ISSN : 2394-2975 (Online)
ISSN : 2394-6814 (Print)
Vol. 4, Issue 1 (Jan. - Mar. 2017)
International Journal of Advanced Research in Education & Technology (IJARET)

An Outcome Based Education (OBE): An Overview

[I]Duradundi. Sawant. Badkar, [II]Dipak. N. Mudgal
[I]Dept. of Mechanical Engg, [II]Dept. of Civil Engg
[I,II]Shri Balasaheb Mane Shikshan Prasarak Mandal Ambap's, Ashokrao Mane Group of Institutions, Vathar Tarf Vadgaon, Dist: Kolhapur, Maharashtra State, India.

Abstract
Outcome-based education (OBE) means clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences. This paper presents the review the operating principles, beliefs, learning and features of outcome-based education, essentials of genuine outcome-based models, and how the effects of OBE on students and institute depends on which implementation approach is used. Major developments have been made with the move towards the outcome-based education (OBE) in technical education and learning outcomes are on today's agenda. Learning outcomes have been specified in a number of areas and frameworks or models for communicating and presenting learning outcomes have been described. OBE has, however, two requirements. The first is to make the learning outcomes explicit and the second is the use of the specified outcomes as a basis for decisions about the curriculum. It is the second requirement that is often ignored. This paper describes how learning outcomes are used in the development of an information systems curriculum.

Keywords
Outcome Based Education: principles of OBE: essentials of OBE.

I. Introduction

There is no one agreed version of outcomes-based education and different versions may show an outcomes-based influence in different ways. However, we can make a broad division between curriculum frameworks where outcomes based education has been mixed with an existing curriculum approach, and the more 'official' account of outcomes-based education that has been developed by William Spady and his colleagues. In the discussion below we will refer to the first, mixed, approach as "lowercase" outcomes-based education (OBE) and to Spady's account as "upper case" outcomes-based education (OBE). William G Spady said that "an Outcome-based Education (OBE) means focusing and organizing an institutes entire programs and instructional efforts around the clearly defined outcomes we want all students to demonstrate when they leave institute". This means starting with a clear picture of what is important for students to be able to do, then organizing curriculum, instruction, and assessment to make sure this learning ultimately happens. The keys to having an outcome-based system are:

1. Developing a clear set of learning outcomes around which all of the system's components can he focused.
2. Establishing the conditions and opportunities within the system that enable and encourage all students to achieve those essential outcomes.

William G Spady pointed out "an Outcome-based Education is NOT a program, a package, a technique, a fad, a quick-fix, a panacea, a miracle or an event. It is transformational way of doing business in education" [1]. As per kudlas J.M. "OBE is a process that focuses on what is to be learned - the outcomes" [2].

William G Spady et al. noted that "The basic tenets of OBE are shifting the focus of educational activity from teaching to learning; skills to thinking; content to process; and teacher instruction to student demonstration" [3]. As stated by Spady, W. D. "An outcome based education is a culminating demonstration of learning. It is a demonstration of learning that occurs at the end of a learning experience. An outcome is the result of learning which a visible and observable demonstration of three things is: knowledge, combined with competence, combined with orientations" [4]. According to James, "Education that is outcome-based is a learner-centered, results-oriented system founded on the belief that all individuals can learn" [5].

As said by William G. Spady and Kit J. Marshall, "Outcomes are clear, observable demonstrations of student learning that occur after a significant set of learning experiences. They are not values, attitudes, feelings, beliefs, activities, assignments, goals, scores, grades, or averages, as many people believe. Typically, these demonstrations, or performances, reflect three things:

(1) What the student knows;
(2) What the student can actually do with what he or she knows;
(3) The student's confidence and motivation in carrying out the demonstration. A well-defined outcome will have clearly

defined content or concepts and be demonstrated through a well-defined process beginning with a directive or request such as 'explain', 'organize', or 'produce'"[6].

Boschee F, Baron and M.A, revealed that "Outcomes are future oriented, publicly defined, learner-centered, focused on life skills and contexts; characterized by high expectations of and for all learners, and sources from which all other educational decisions flow". As per the statement given by Boschee F, Baron and M.A, "Learning is facilitated carefully toward achievement of the outcomes, characterized by its appropriateness to each learner's development level, and active and experienced-based"[7]. Stephen Adam summarized that outcomes are usually defined in terms of a mixture of knowledge, skills, abilities, attitudes and understanding that an individual will attain as a result of his or her successful engagement in a particular set of higher education experiences. Stephen Adam in his literature also mentioned that "Learning outcomes can provide a clear focus on what students achieve and lead to better qualifications and an improved student experience"[8].

