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A Case Study of Outcome-based Education: Reflecting on Specific Practices between a Malaysian Engineering Program and a Chinese Science Program

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Abstract

Outcome-based education (OBE) has permeated the education systems globally and has been upheld by the Washington Accord for accreditation of undergraduate engineering programs. Its implementation has extended beyond engineering to many other programs. This study adopted a reflective approach in comparing the specific cases of OBE practices of an undergraduate engineering program and a science program in two different countries based on recollection of involvement in the OBE practices. The reflected aspects covered the alignment of outcomes, the design of assessments, teaching and learning process, and measurement of outcomes. The reflection shows that the engineering program has a more formalized and prescriptive approach to OBE than the science program and there is greater emphasis on quantitatively determining the attainment of program and course outcomes. The science program, however, has a more flexible structure of OBE and more diverse channels of gathering data for outcomes attainment. It is deemed that a structured OBE that confers greater flexibility in accommodating different learning needs and gauging of achievement would be helpful to the OBE practices of both programs. OBE, as an educational theory, needs to be internalized by educators to optimize its impacts. It should ideally move on from the showcase of outcomes and numbers which may at times, compromise educational quality.

Keywords: accreditation, outcome-based education, reflection, undergraduate, Washington Accord

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Introduction

Outcome-based education (OBE), otherwise known as standards-based education emphasizes the achievement of goals or outcomes by students in the teaching and learning process (Morcke et al., 2013). The implementation of OBE is not constrained to specific formats or assessments. Various means such as assignments, class activities, examinations, presentations, projects, and practicums, can be employed to facilitate the achievement of learning outcomes by students (Mukhopadhyay & Smith, 2010; Tang & Kurnia, 2015; Tang, 2020a). OBE has been practiced globally at various education levels from primary to tertiary. For instance, Australia's adoption of OBE dated back to the early 1990s though its implementation differed across states (Donnelly, 2007). In the United States, OBE was already practiced since 1994 and was continuously improved subsequently (Glatthorn, 1993). OBE permeated the universities in Hong Kong in 2005 while it was incorporated into the Malaysian public-school systems in 2009 (Kwok, 2000; Mohayidin et al., 2008).

OBE promulgates that teachers should change their role in the classroom from information providers to facilitators of learning (Morcke et al., 2013). While there have been arguments on its effectiveness, it is currently still influential in many education systems, particularly in undergraduate engineering education under the Washington Accord (Brady, 1996). The Washington Accord is an international agreement for accreditation of professional undergraduate engineering degrees which permits accredited undergraduate engineering degrees of a signatory to be recognized by other signatories. It regulates the quality of the degrees offered in the signatories and acknowledges their equivalence (Mahmood et al., 2015). As of 2020, there are 22 signatories including Australia, Canada, Chinese mainland, Hong Kong SAR, India, Japan, Korea, Malaysia, New Zealand, Singapore, the United Kingdom, and the United States. Each signatory of the Washington Accord has an entity assigned to oversee the accreditation of its engineering degrees (Wilson & Marnewick, 2018). In Australia, the institution is the Engineers Australia while in Chinese mainland, it is the China Association for Science and Technology. The accreditation institutions in Hong Kong SAR and Malaysia are the Hong Kong Institution of Engineers and the Board of Engineers Malaysia respectively (International Engineering Alliance, 2021). The Washington Accord has specifically required the implementation of OBE as a condition for accreditation (Liew et al., 2014).

