REVIEW ARTICLE

Outcome-based approach to medical education towards academic programmes accreditation: A review article

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Abstract

The rapid change worldwide, as a consequence of advances in science and technology, necessitates the graduation of well-qualified graduates who have the appropriate knowledge and skills to fulfill specific work requirements. Hence, redesigning academic models by focusing on educational outcomes became the target and priority for universities around the world. In this systematic review we collected and retrieved literature using a selection of electronic databases. The objectives of this report is to: 1) provide an overview of the evolution of outcome-based education (OBE), (2) illustrate the philosophy and principle of OBE, (3) list the OBE advantages and benefits, (4) describe the assessment strategies used in OBE, and (5) discuss the role of teachers and students as key elements. In conclusion, there is growing interest by the Saudi government to provide student-centered education in their institutes of higher education to graduate students with the necessary knowledge and skill experiences. Moreover, OBE is considered a holistic approach which offers a powerful and appealing way of reforming and managing medical education for mastery in learning and to meet the prerequisites for local and international accreditation.

Keywords: Outcome-based education, Learning outcomes, Competencies, accreditation, Medical education.

Introduction

In the era of rapid science and technology advancement, higher educational institutions need to provide programmes that are relevant and appropriate to prepare graduates for the global labour market and improve employability.[1,2] Moreover, employers are demanding that university graduates not only have the knowledge but the appropriate skills to be effective and productive in the workplace.[3]

Retention and transfer are two of the crucial targets in the educational process. Retention is based on memorizing and recalling the information the same as it is taught during the learning process. On the other hand, transfer deals with the capability to utilize what was learned in answering new questions or facilitating learning new subject matter which eventually reinforcing the meaningful of learning.[4] Moreover, traditional class settings of many current educational systems rely upon teachers who serve as the main source of information. Such transferred knowledge is assessed later in written examinations without emphasis on how to utilize the transferred information in the later parts of the course or the following courses.[5,6] Traditional education focuses on the input that frequently results in rote memorization as the default "learning" outcome.[5,7] Many criticisms have been directed towards the traditional curriculum design. One of these limitations is the overcrowding of the curriculum with overemphasis on certain subjects and the inclusion of some less relevant subjects which have been shown to have a negative impact on students' academic achievement and the educational environment.[8,9]

In view of these limitations and the tasks required, medical institutes worldwide have been increasingly confronted with the challenge of making their curricula more meaningful and focusing on educational outcomes to produce doctors oriented to the real needs of the community.[3,10,11] Educational outcomes are the knowledge, skills, and abilities that learners have attained as a result of a particular set of educational experiences. The process involves "sticking" with the student until he or she attains the required outcome. The outcomes should be achievable and assessable, transparent and fair, and reflect the result of learning, not the process.[12]

Outcome-based education (OBE) has been defined as "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".[13-15]

The use of the verb "to do" in the definition emphasizes the aspect of competency rather than the way in which this ability is demonstrated.[2] A competent person has been considered as the one that beside possession of the

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required competencies, he or she is able to use these competencies to make appropriate decisions and judgments according to the context.[16]

The overarching aim of this review is to give a systematic overview of the literature on outcome-based education (OBE) as a performance-based approach for mastery learning and meet the prerequisites for accreditation standards locally and internationally.

Literature Search Procedure

Literature was collected and retrieved during October-November 2015 using a selection of electronic databases: Taylor & Francis Online — Journals, MEDLINE [NLM], Wiley Online Library, SpringerLink, ScienceDirect. For those articles, which need subscription, we utilized the e-journals databases of the academic digital library, Qassim University and Saudi Digital library (SDL).

Only articles published in the English language were considered/reviewed and cited. The search terms used were: outcome-based education, learning outcomes, assessment, competencies, accreditation, and medical education

Evolution of OBE

Much of the work on the development of OBE was carried out in the USA pre-university education which demonstrated problems that necessitate a need for reform of the educational system to show clarity of focus, expanded opportunity, and high expectations.[17]

The basic idea of emphasizing educational objectives had been given its definitive form by Ralph Tyler as early as 1949.[18] The concept of Tyler`s oriented rationale for curriculum design is based on four questions: what educational objectives should the institute aim to achieve?, how does one select learning experiences that are likely to be useful in attaining these objectives?, how should learning experiences be organized for effective instruction? i.e., teaching strategies, and finally how would the effectiveness of learning experiences be evaluated?[19,20]

