

Outcome-based Curriculum - Impact on Tertiary Education

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Abstract

The Hong Kong Polytechnic University had taken a major initiative in 2004: “Curriculum Revision” (CR) to revise all undergraduate programmes to outcome-based curricula (OBE) for implementation in the triennium 2005-2008. Subsequently, a two-year University funded learning and teaching (L&T) project was proposed to study the impact of outcome-based education/curriculum on student learning outcomes. This paper focused on the theoretical framework of this project in examining and reviewing the concept of outcome-based education (OBE) and its development in the tertiary education. The merits and issues of introducing OBE in tertiary curriculum and some strategies of its implementation were discussed.

Keywords: outcome-based education/curriculum, learning outcomes, student-centred learning, criterion-referenced assessment, curriculum mapping.

1. Introduction

There was a general out-cry in the society that the education system could not adequately prepare students for life and work in the 21st century during the past decade. A worldwide pursuit in exploring new ways for designing education system is resulted. Not only primary and secondary education, tertiary education is also shifting from the traditional teaching-centered approach to a student-centered approach.

The demands of accountability and accreditation on education were the major reason for the rapid spread of various forms of educational reform (McDaniel et al., 2000; Brindley, 2001). Tertiary institutes throughout the world are being increasingly required by external governing bodies and accreditation organizations to demonstrate that they have appropriate self-regulating processes to assure that their stated missions and goals are met (Lohmann, 1999).

In recent years, nationwide educators have paid much attentions on student learning outcomes, and aligning teaching and assessment with the intended learning outcomes for effective learning. Outcome-based education (OBE), which is a method of curriculum design and teaching that focuses on what students can actually achieve after they are taught and have learned has received increasing calls in many countries such as USA, UK and Australia since 1980s.

Bloom’s promotion on mastery learning movement (Bloom, 1968) had already suggested that “every learner can master desired outcomes if educators refashion the time and instructional

parameters in which learning takes place". More recently, the findings of the Dearing Report (NCIHE, 1997) discussed the importance of making the learning and teaching process more explicit to both students and teachers (D'Andrea, 2003). With such vision of student learning priority on the agenda, the Hong Kong Polytechnic University had taken a major initiative in 2004 : "Curriculum Revision" (CR) to revise all undergraduate programmes to outcome-based curricula (OBC) for implementation in the triennium 2005-08.

2. Research Objectives

A two-year university funded learning and teaching (L&T) project was proposed by the Department of Building and Real Estate to examine the impact of outcome-based curriculum on student learning outcomes with particular emphasis on engineering/surveying education across the undergraduate degree programmes offered by the four departments (namely Building & Real Estate; Building Services Engineering; Civil & Structural Engineering and Land Surveying & Geo-Informatics) within the Faculty of Construction and Land Use (FCLU).

The research objectives of this L & T project are:

- (i) to critically review the concepts of OBE/OBC
- (ii) to identify the corresponding strategies adopted by the four departments within the Faculty in implementing OBC
- (iii) to investigate, if any, changes in learning and teaching culture in implementing OBC
- (iv) to explore the impact of OBC on organizational and educational policies and practices
- (v) to study the impact of OBC on student learning outcomes in FCLU programmes
- (vi) to develop a best practice mechanism in implementing OBC

All undergraduate programmes offered by FCLU are professional programmes accredited by both local and overseas professional institutions. Consequently, the four departments with their respective programme teams have designed their programmes with learning outcomes for professional competence and all-round attributes. Subsequently aims and objectives of all subjects were revised to learning outcomes of which upon completion of a certain subject (course), for example, students are able to perform a certain task or to achieve a certain standard. With the accumulation of learning from different subject areas, the programme outcomes and all-roundedness are thus achieved. This was further enhanced by the alignment of subject/discipline learning outcomes with the programme outcomes and all-round attributes through the use of curriculum mapping.