While OBE has conventionally been practiced by engineering degrees offered by signatories of the Washington Accord, the practices have widely varied. OBE for engineering degrees in Malaysia require the quantification of attainment of learning outcomes under a list of standard program outcomes set by the Board of Engineers Malaysia (Liew et al., 2014). In India, the adoption of OBE is similar to Malaysia with extensive outcome analysis. The OBE culture in India is more extensive with such analysis not only limited to engineering courses, but other courses such as pharmacy and management programs (Jadhav et al., 2020). In Australia, despite the removal of OBE from its primary and secondary education systems, its engineering degrees are still bound by the Washington Accord's requirement for OBE. However, the OBE in Australia has a less rigid structure in capturing the attainment of learning outcomes although it also states the generic competency standards for professional engineer (Kootsookos et al., 2017). Besides, it's criteria for accreditation is less prescriptive than those of Malaysia. In Hong Kong, engineering degree programs are accredited by the Hong Kong Institution of Engineers with accreditation criteria parallel to other signatories of the Washington Accord (Kwok, 2000). Similar to India, the OBE has been widely adopted in Hong Kong and is called the outcome-based teaching and learning. Beyond engineering degrees, the universities have the freedom to develop the approach on their own (Kwok, 2000; Wong & Cheung, 2011).

This study aims to reflect upon the OBE practices of an undergraduate engineering program offered by the Malaysia's campus of an Australian University which is regulated by the Washington Accord and a science program offered by a college in Chinese mainland with its degree awarded by a university in Hong Kong. The science program is not bound by any international treaties.

Literature Review

OBE has evolved from an educational theory to an instructional practice which systematically identifies the essential skills or knowledge the learners should acquire upon completing a course and program of study (Glatthorn, 1993; Tang, 2018). The implementation of OBE has extended beyond engineering degrees to other degrees such as nursing education (Tan et al., 2018), medicine (Mukhopadhyay & Smith, 2010), accounting (An, 2014) and sciences (Wong & Cheung, 2011). OBE focuses not only on intellectual skill, but vocational and interpersonal skills. Advocators of OBE often laud its clarity in spelling out the expectations of outcomes to be achieved at the end of a course, which enables students and teachers to have better focuses of their learning and teaching respectively (Tam, 2014). OBE also confers the flexibility to design lessons around the intended outcomes in a student-centered manner, knowing that students have different learning needs (Tam, 2014). With similarities in OBE practices across Washington Accord's signatories, cross-institutional comparison of learning outcome attainment is possible. This permits benchmarking and continuous improvement besides enabling students' mobility between institutions (Mohayidin et al., 2008).

OBE is often associated with constructive alignment owing to the process of matching the intended outcomes to the learning activities and assessment employed. In essence, constructive alignment contains two components, namely constructivist psychology and curriculum theory. The former centers on the use of suitable learning activities to scaffold students' knowledge while the latter entails what OBE is commonly known for, which is the alignment of learning activities and assessment to the intended learning outcomes in order that learning can be optimized (Biggs & Tang, 2015). Studies on constructive alignment are invariably related to outcome-based approach. Romero & Kalmpourtzis (2020) stated that outcome-based teaching is an important channel for quality assurance and analyzed a newly designed game-based learning from the angle of constructive alignment. Thian et al. (2018) proposed a practical curriculum design framework which was based on constructive alignment to enhance the achievement of graduate capabilities. Their work highlighted graduate capabilities as an important attribute of OBE. Emphasis on the attainment of intended learning outcome in OBE ultimately leads to better building of graduate capabilities. Loughlin et al. (2020) opined that constructive alignment plays a supporting role in teaching and learning and its administrative potential could be diluted when used as a quality assurance tool because of the possibility of misrepresenting the reality of teaching and learning. Constructive alignment has been employed in development of a group work assessment pedagogy for a nursing course, again, to address the learning outcomes. It can therefore be safely concluded that constructive alignment is widely practiced in OBE to the point that it is almost analogous to OBE, even though it serves only as a means in the overarching OBE implementation.