Towers, James M. highlighted that to make the outcome-based system work, the following four points are necessary. First, what the student is to learn must be clearly identified. Second, the student's progress is based on demonstrated achievement. Third, multiple instructional and assessment strategies need to be available to meet the needs of each student. And finally, adequate time and assistance need to be provided so that each student can reach the maximum potential" [9].Tucker B. defined the process of OBE in such way that "Outcomes based education (OBE) is a process that involves

ISSN : 2394-2975 (Online)
ISSN : 2394-6814 (Print)

the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than the accumulation of course credits" [10]. Suskie, L, assessed OBE as, "an expected learning outcome is a formal statement of what students are expected to learn in a course. Expected learning outcome statements refer to specific knowledge, practical skills, areas of professional development, attitudes, higher-order thinking skills etc. that faculty members expect students to learn, develop, or master during a course" [11]. In order to adapt to these challenges, universities worldwide are thinking about how to redesign their academic models. A recent US national panel report calls for a dramatic reorganization of undergraduate education to ensure that all college students receive not just access to college, but an education of lasting value. The report also recommends colleges help students become "intentional" life-long learners, and to create new assessments that require students to apply their learning to the real world [12].

It is stated clearly not what the lecturer is going to teach, but what the outcome of that teaching is intended to be and at what standard. We also need Assessment Tasks that tell us not how well students have received knowledge, but how well they can use it in academically and professionally appropriate ways such as solving problems, designing experiments and communicating with clients.

This paper presents the review the principles of outcomes-based education with an emphasis on beliefs and features and design principles and essentials.

II. Beliefs and Features of Outcome-Based Education (OBE)

Spady, W. D, in his book, "Outcomes Based Education: Critical Issues and Answers" highlighted the following seven Beliefs and Features of Outcome-based Education (OBE) [1].

1. All students can learn and succeed, but not on the same day in the same way.
2. Success breeds success.
3. Schools control the conditions of success.
4. It emphasizes authentic, achievable and assessable learning outcomes.
5. It is primarily concerned with what students' culminating capabilities at graduation time. It centers curriculum and assessment design around higher order exit outcomes.
6. It is accountable to the stakeholders, the learners, the teachers, the employers and the public.
7. It leads to the change of schooling, including the curriculum, instruction and assessment.

III. Operating Principles of OBE

William G Spady focused on the following four Operating Principles of OBE [1].

- Clarity of focus, meaning that all activities (teaching, assessment, etc) are geared towards what we want students to demonstrate;
- Expanded opportunity, meaning expanding the ways and numbers of times kids get a chance to learn and demonstrate a particular outcome;
- High expectations, meaning getting rid of the bell-curve and all students should achieve at the highest level;
- Design down, meaning designing the curriculum from the point at which you want students to end up.

IV. Learning Outcomes [Washington Accord-Graduate Profiles

Knowledge and skills for the 21stcentury are mentioned below [13].

1. Academic Education

Completion of an accredited programme of study typified by four years or more of post-secondary study

2. Knowledge of Engineering Sciences

Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models

3. Design/development of solutions

Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and an d safety, cultural, societal and environmental considerations.

4. Investigation

Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

5. Modern Tool Usage

Create, select and apply appropriate techniques, resource, and modern engineering tools including prediction engineering tools including prediction and modeling, to complex engineering activities with an understanding of the activities, with an understanding of the limitations.

6. Individual and Team work

Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings and in multi-disciplinary settings

7. Communication

Communicate effectively on complex engineering activities with the engineering community and with society at large, such being able to comprehend and write effective reports and design documentation make effective presentations, and give and receive clear.

8. The Engineer and Society

Demonstrate understanding instructions of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

9. Ethics

Understand and commit to professional ethics and responsibilities and norms ethics and responsibilities and norms of engineering practice.

10. Environment and Sustainability

Understand the impact of engineering solutions in a community context and demonstrate knowledge of and need for sustainable development.