Following Tyler, John Carroll (1963) suggested that given sufficient time, virtually all students could learn what typically only the strongest learn.[21] This model posits that student learning is dependent on two variables: the amount of time a student spends learning a task and the amount of time a student needs to spend on the task in order to master it. Accordingly, the amount of learning varies directly with the first variable (time on task) and inversely with the second (time needed to learn).[22] Additionally, Carroll's model suggests that both the increased effort for student potentialities and the appropriate designing of instruction to these potentialities lead to the achievement of equal opportunity of learning within a diversity of educational objectives.[23]

Carroll claimed that it was not logic to expect variable results from students if the time for learning was fixed. Therefore, to evaluate student performance it is necessary to consider a uniform minimum standard for all students would be expected to achieve and also give the needed time to achieve it.[17,24]

Carroll's thinking was translated into the notion of mastery learning by Benjamin Bloom, Tyler's former Ph.D. student, in which a fixed level of performance was to be achieved by students by changing the relationship between time and learning. The learning became fixed and the time to achieve the learning became the variable. These concepts became the principal educational elements for OBE.[17] Bloom established a taxonomy of three learning domains which are believed to be important in the learning process. These learning domains in Bloom's Taxonomy are cognitive, affective and psychomotor. Cognitive outcomes, which have been the most widely recognized and utilized, generally refer to the content knowledge that students can comprehend, explain, analyze and apply. Affective outcomes are related to attitudes which usually involve changes in beliefs or the development of certain values such as ethical behavior, empathy, or respect for others. Psychomotor (skills) outcomes refer to the capacity to do things, including problem solving, or performing certain technical procedures in a task.[25,26]

The cognitive domain was further classified into the six major categories, which were ordered from simple to complex and from concrete to abstract, including knowledge, comprehension, application, analysis, synthesis, and evaluation. The mastery of each simpler category was prerequisite to mastery of the next more complex one.[27] The complete structure of the Bloom`s Taxonomy[28] is shown in Table-1.

After Bloom came Robert F. Mager whose guidelines adhere to principles of writing learning outcomes in terms of the expected student performance, the conditions under which it is attained, and the standards or the level of competence for assessing quality.[20,26] Clear understanding and articulation of intended learning outcomes facilitates the design of an effective curriculum and appropriate assessments to measure achievement, and to plan the learning process for individual students.[12,29]

Table-1: Bloom`s Taxonomy; description and ordering of the categories in cognitive domain.[28]

Level	Description	
Knowledge	Focuses on recall or recognizing information, ideas, and principles in the approximate form in which they were learned	Lower order thinking skills
Comprehension	Focuses on the ability to grasp the meaning and understanding the information memorized	
Application	Focuses on ability to use learned material in new and concrete situations and includes applying rules, methods, concepts, principles, and theories	
Analysis	Focuses on the ability to use critical thinking skills to break down material into its component parts and may include identification of the parts, analysis of the relationship between the parts, and recognition of the organizational principles involved	
Synthesis	Focuses on the ability to put parts together to form a new whole. The student originates, integrates, and combines ideas into a product, plan, or proposal that is new to him or her.	
Evaluation	Focuses on the ability to judge the value of material for a given purpose. The judgments are based on defined criteria that are either developed by the student or given to the student by an outside source	Higher order thinking skills

Later, Harden published a report describing OBE as "a performance-based approach at the cutting edge of curriculum development that offers a powerful and appealing way of reforming and managing medical education". In the words of Harden, the learning outcomes in OBE required to be identified, explicit and communicated to all concerned as well as to be the overriding issue in all curriculum and teaching decisions.[18]

Philosophy & Principle

Teaching and learning occur in three interlocking phases: input, process, output.[6,30] OBE is principally concerned with intended student learning outcomes instead of what students are taught (input).[5] In fact, OBL is a "designing down" approach in the development of the curriculum.[12] First the intended learning outcomes should be emphasized and pre-determined then going backward with curriculum design, instructional materials, and assessments to support and facilitate the intended outcomes. OBE approach, which is described as an eclectic educational philosophy, can equip the graduates with the necessary skills and capabilities before they enter the workplace.[14,20,31]

OBE can influence the whole process of education including decisions about the content of the curriculum, formulation of aims, educational strategies, design of teaching methods, assessment procedures, and the educational environment, as shown in Figure-1.[32,33]