Furthermore, criterion-referenced assessment was introduced to ensure the performance standard of students' achievement in their learning outcomes.

This paper will focus on research objective (i) and (ii) to review the concepts of OBE/OBC through literature review and to identify the issues and hence the strategies in the implementation of OBC based on some initial findings.

3. Research design

In designing this proposed study, reference has been made to a major study commissioned by the Accreditation Board of Engineering Education (ABET) in assessing the impact of ABETs EC2000 on engineering education (Volkwein, et al, 2004). An abridged research conceptual framework is shown as follows:

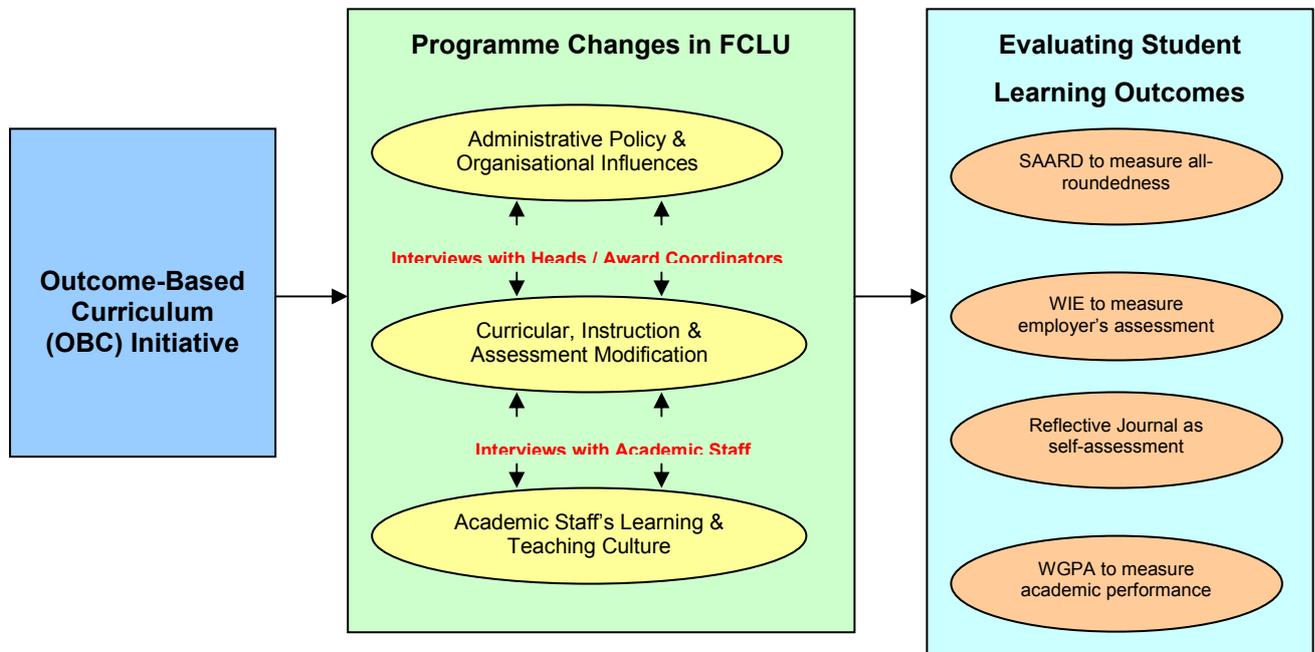


Figure 1 Conceptual Framework of the Study (Adapted from Volkwein et al, 2004)

4. Outcomes of Initial Findings

4.1 Concepts of Outcome-based Education/Curriculum

Literature shows that there are numerous definitions of outcome-based education (OBE), but, all of them share a common emphasis on setting clearer standards with observable and measurable outcomes which meet the demands of the society. OBE provides a platform of making teaching and learning process more explicit and transparent to both teacher and students (D'Andrea, 2003). Explained by Spady (1994), the theory of outcome-based education is built on the following assumptions: *(i) every student is able to be a successful learner, (ii) success leads to more, once experienced, leads to more success; and (iii) that teaching staff need to understand that they have control over the conditions which make it possible for success to be enjoyed by all students.*