Nonetheless, OBE is not without its drawback. It has been challenging to arrive at a consensus for the definitions of outcomes even between the Washington Accord's signatories. This could lead to different approaches in measuring outcomes (Donnelly, 2007). Furthermore, it arguably restrains learning to the achieving of outcomes which are specific, measurable, and observable, and this deviates from the essence of holistic learning (Brady, 1996). OBE in the engineering context is often prescriptive, which eventually dictates the styles or formats of assessment, making learning assessment-centered and the setting of assessments less flexible (Mohayidin et al., 2008). Researchers argue that assessments may not be the only way to test students' ability in applying the knowledge learnt and focusing on the outcomes prescribed by OBE may not give a precise indication of students' ability of knowledge application (Glatthorn, 1993).

Recognizing the drawbacks, some countries have removed or are gradually phasing out OBE from its education system (Donnelly, 2007). Skeptics of OBE doubted the effectiveness of large-scale implementation of OBE in Australia and the United States (Glatthorn, 1993; Brady, 1996). In Australia, the mounting learning outcomes to be achieved triggered dissatisfaction among teachers and raised doubts on whether these outcomes had met the needs of students and teachers. This led to the removal of OBE from numerous Australia's education policies (Donnelly, 2007). OBE has not gained favor in the South Africa on the grounds that it unreasonably favors criterion-referenced assessment over norm-referenced assessment, burdens teachers with additional administrative and analytical workloads, and erodes emphasis on subject knowledge while upholding skills (Donnelly, 2007). Nonetheless, OBE seems to still gain popularity due to the need for structured quality assurance in teaching and learning and the fact that OBE, or more specifically constructive alignment, provides the channel to the often-mechanistic validation and audit process upheld by educational quality assurance. The OBE-based quality assurance processes differ in level of standardization and in practice across institutions and programs. This article, therefore, serves to share the experience of the author in OBE implementation through a reflective approach, in the hope to contribute to a more innovative OBE implementation, crucial to the current system of teaching and learning.

Method

This study adopts a reflective approach to provide a comparison of OBE implementation for two programs, namely an engineering program offered by a campus of an Australian University in Malaysia and a science program of a college in the Chinese mainland, from the experience of the author (Singh et al., 2019; Tang, 2020b). Therefore, this reflection is limited to the involvement of the author in the teaching and learning processes of the two programs. It has not been extended beyond a personal sphere to permit a more diverse comparison of OBE implementation in other programs of other universities that the author has not experienced.

The reflection also aims to draw the strengths, weaknesses, opportunities, and threats (SWOT) for OBE implementation of both the programs (Tang, 2020c). The aspects of reflection begin with planning stage through aligning learning outcomes of courses and programs to the assessment tasks, and proceed to implementation of the assessment tasks, evaluation of students' attainment of learning outcomes and finally identification of areas for improvement. In the process of reflecting, materials not limited to accreditation documents, course and program reports, guidelines, official websites and scholarly articles might be referred to.

It is also deemed necessary that the backgrounds of the two programs are provided in this section to facilitate subsequent comparison and discussion. The engineering program offered by the campus of an Australian university in Malaysia has been accredited by the Engineers Australia and the Board of Engineers Malaysia, the institutions mandated for undergraduate engineering degree accreditation in the respective signatories of the Washington Accord. As such, the program is subject to the adoption of OBE.

The science program offered by the college in China, which is a joint venture between a university in Chinese mainland and a university in Hong Kong, has been accredited by the Department of Education, Guangdong Province. As the degree is awarded by the Hong Kong counterpart, the program is also subject to scrutiny of the Hong Kong counterpart which is a self-accrediting university. While the implementation of OBE is not an explicit criterion of its accreditation, there are clear signs of OBE adoption in the program with the establishment of, and emphasis on program and course learning outcomes. These practices align with that of the awarding university but is not subject to the requirements of the Washington Accord since it is not an engineering program. Therefore, there are bound to be differences in its implementation, compared to an engineering program.

Results and Discussions

The core of OBE lies in the identification and establishment of learning outcomes, prior to aligning the outcomes to the design and development of assessment tasks. The learning outcomes are frequently framed to facilitate the achievement of institutionally-defined graduate attributes, and would ideally address all the attributes defined. Table 1 shows the comparison of the OBE practices between the two programs.

