their qualifications had not been recognized for admission to further learning and employment.

FOCUS AND BENEFITS OF OBE

OBE addresses the following key questions:

1. What do we want the students to have or be able to do?
2. How can we best help students achieve it?
3. How will we know whether they students have achieved it?
4. How do we close the loop for further improvement (Continuous Quality Improvement (CQI))?

BENEFITS OF OBE

1. More directed & coherent curriculum.
2. Graduates will be more "relevant" to industry & other stakeholders (more well rounded graduates)
3. Continuous Quality Improvement (CQI) is in place. OBE shifts from measuring input and process to include measuring the output (outcome).

ORIGIN OF OBE

1. It is an International Partnership
2. In 1989 the six foundation signatory organizations from Australia, Canada, Ireland, New Zealand, the United Kingdom and United States observed that their individual processes, policies, criteria and requirements for granting accreditation to university level programmes were substantially equivalent. They agreed to grant (or recommend to registering bodies, if different) the same rights and privileges to graduates of programmes accredited by other signatories as they grant to their own accredited

programmes.

3. Full signatories as of 2017 are Australia, Canada, Ireland, New Zealand, United

Kingdom, United States, Hong Kong, China, South Africa, Japan, Singapore, Korea, Malaysia, Turkey, Russia

4. The following organizations hold provisional status:

Bangladesh, China, India, Pakistan, Philippines, Sri Lanka

OUTCOME SEQUENCE

The outcome of a programme may be accessed at different periods of study. But the outcomes at all levels are not mandatory. One or two levels are merged and cumulative. International Journal of Pure and Applied Mathematics Special Issue 1486 assessment may be enough. But the assessment must give significant scale value to measure the outcome at various levels. For example, programme outcomes, course outcomes may be the sufficient indicator of quality of outcome at the end of graduation period and course period respectively.

OBE FRAMEWORK

The OBE Framework is a paradigm shift from traditional education system into OBE system here there is greater focus on program and course outcomes. Also for the educational system to function effectively, OBE framework is identified. It guarantees that curriculum, teaching and learning strategies, and assessment tools are continuously enhanced through an evaluation process. Program Educational Objectives (PEOs) is defined as qualities or specific goals describing expected achievements of graduates in their career and professional life after graduation. These objectives are aligned with the vision-mission statement of the department and are defined in collaboration with the stakeholders from the industry partners, students, parents, alumni, faculty and administration. The PEOs

will be assessed three (3) to five (5) years after the students graduated from college through a tracer study and employers questionnaire surveys. The data obtained from the assessment will be used as basis for the improvement of the existing PEOs.

PROGRAM OUTCOMES (PO)

At the heart of OBE are the Graduate Attributes. The Graduate Attributes, also referred to as Program Outcomes, stated in Washington Accord, which are given below .

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

2.Problem analysis: Identify, formulate, research literature, and analyze complex engineering 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 the public health and safety, and the cultural, societal, and environmental considerations.

4.Investigation: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5.Modern tool usage: Create, Select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities 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 and the consequent responsibilities relevant to the professional engineering practice.

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

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

9.Individual and team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and International Journal of Pure and Applied Mathematics Special Issue 1488 write 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 and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

OBE FRAMEWORK MAPPINGS

All courses under the academic programme would have their own course outcomes or also commonly known as CO. These COs are produced based on the requirement of the programme outcomes (PO). Each CO will be mapped to PO (the CO-PO) matrix. The PO will be then mapped to

the programme educational objectives shows an example of relationship between CO, PO and PEO.

OBE ASSESSMENT

Assessments can provide direct or indirect measures of student learning.

1. Direct measures require students to demonstrate their achievement and often involve quantitative measurement procedures. Indirect assessment is based on opinions.

Direct evidence of student performance or attainment relies upon direct scrutiny or examination of student performance or attainment for individual students. These methods allow you to collect the evidence of student learning or achievement directly from students and the various works they submit to you (assignment, exam, term paper, project, Laboratory Tests, Quizzes and etc.). Indirect evidence of student achievement requires that faculty infer actual student abilities, knowledge, and values rather than observe direct International Journal of Pure and Applied Mathematics Special Issue 1489 evidence of learning or achievement. Indirect methods provide the perspectives of students, faculty or other people who are concerned with the course or program or institution, such as alumni.

ATTAINMENT OF OUTCOMES

The process of attainment of COs, POs and PSOs starts from writing appropriate Cos for each course of the program from first year to the period of the program. The course outcomes are written by the respective faculty member. Then, a correlation is established between COs and POs in a fixed scale value for example, 1 being the slight (low), 2 being moderate (medium) and 3 being substantial (high). A mapping matrix is prepared in this regard for every course in the program. The overall attainment of outcomes of a program (POs) is computed by adding direct attainment

and indirect attainment values in a fixed proportion and compared with the set value. Any deviations from the set value, then the system should be improved so that to reach the set value. This should be done continuously till the attainment of set value. This is called the continuous improvement and also the strength of the OBE.

CONCLUSION

This paper provides an overview of the key characteristics of Outcomes-Based Education and its application in various contexts. The approach is based on sound educational principles and provides a robust framework for students to acquire the necessary fitness to practice. The level of educator's understating of OBE is still very low. For successful implementation of OBE, the educators should understand the OBE system. All of sudden the traditional approaches should not be thrown away, but should be used as a means towards implementing OBE. Educators should change or improve their ways of instructing and accessing the learner's work. Affiliating universities should frame the curriculum, students assessing system (Examination question pattern) and teaching methodologies in such a way that the students should realize the importance of OBE system. It is necessary to find methods to implement the twelve graduate attributes individually in a successful manner. Also the entire academic institutions in the nation should follow the common way of producing the graduates following the OBE system. Then only the importance of OBE can be realized.

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