Furthermore, there are three basic premises that underpin OBE and serve as a rationale for OBE implementation. The first premise states that the learning and success among students differ in rate and style from one student to another. The more comprehensively teachers understand the differences in students' motivation and attitudes about teaching and learning processes, the greater the possibility of meeting the diverse learning needs of the students. The second premise highlights that successful learning promotes even more successful learning. The third premise claims that the conditions which determine the students` learning successfulness are controlled by schools and teachers.[13,34]

Identify the desired outcomes
(What do you want the students to learn? Why should they learn it?)
↓
Specify the teaching strategies to achieve those outcomes
(How can you best help students learn it?)
↓
Determine assessment measures for the achievement of outcomes
(How will you know if they have learnt it?)

Figure-1: The process of designing OBE programme curriculum.[32]

Four basic principles of OBE were developed from the three premises above. First, intended learning outcomes should be clear for both students and teachers; second, using the learning outcomes as the basis for designing the curriculum upon which all teaching strategies and assessment methods and planning decisions are directly linked; third, encouraging students to engage deeply in what they are learning by establishing high challenging standards of performance; fourth, giving appropriate opportunities for all students helps most students to achieve high standards of performance and overcomes the differences in learning rates and learning styles among students.[31]

Advantages and Benefits of OBE

A. More directed and coherent curriculum

OBE is a sophisticated strategy for curriculum planning. The designing back of the curriculum based on the intended learning outcomes offers the pathway to desired performance. In other words, the OBE can be used as a framework for designing learning outcomes at the

courses' level which curriculum mapping with the programme learning outcomes that ultimately lead to optimal learning experiences or desired outcomes.[32,35]

Clear intended learning outcomes should be developed from programme objectives which in turn are based on the needs of students and stakeholders and the institutional mission statement.[36] Moreover; outcome-based approach identifies specifically what the learners should to be able to do once they have completed a course or programme with acquired content knowledge and skills.[37]

B. International Trends & Globalization of Education

Medical education is facing vertiginous challenges to fulfill the populations' health needs. These demands impose the importance for establishing reference standards in order to ensure the degree of mastery of the outcomes.[38] In addition; future health care practitioners should have the competencies to work in a globalized arena with an increased emphasis on education for life-long learning.[35]

Therefore, the OBE has been implemented and gained prominence recognition worldwide in order to achieve the demand for education reform. OBE has been adopted in medical institutes around the world including the USA, Canada, United Kingdom, Australia, New Zealand, South Africa, Hong Kong, India, China, and Malaysia.[14,38]

Moreover, the learning outcomes model has been approved to create an integrated European Higher Education Area as stated in the Bologna Process policies.[2] The target for 2010 was that all programmes offered by higher education institutions should be based on the concept of learning outcomes and that curricula should be redesigned to reflect this goal. Thus, through developing the national qualifications frameworks, all European academic degrees (Bachelor and Masters) were described in terms of learning outcomes, workload, level, competences and profile.[25]

In the Middle East, many Arab countries have come to identify a good education system as a cornerstone of economic progress. Efforts have been made to develop and implement comprehensive education-reform programmes that can result in a skilled, knowledge-based workforce in line with socioeconomic goals.[39] For example, the Qatar University in Qatar has adopted outcome-based education and invested considerable resources, time, and effort in establishing the academic programme learning outcomes to improve student attainment. The quality assurance procedures implemented in Qatar University provide the evidence for the quality of education and learning experiences received by the students. Also, these procedures demonstrate the added value and contribution of the university to the community.[40]

C. Local Accreditation is moving towards OBE

Due to local development needs; the United Nations Educational Scientific and Cultural Organization (UNESCO) supported efforts in the Arab countries to improve quality assurance in higher education. UNESCO held conferences and organized training sessions that enhanced Higher Education Institutions quality and accelerated the growth of quality assurance agencies in each country, including the Gulf countries.[41]

National Commission for Academic Accreditation & Assessment (NCAAA), an independent authority reporting directly to the Higher Council of Education in Kingdom of Saudi Arabia (KSA), is involved in the fulfillment of three major quality objectives. These objectives include the quality of students' learning outcomes, monitoring the efficiency of management and support services, and evaluating the quality and impact of research and community development contributions.[42-44]