Table 1

Comparison of OBE Practices of the Engineering and Science Undergraduate Programs of Interest

	Engineering Program	Science Program
Graduate attributes	There are nine institution-wide graduate attributes to which this program aligns, namely: 1. Apply discipline knowledge, principles and concepts 2. Think critically, creatively and reflectively 3. Access, evaluate and synthesize information 4. Communicate effectively 5. Use technologies appropriately 6. Utilize lifelong learning skills 7. Recognize and apply international perspectives 8. Demonstrate intercultural awareness and understanding 9. Apply professional skills The program outcomes (POs) should address all the attributes. Note: The source is not revealed to prevent any potential conflict of interest.	The program adopts the seven graduate attributes of the degree-awarding partner, namely: 1. Citizenship – exercise the responsibility of a globalized, ethical and civilized citizen 2. Knowledge – acquire updated and deep academic knowledge, besides wide cultural and general knowledge 3. Learning – engage in independent life-long learning 4. Skills – acquire IT, numerical and problem-solving skills 5. Creativity – exercise creative and critical thinking 6. Communication – proficient in English and Chinese and demonstrate the ability to clearly and coherently express ideas 7. Teamwork – engage in team endeavors while adopting healthy lifestyle The Program Intended Learning Outcomes (PILOs) should address all the attributes Note: The source is not revealed to prevent any potential conflict of interest.

<table>
<tr><th></th><th>Engineering Program</th><th>Science Program</th></tr>
<tr><td>Types of outcomes</td><td>There are three types of outcome, namely:
1. Program Educational Outcomes (PEOs) which represent the long-term goals to be achieved by the graduate, for instance, upholding of professionalism and staying updated with industrial development.
2. POs which represent the learning outcomes that students of the program should achieve upon completing the program.
3. Course outcomes (COs) which are outcomes that students of a course are expected to have achieved at the finish of the course.
If the outcomes were to be presented in a hierarchy from broad to specific, PEOs will occupy the top level followed by POs and COs.</td><td>There are two types of outcome, namely:
1. PILOs which are equivalent to the POs of the engineering program.
2. Course Intended Learning Outcomes (CILOs) which are equivalent to the COs of the engineering program.
The PILOs are standardized for particular programs within the institution and the partnering institutions such as the general education programs and the individual science degree programs. Each science degree has its own set of PILOs. Similarly, each course has its own set of CILOs.</td></tr>
<tr><td>Alignment of outcomes</td><td>The alignment of the outcomes is generally called mapping. The PEOs are in line with the institutional vision and mission to ensure their alignment. The POs are mapped to the PEOs and subsequently the COs to POs. Twelve POs have been specified by the Engineering Accreditation Council (EAC) as an accrediting arm of the Board of Engineers Malaysia. The number of COs vary with courses.
Direct and explicit mapping has been emphasized with mapping of lower-level learning outcomes to only one higher-level learning outcomes.</td><td>The CILOs are aligned to the PILOs. There is strong emphasis that the number of PILOs should not be more than three for each course in the recent curriculum reform though the emphasis was not obvious prior to this. There is no specific mention of exceptions to the ‘three PILOs’ practice.
Similar to the engineering program, the mapping of multiple CILOs to one PILOs but not the other round has been highlighted.
The use of observable and measurable verbs in the CILOs in reference to the Bloom’s Taxonomy is stressed.</td></tr>
</table>