OBE was initially raised according to the Total Quality Management in business (Dejager & Nieuwenhuis, 2005). The traditional education system focuses on transmitting knowledge and skills from teachers to students. In contrast, OBE is a method of curriculum design and teaching that focuses on what students can actually do after they are taught or have learned. It starts with

a framework and a set of expectations about the desired learning results which focuses on individual development of the learner (Dejager & Nieuwenhuis, 2005). This curriculum reform has been applied widely not only in primary and secondary schools but also in higher education system since 1980s. The implementation of OBE marks a paradigm shift from the traditional teacher-centered (content) system to a student-centered system.

This shift of learning paradigm is important and necessary as globalization is on the pipeline. Students are not prepared only for the acquisition of professional knowledge but they must be able to perform hands-on work and knowledge application/replication in different work settings and societies. Alongside with it, students should possess such generic (all-round) attributes like life long learning aptitude, team work attitudes, communication skills, etc. in order to face the ever-changing world/society. It follows that tertiary education needs 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. In short, students must be well equipped and prepared for what is awaiting ahead. Hence, this leads to orientation to outcomes of learning. This in turn orientates the focus of tertiary education on outcomes of student learning - what students can actually do/perform. Because of such re-orientation of learning, although the word “instructional objectives” and “learning outcomes” sometimes are interchangeable (Harden, 1999), the latter seems to be more adaptable to the needs of the 21st century as it closely links to the learning and assessment process, and thus, has a greater accountability (Brady, 1994). Otter (1992) defined learning outcomes as “what a learner knows or can do as a result of learning”. According to Spady (1994), outcomes should be “clear, observable demonstrations of student learning that occur at or after the end of a significant set of learning experiences”.

4.2 Assessment on Learning Outcomes of OBE/OBC

Since OBE focuses on what students actually can perform, the assessment method has also undergone great changes to facilitate the implementation of OBE in tertiary education. Students therefore should be assessed against external objectives, not in comparison to their peers. There are many different approaches to serve this purpose. And one of them, students cannot be “failed”. Students are assessed with “levels” instead of “grades”, and some of them may just simply not achieve a certain level whilst their peers are achieving (Byrne & Flood, 2003). This allows and encourages differential growth of students at different stages, and facilitates teachers to cater for individual differences. Learning-outcome Framework (LoF) is widely used in this basic concept of education.

The OBE system also emphasizes on alignment. Criterion-Referenced Assessment (CRA) is always used to align the assessment method with the learning outcomes (Biggs, 2003). CRA measures how well a student performs against an objective or criterion, which is pre-set before the teacher assesses the students, rather than comparing them against each other. Therefore CRA determines individual performance in comparison to some standard or criterion items based on standards given to students. These standards or criteria are aligned with the learning outcomes. Discrimination is irrelevant and should not take place in this assessment method. Criterion-referenced assessments help to eliminate competition and may improve cooperation (Byrne & Flood, 2003) in student learning.

4.3 Value added to tertiary education with the implementation of OBC

Evidences have been found that OBE helps in improving student performance significantly (D' Andrea, 2003; Prosser et al., 2006) in that the intended learning outcomes are made explicit to students by the teaching faculty who is responsible to set clear goals of learning. Other studies also proved that OBE can enhance the involvement of the educational community, especially the employers (Lohman, 1999). One of the most important endorsements for OBE is that it shifts the ownership from the curriculum planner/faculty head to the front line teachers and students (Crump, 2005; D'Andrea, 2003; Harden, 2002; McDaniel et al., 2000). It gives direction to student learning and provides a positive contract between the teacher and student, thus avoiding digressions (D'Andrea, 2003).