11. Project Management and Finance

Demonstrate acknowledge and understanding of management and business practices, such as risk and change management, and understand change management, and understand their limitations.

12. Life Long Learning

Recognize the need for, and have the ability to engage in independent and life-long learning.

V. The Essentials of OBE

- In OBE, what matters ultimately is not what is taught, but what is learned;
- Teachers must set appropriate course intended learning

outcomes, instead of teaching objectives;
- Constructive alignment: What we teach, how we teach and how we assess ought to be aligned with the intended learning outcomes, such that they are fully consistent with each other;
- The quality of teaching is to be judged by the quality of learning that takes place;
- All OBE approaches take a criterion-based view of assessment and focus on what students can do with knowledge after a period of learning.

VI. Current Practice And Critical Issues For Engineering Education

In recent years studies have been conducted in many countries to determine the technical and personal abilities required of engineers by today's industry [14]-15]. These studies have indicated some key concerns. Today's engineering graduates need to have strong communication and teamwork skills, but they don't. They need to have a broader perspective of the issues that concern their profession such as social, environmental and economic issues, but they haven't. Finally, they are graduating with good knowledge of fundamental engineering science and computer literacy, but they don't know how to apply that in practice. These studies have informed reviews of engineering education conducted in several countries [16]-17] and have had a major influence on the revision of national accreditation criteria for engineering programs in countries such as the USA [18], UK [19] and Australia [20]. The new accreditation approach shifts emphasis away from "what is being taught" to "what is being learned" [21]. Engineering programs are now required to demonstrate that their graduates are achieving a set of specified learning outcomes, and the means of demonstrating this is left to each university to decide and implement. There are also some requirements in each country for increased management education, design education and industry relevance of programs. If the industry studies, accreditation criteria and reviews of engineering education are examined it is clear that the profession, the industry employers and the students themselves are calling for significant changes to the current philosophy and delivery of engineering education. What are the critical issues that need to be addressed? These can be summarized as follows:

1. Engineering curricula are too focussed on engineering science and technical courses without providing sufficient integration of these topics or relating them to industrial practice. Programs are content driven.
2. Current programs do not provide sufficient design experiences to students.
3. Graduates still lack communication skills and teamwork experience and programs need to incorporate more opportunities for students to develop these.
4. Programs need to develop more awareness amongst students of the social, environmental, economic and legal issues that are part of the reality of modern engineering practice.
5. Existing faculty lack practical experience, hence are not able to adequately relate theory to practice or provide design experiences. Present promotion systems reward research activities and not practical experience or teaching expertise.
6. The existing teaching and learning strategies or culture in engineering programs is outdated and needs to become more student-centred.

Modern Approach to Curriculum Design

- Select course objectives which promote higher order thinking skills such as Analysis, Synthesis, Evaluation and Creativity
- Express the objectives as knowledge, skills and attitudes which the students should be able to demonstrate on successful completion of the course, using measurable Action Verbs.
- Take advantage of ICT tools to make these available to everyone concerned well in advance.

Tomorrow's World of Education Outcome-based Learning

At the end of a four year program of study, graduates need to demonstrate the mastery of not only a well chosen set of domains specific learning objectives, but also a set of domain independent but also a set of domain independent learning outcomes. It is challenging that how to ensure mastery over not only the domain knowledge but only the domain knowledge but also over knowledge, skills and attitudes needed for the 21st century. The leading teaching pedagogy for engineering education still remains "chalk and talk", despite the large body of education research that demonstrates its ineffectiveness. In recent years, the engineering profession and the bodies responsible for accrediting engineering programs have called for change in academic excellence in technical education.

VII. Conclusion

The key benefit of this approach is that we can actually see what students have learned and adapt our pedagogical approach in response to this valuable feedback. The OBE accreditation process is one of assurance and building of trust and once this position has been established then all parties can work cooperatively to further the quality of engineering education for students and society. Outcome-based systems are built around outcomes and flexibly use time and other critical resources to accomplish those outcomes for all students. Outcomes are clear demonstrations of learning not values, attitudes, internal mental processes, or psychological states of mind. It is too early to assert the effectiveness of this newly adopted academic model. The challenges that face the faculty members are numerous; some issues that need to be addressed are how to effectively integrate learning outcomes in courses, how to assess students in a way that will contribute to their learning experiences and how to shift the focus from input/lecturing to feedback/learning.

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