	Engineering Program	Science Program
Alignment of outcomes	For instance, it has been encouraged that each PO is mapped to only one PEO. As there are more POs than PEOs, more than one POs can be mapped to the same PEOs but not more than one PEOs to one POs. This emphasis is stronger for POs and COs mapping, where each CO should be mapped to one PO but not multiple POs. With that said, two or more COs can be mapped to the same PO. Ideally, each course should not have more than three POs unless it is a capstone unit such as a design project. COs are formulated with action verbs of the Bloom's Taxonomy /	
Design of assessments to achieve the learning outcomes	Assessments are designed to address the COs which have been mapped to the POs. Various types of assessment comprising formative and summative tests, projects, laboratory exercises, reports, presentations, etc. can be employed. There is emphasis on the incorporation of open-ended lab where students are encouraged to design their own experimental procedures to investigate a phenomenon of interest. This is on top of the conventional lab practices guided by lab manuals. Besides mapping to the POs and COs, the assessments are to be mapped to the six levels of the Bloom's Taxonomy, namely remembering, understanding applying, analyzing, evaluating and creating.	Assessments are designed to address the CILOs, hence the PILOs. The range of assessment is similar to that of the engineering program. While there are lab practices guided by lab manuals, there is no specific emphasis on open-ended lab. Mapping of the assessments to the six levels of the Bloom's Taxonomy is not required. However, lecturers are advised to set assessment tasks that address different levels of the Bloom's Taxonomy. There is no requirement on meeting certain weightages for the levels. While the top-down approach suits the design of assessment, this has not been underscored.

	Engineering Program	Science Program
	If an assessment addresses more than one COs and levels of the Bloom's Taxonomy, mapping is refined to the parts of the assessment. The reason for mapping to the Bloom's Taxonomy is attributed to the increasing emphasis on reporting of the assessment weightages based on the overarching high, middle and low levels. Therefore, the design of assessments should ideally adopt a top-down approach according to the COs and the levels the assessments aim to address. Criterion-referenced assessment is practiced throughout the assessment process.	Criterion-referenced assessment has been widely practiced though norm-referenced approach is still practiced in a certain aspect of assessment process.
Teaching and learning to achieve OBE	Lecturers have the flexibility to design suitable learning activities to facilitate the learning of students and achievement of their COs through the assessments administered. Sharing sessions by scholars, alumni and industrial practitioners are encouraged. Field trips are also a bonus to OBE implementation. Ideally, lecturers should assume the role of a facilitator in line with the student-centered approach advocated by OBE. However, the approaches vary and the lecture-tutorial model is still very common. Students are required to complete a design project in group and a final year project individually.	Similarly, lecturers have the flexibility to design suitable learning activities. The teaching and learning activities are explicitly matched to the CILOs in addition to the assessment components. Similarly, sharing sessions and field trips are encouraged, and lecturers should ideally facilitate teaching and learning rather than feeding students with information, parallel to the idea of OBE. Students are required to complete a final year project individually. Students are encouraged to undergo optional industrial placement. Students are expected to engage in self-learning as well as facilitated learning mentioned above. Class.

	Engineering Program	Science Program
	Every student is required to complete a compulsory industrial training. Students are expected to engage in self-learning as well as facilitated learning mentioned above. Class attendance is not explicitly made compulsory. Students are required to fulfil a certain credit hour requirement to graduate from the course.	attendance is not explicitly made compulsory. Students are required to fulfil a certain credit hour requirement to graduate from the course.
Evaluation of the attainment of learning outcomes and continuous improvement	This is generally called the continuous quality improvement (CQI) where the achievement of learning outcomes is calculated and analyzed based on students' performance in all the assessment components. With the earlier mappings, it is possible to calculate the attainment of a student's COs, hence POs. POs attainment usually receives greater interest since the standardized POs allow cross-institutional comparison. From the attainment scores, continuous improvement plan for a course is drafted to address the low-achieving COs and POs.	There is a continuous improvement process at the program level but continuous improvement specific to courses has not been emphasized. Courses are reviewed by external examiners for quality assurance and the reviews may not cover all aspects of OBE. The calculation of attainment of CILOs is not required. Course-level outcome analysis typically involves examination of the collective results of a course for scores and grades distribution, and in certain instances, comparing the results with those of previous students' cohort. Variation in the results may provide indication of the strengths and weaknesses of the course. Attainment of PILOs is calculated based on the results of teaching and learning survey items which are matched with the PILOs and in certain instances, the results of chosen courses.