To achieve these three objectives, NCAAA has developed a set of eleven standards which are generally accepted as good practice in higher education throughout the world and adapted to the particular circumstances of higher education in the KSA.[45] NCAAA Standard #4 states that all courses should contribute to the programme's intended learning outcomes. The student learning outcomes must be clearly specified, consistent with the National Qualifications Framework (NQF) and requirements for employment or professional practice. The five domains of learning provided in the NQF are knowledge, cognitive skills, interpersonal skills and responsibility, communication, information technology and numerical skills, and psychomotor skills.[24,44]

D. OBE as framework for measurements of quality

The quality of medical education is reflected by the quality of health care services delivered to patients.[10] The paradigm shift towards outcomes-based curricula increases the relevancy of the education for the learners` real practice of medicine.[33] Most stakeholders develop standard operating procedures for their organizations to achieve set outcomes and organizational goals. One of the key principles of OBE is the linkage of the quality of teaching and learning to the achievement of learning outcomes.[2,12]

Moreover, one of the notions of total quality management embraces the principle that organizations should listen to those whom they serve, continually evaluate how well they are responding to the needs of their constituencies, and initiate change to meet or exceed the expectations of these groups. That is, OBE builds evidence for institutional accountability and improvement.[12,37,46]

E. Global mobility for Professional Practice

The most significant application of OBE has been demonstrated in European universities as part of the Bologna Process designed to create a barrier-free European Higher Education Area.[12] Intended Learning Outcomes for courses and curricula were brought to the fore as a means for transparency, mobility and accountability.[35]

In line with the globalization, Saudi Arabia has made huge efforts to standardize the frameworks of undergraduate medical education by establishing outcome-based patterns and creating a uniform competency model.[47]

Assessments in OBE

Two distinct terms are commonly used in the educational process: assessment and evaluation. Assessment is a comprehensive term for the quantitative judgment of student's performance with the ultimate purpose to validate learning outcomes.[20,48] Pragmatically, assessment is the most appropriate engine on which to harness the curriculum.[49] In the other hand, evaluation is the overall complete judgment of student's performance which covers both the quantitative as well as qualitative fields.[50,51]

To promote the learning process and its quality, assessment should have formative and summative functions. The formative assessment intends to generate feedback on students' achievements to improve student learning. In other words, students learn from tests and receive feedback on which to build their knowledge and skills.[52,53] Summative assessment provides assurance that graduates have met minimum standards and are 'fit for practice', that is, making an overall judgment about competence, fitness to practice, or qualification for advancement to higher levels of responsibility.[49,54]

To verify student learning, there are many assessment methods or strategies like exams, portfolios, log books, lab reports. The combination of using more than one method can partially compensate for flaws in any one method.[53]

For interpretation of results and evaluating students' learning outcomes, the criterion-referenced evaluation (CRA) methods are commonly used. The CRA focuses on the expectation of student's learning, skills they should have in order to obtain a higher grade.[31,55,56] In other words, criterion referencing provides a basis for assessing the performance of examinees in relation to specific criteria and standards rather than in relation to other examinees, as with norm-referenced tests.[57]

OBE provides a new paradigm of teaching and learning in which the students at all times focus on the goals of their learning, assessment methods, and their status in relation to each of those goals.[58]

Role of Teachers and Students in OBE

Beside the student, the teacher is a major asset in the learning process. In keeping with the changes in curriculum development, today's teacher has to be prepared for many roles and appropriate training in teaching and learning methods.[59]

In outcome-based approach, the role of faculty members shifts to being advisors, mentors, and guides. The teacher becomes more a facilitator learning by stimulating creativity, self-learning, and critical thinking. In addition, teachers have to focus on the outcomes of education rather than merely teaching information.[60]

The other partner in OBE, the student, is actively engaged in the learning process rather than simply passively receiving information from a lecture by the instructors. Learner-centered methods of content delivery allow students the opportunity to control their learning and thus to take the responsibility for their learning.[61]

Conclusion

This review demonstrates the importance of graduating well-qualified graduates with not only the knowledge but also the appropriate skills to meet market needs. Outcome-based education can be described as a performance-based approach for mastery learning in which a fixed level of performance is to be achieved by students at the end of their learning experiences. This approach places the students at the center of the educational enterprise and actively engages them in the learning process that is related directly to students' future life roles to be effective and productive in the workplace.

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