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An overview of Outcome Based Education, Graduates Attributes and Program Outcomes

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Abstract

Outcome based Education is nothing but the outcome of the students i.e. what is the role of the students after completing their Programme. We should have the proper teaching learning methodology – what are the tools available for the course, Course objective, Program objectives of what we teach. Based Education (OBE) is an important demonstration Tool for student-centered instruction that focuses on measuring student performance through outcomes. The graduate attributes adopted by the Washington Accord signatories are generic to the education of professional engineers in all engineering disciplines. Programme Outcomes are narrow statements that describe what the students are expected to know and would be able to do upon the graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme.

Keywords: OBE, Graduate Attributes (GA), Program Educational Objectives (PEO), Program Outcome (PO), Program Specific Outcome (PSO), Course Outcome (CO)

Introduction

Outcome based Education is nothing but the outcome of the students i.e. what is the role of the students after completing their Programme. Before

going to deliver the lecturer in the classroom, the teacher should fix the outcome and decide the Curriculum. We should have the proper teaching learning methodology – what are the tools available for the course, Course objective, Program objectives of what we teach. There are 3 types of OBE i.e. Traditional OBE, Transition OBE AND Transformation OBE. Existing curriculum we have to write outcome with actual time table and normal class hours is traditional OBE. The student's wants to place in the industry, the teacher should be updated. Traditional OBE focused on the main loyalty, blooms taxonomy and knowledge. Transformation OBE focus that the students should be considered as the future citizen. Principles of OBE are designing; high expectation of the student and extended opportunities. The vision and mission of the department and college should be framed. The outcome is the student's position at the time of employment after getting degree. Program outcomes, Program specific Outcome, Domain specific outcome should be designed. Outcome based education to skill and 5 units should have 5 outcomes. PEO should be measurable, appropriate, realistic, time bound and achievable– based on the needs of stakeholders (parents, society and faculty also). Prepare program specific outcome. Learning outcome should be analysed at the end of the course. Faculty should try to develop learning resources like video files, audio files, open source software. (IQAC, 2019)

Outcome Based Education (OBE)

Outcome-Based Education (OBE) model is being adopted at a fast pace at Engineering colleges in India at the moment. It is considered as a giant leap forward to improve technical education in India and help Indian Engineers compete with their global counterparts. Outcome Based Education (OBE) is an important demonstration Tool for student-centered instruction that focuses on measuring student performance through outcomes.

Quality assurance and improvement process is about determining whether the set educational objectives meet a general standard of quality. Emphasis of outcome-based education (OBE) system is on quantifying what the students are capable of doing and learning outcomes of the students is one of the key components. Course Outcomes are the statements indicating knowledge and skills the student is expected to acquire at the end of a course. Program outcomes represent the knowledge, skills and attitudes the students should have at the end of program. Program outcomes can be directly measured through course outcomes. The outcome-based education model is based on defining various parameters called as Graduates Attributes (POs). (NEC, 2022)

Graduate Attributes

The graduate attributes adopted by the Washington Accord signatories are generic to the education of professional engineers in all engineering disciplines. They categorize what graduates should know, the skills they should demonstrate and the attitudes they should possess. The graduate attributes have been refined over more than a decade and in 2013 were adopted by the signatories as the exemplar (or reference point) against which substantial equivalence of their own accreditation requirements are to be assessed. In addition, the graduate attributes are intended to assist signatories and provisional members to develop outcomes-based accreditation criteria for use by their respective jurisdictions.

For Washington Accord Graduate

Engineering Knowledge:

- **WA1:** Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to the solution of complex engineering problems.

Problem Analysis

- **WA2:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (WK1 to WK4)

- **Design/ development of solutions:** WA3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (WK5)

- **Investigation:** WA4: Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

- **Modern Tool Usage:** WA5: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems, with an understanding of the limitations. (WK6)

The Engineer and Society:

- **WA6:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (WK7)

Environment and Sustainability:

- **WA7:** Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (WK7)

Ethics:

- **WA8:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (WK7)

Individual and Team work:

- **WA9:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

Communication:

- **WA10:** Communicate effectively on complex engineering activities with the engineering community and with 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.

Project Management and Finance:

- **WA11:** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Lifelong learning:

- **WA12:** 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.

(AcreditaCI, 2022)

Program Outcomes as defined by NBA (PO)

Engineering Graduates will be able to:

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, review 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. Conduct investigations of complex problems: 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 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.

((NBA), 2022)

Conclusion:

Outcome Based Education is one of the critical objectives of the state of the art engineering and management education. Program outcomes inspect what a program or process is to do, attain, or complete for its own improvement and/or in support of institutional or divisional goals: In general, it is numbers, needs, or satisfaction driven. It addresses quality, quantity, fiscal sustainability, facilities and infrastructure, or growth. Towards the same, Graduate Attributes by Washington Accord and Program Outcomes by National Board of Accreditation has to be disseminated and practiced at the best.

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