Outcomes-based assessment provides additional advantages to the stakeholders in educational programs, including high transparency of reporting, alignment of teaching and curriculum goals and assessment, and sensitivity to individual differences (Brindley, 2001; Prosser et al., 2006). Spady (1994) believed that OBE is a way to get beyond "meaningless" percentages and marks to provide students with a broader and more transformative education.

Outcome-based approach also encourages teachers to clarify the intended learning outcomes of their teaching and learning activities. It also allows students to have a clearer understanding of what they should learn in the course. Spady (1994) believed that these advantages can increase students' motivation to learn.

With such beauty of OBE/OBC, one of the pioneer countries implementing OBE is the United States. OBE was advocated as an innovative educational system in the late 1980s. In 1992, OBE was introduced to the state of Pennsylvania (Volkwein et al., 2004). By the mid 90s, a total of 22 school districts had decided to try it out. In US, OBE is specifically emphasised in several tertiary disciplines, including medicine (Harden et al., 1999), science and engineering (Moore & Williamson, 2005). OBE has also been embarked in South Africa since 1990s to improve the rationality, coherence and quality of education (Cretchley & Castle, 2001; Dejager & Nieuwenhuis, 2005). In Hong Kong, the University Grant Council (UGC), the funding body of the universities has encouraged the use of OBE/OBC in all tertiary programmes. The Hong Kong Polytechnic University is pioneering in this area.

5. Issues of the Implementation of OBE/OBC

Initial findings from the interviews of the teaching faculty in the PolyU funded research project could be briefly outlined as follows: there was persistence of the teacher-centered teaching culture among some academic staff. The increase of workload was experienced by the teaching staff in particular in the area of assessment where individual student was assessed of his/her attainment of the level of learning, which was different from the traditional summative examination. It was also found quite time consuming in writing the set of assessment criteria and rubrics in order to assess/measure individual student's learning outcomes effectively and fairly. Some found that considerable amount of time needs to be spent on writing measurable and performable intended learning outcomes and at times it was rather difficult to design/compile a coherent set of learning outcomes. Doubts were also expressed as to the validity and reliability of criterion-referenced assessment - can it truly reflect student's ability and grasp of knowledge if there was no 'failure' threshold and only levels of attainment? There were also queries as to whether OBE was too vocational oriented for a university education.

What was found in the above research study was best summarized by Brindley (2001) as the common problems of outcome-based education in that (i) *tensions between summative*

reporting for accountability purposes and formative assessment for curriculum monitoring and improvement (Gipps, 1994; Teasdale and Leung, 2000); (ii) doubts surround the validity of outcome statements and the reliability of the assessment tools that are used to elicit student performance (O'Leary and Sheil, 1997); (iii) difficulties in ensuring the comparability of teacher-developed assessments (Brindley, 1994); and (iv) the high costs, complex logistics and time demands of developing and administering individualized performance assessments (Wolf, 1995; Breen et al., 1997)

It was also reported that the assessment system in OBE needs to be adequately resourced which was much more expensive to administer and required greater skills in handling on teachers' part (Breen et al., 1997; Brindley, 2001). Some academic staff found that the learning outcomes focus too narrowly on details and it was difficult and time-consuming to write the learning outcomes (D' Andrea, 2003). These were echoed in our interviews with teaching members in the L&T research project.

Educational stakeholders further criticized that setting explicit learning outcomes may lead to the neglect of attitudes, values, motivation and interests which are non-measurable objectives. This would limit the opportunities from spontaneous unintended outcomes occurring during learning experiences (D'Andrea, 2003). Other criticism includes that OBE might disadvantage the more capable students (Towers, 1994). These were being commented by some of the faculty during interviews of the research project.

There seems to be some universal concerns of OBE and these must be ironed out before a fruitful implementation of OBE/OBC in tertiary programmes can be achieved.