It is noteworthy that the comparison above is not an apple-to-apple comparison but rather a reflection of the OBE practices based on the experience of the author in both the programs. It should also be noted that a greater level of formalization of OBE by the engineering program is an attempt to fulfil the requirements of the Washington Accord and it neither indicates the effectiveness of OBE in engineering programs nor suggests the same practices to be adopted by other programs. The SWOT analysis for OBE practices drawn from the comparison above are presented in Table 2.

Table 2
Reflective SWOT Analysis of the OBE Practices of the Engineering and Science Undergraduate Programs of Interest

	Engineering Program	Science Program
Strengths	OBE implementation of the program has a defined structure which enables comparison of POs across regional institutions and even other signatories of Washington Accord having similar practices in OBE implementation. Constructive alignment is systematically practiced.	The program employs diverse tools in capturing the PILOs attainment of a particular cohort every semester. Similarly, constructive alignment is systematically practiced.
Weaknesses	A greater level of structure and formalization of OBE means there is much rigidity in the OBE practices which more often than not, are geared towards the calculation of learning outcomes attainment. The rigidity could be escalated by the need to fit the assessments into certain weightages of the levels of the Bloom Taxonomy. There is over-reliance on quantitative measures of learning outcomes.	There is currently a lack of standard guideline in the implementation of OBE, resulting in a lack of structure and inconsistent OBE practices.

	Engineering Program	Science Program
Opportunities	The program could be geared towards a less rigid model without being overly prescriptive on weightings. It could also benefit from aligning the teaching and learning activities to the COs without an extensive tracking mechanism similar to that for assessments. A mix of qualitative and quantitative measures can be used for gauging the attainment of learning outcomes.	While the same formalization of OBE of the engineering program may not be applicable to this program, it could benefit from a guideline and centralized communication of OBE practices to ensure consistent practices among staff members. A better structure of OBE without adding to the administrative loads of the academic staff is desirable. Specific instruments for gauging the achievement of PILOs and linking the CILOs to the PILOs will be advantageous. Training of OBE will be beneficial for members of this program. Open-ended lab can be incorporated. Course review based on CILOs or PILOs achievement could be advantageous. Criterion-referenced assessment process can be upscaled with marking more closely following the criteria set.
Threats	The formalized practices have incurred additional administrative burdens to educators while diverting their attention and effort partly from the primary role of educating. Calculation of outcomes attainment can be complicated by options provided to students in an assessment task where students can opt for questions addressing different COs and different levels of Bloom's Taxonomy.	Alignment of the PILOs to the institutional vision has yet been established. A course-level continuous improvement mechanism is lacking. It seems that the achievement of PILOs is drawn from existing instruments which may have their constraints in monitoring PILOs attainment.

The common characteristics of OBE in both the engineering and science programs are the specification of learning outcomes, the alignment of learning outcomes at course and program levels as well as the planning of teaching strategies and assessments according to the learning outcomes (Mohayidin et al., 2008). In OBE, educators assume the roles of facilitators in a student-centered learning environment. An obvious difference between the programs is that accreditation of engineering programs has catalyzed the formalization of OBE.