6. Some strategies to improve the effectiveness of OBE

Although it is controversial on the implementation of OBE in tertiary education in many countries as well as in our University, it is still widely believed that OBE is worth implementing and there are ways to minimize the problems being raised.

The role of faculty (academic staff) is important in outcome-based approach. Efficient collaboration amongst teaching faculty would facilitate the implementation of OBE. McDaniel et al. (2000) suggested that "*Faculty members need to work together to design the appropriate assessment approaches and criteria to validate student mastery of learning outcomes that are held in common by a department, a course team or the whole faculty*". Prosser et al. (2006) also asserted that OBE can be the media to improve the inter-departmental relationship with significant reformulation of the roles of teachers and the academic polices and structure. OBE also offers academics' new opportunities for self-direction and autonomy (McDaniel et al., 2000).

Moreover, greater consideration needs to be given to the role of the teacher in outcome-based education for accountability purposes. Many research reported that one of the greatest obstacles for implementation of OBE was the resistance from academic staff (Crump, 2005; Harden, 1999). It is believed that this resistance can be alleviated by increasing the sense of belonging of the teacher to OBE. Many potential benefits of involving teachers in assessment may not be realized unless adequate resources and appropriate forms of professional development are provided to faculty members (Brindley, 2001).

Another by-product of OBE is the increase in workload of academic staff (D'Andrea, 2003; Crump, 2005; Moore & Williamson, 2005). This situation can be minimized or even avoided by reducing the number of assessments tasks. The assessment load on staff and student can be reduced by simplifying the assessments and reducing the number of assignments required (Moore & Williamson, 2005). There is no need to assess the same student's learning outcomes yearly. Different student learning outcomes can be assessed in alternate academic years to avoid over-assessment. In the meantime, the routine works in the departments/faculty should also be reviewed accordingly whenever new policies should be initiated (McDaniel et al, 2000).

The efficiency of OBE can be enhanced through teaching development. There was research evidence to demonstrate that good teaching has positive effects on student outcomes. Therefore teaching development is necessary to improve student outcomes and thus the efficiency of OBE (Prosser et al., 2006).

As discussed previously, OBE was initially raised according to the Total Quality Management in business and is widely used recently to meet the needs of society. It is therefore important to conduct employer survey to solicit the views from the "end-user" of the educational system (McDonald et al, 2000). This can be observed in the research design of our research project on OBE/OBC.

Froyd et al. (2006) suggested that attention should be paid to the process of curricular reform which might lead to broader, deeper, and more lasting improvement in particular in tertiary engineering-related education. Department mission, programme outcomes curriculum mapping, and course portfolio should be developed to facilitate such curriculum reform/revision.

It was also found by Brady (1997) that the common attributes to enhance the success of the implementation of OBE/OBC were: *(i) the statement of specific outcomes; (ii) the planning of appropriate learning activities to achieve the outcomes; (iii) the monitoring of individual performance through the use of criterion referenced assessment; and (iv) the provision of remediation and enrichment.*

7. Conclusion

In order to meet the demands of accountability and accreditation on education, OBE is the most commonly used approach by overseas educators. Although outcome-based approach has been widely adopted in many countries such as USA, UK, Australia and Africa since 1980s, the debates on the effectiveness of OBE are still ongoing.

Literature has demonstrated that OBE does bring a lot of benefits to the education system which suits the contemporary demand of the society. It helps in improving student performance, enhancing the involvement of the educational community, providing a platform to shift the ownership from administrators to teachers and students, and above all, setting clear direction to student learning.

Despite these benefits, a number of problems have also been identified in the past studies and this present L&T research project. These include: increase of workload, doubts about the validity and reliability of the assessment tools, difficulties in implementing the newly-developed assessment methods, and limiting the development of more capable students.

The experiences from the pioneers in implementing OBE have proven that this is the right approach to serve the education demand in the 21st century. By carefully imparting the suggested strategies, the implementation of OBE in the tertiary education should be more effective.

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