The science program does not underscore PEOs which are commonly addressed by engineering accreditation bodies. The Engineers Australia, for instance, calls these educational objectives statement which fundamentally reflects the goals an engineering graduate is expected to achieve in the few years after graduation (Engineers Australia, 2008). Nonetheless, the science program has implied certain attributes the graduates are expected to have acquired upon graduation. OBE practices of the engineering program are highly prescriptive and demonstrate preference for quantitative data for tracking its implementation. This is also echoed by the findings of Mohayidin et al. (2008). OBE for engineering programs in Australia also stresses on the adoption of measurable performance indicators for graduate attributes, the Australian equivalence of POs or PILOs. However, the measurement is multifaceted, encompassing the collection of quantitative and qualitative data from different sources (Engineers Australia, 2008). The multifaceted measurement reduces reliance on quantitative data which requires extensive mapping and analysis, and confers more flexibility. Such flexibility is also reflected in the provision for differences of background and prior learning of students as well as their learning ability. Performance data for OBE implementation can be drawn from surveys, focus and discussion groups, questionnaires, and professional interviews (Engineers Australia, 2008). The science course uses survey to derive its PILOs attainment.

Arguably, the difference in the structuredness of OBE of both the programs does not dictate the quality of the students produced, neither does it indicate the quality of learning experiences. In both programs, the learning experiences of the students have been enhanced through interactive learning, industrial sharing, alumni sharing, field trips, project-based learning and experiential learning, as a result of OBE implementation. Due to the differences in certain natures of the programs, the engineering program has greater focus on simulation-based learning while the science program has been designed to equip students with diverse knowledge ranging from life science to information technology.

Even with the same framework of OBE under the Washington Accord, it has been challenging to determine which model of OBE implementation is more effective and it is unjustifiable to say that a prescriptive model of OBE in Malaysia produces students of better quality than a less prescriptive model of OBE in Australia. An over-reliance on reporting numbers could also result in fitting the mapping and calculation to the desired numbers. In certain instances, the implementation of OBE could be likened as the 'peacocks' described by Harden (2007) that showcase the outcomes and their attainment glamorously without actually internalizing the values of OBE. In addition, the 'outcomes' could raise questions because the instruments used to track outcomes may not clearly represent the actual outcomes and setting outcomes which are outdated, irrelevant and biased could nullify the intention of OBE. As OBE centers on outcomes, the setting of outcomes need to be carefully conducted in consultation with the relevant stakeholders to ensure that they are specific, measurable, achievable, relevant and time-bound. A periodic revision of the outcomes ensures the outcomes are up to date (Liew et al., 2014).

While OBE has its limitations and the empirical evidences of its effectiveness are subject to arguments, it is not without merit. It can serve as the basis for designing teaching and learning activities as well as assessments based on the crucial outcomes defined. However, provided that OBE has become a value of educators along with other educational theory such as holistic learning, and that it is backed by sound pedagogies, the implementation of OBE is bound to be mechanical or trend-following (Morcke et al., 2013).

This study is limited by its comparison of two courses which are not largely similar though it sheds light into what one can learn from the other in terms of OBE practices. As the reflection relies on recollection of OBE practices of the author, it is not likely to capture all aspects of OBE implementation in both the programs.

Conclusion

In addition to a system, the success of OBE lies with the educators. Educators need to see the values of OBE in order to start implementing it in the teaching and learning process. Besides, even without the glamour of OBE, educators may have already incorporated a wide range of teaching strategies such as lectures, tutorials, simulation, teamwork, role play, audio-visual aids, and interactive learning, as well as assessments such as quizzes, projects, tests, and presentations

(Tang & Intai, 2018). OBE may probably come as a reversal of the work sequence which begins by identifying the outcomes before planning the rest around the outcomes. In the implementation of OBE, particularly with numbers having the upper hand in certain circumstances, it is not uncommon for existing courses or programs to work retrospectively to fit the intended outcomes. If well-communicated, OBE could serve as a useful guide for development of new courses and the revision of existing courses. However, to optimize the benefit of OBE, it needs to move from being a number game and performance criterion to being internalized by educators, and it should be flexible enough to accommodate other educational theories such as work-integrated learning. In the future, this reflective practice can be extended to a full qualitative study involving in-depth interviews with educators of other institutions and regions to draw the institutional, geographical and disciplinary differences in OBE implementation.

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