Implementation of Outcome-Based Education Including Technology Innovation

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ABSTRACT: *This study investigated the impact of the implementation of outcome-based education (OBE) incorporating technology innovation in the teaching and learning of a higher education institution in Malaysia. In this study, OBE implementation was evaluated through report on average gap of entrance and exit survey, OBE-student centered learning average score, student online grading and analysis of examination score. This study investigated all OBE course codes offered in the campus under study. Data was collected for two semesters of year 2011, namely Semester April 2011 and Semester October 2011. The instruments of this study consisted of OBE report that contains information regarding average gap and OBE-student centered learning average score. Student online grading was generated from the computer system, as had been rated by the students. Report on OBE grade score, class size and semester of all OBE course codes offered was also analyzed. The data analysis revealed that there is no significant correlation between OBE grade score and average gap of entrance and exit survey. There is also no significant correlation between OBE grade score and OBE-student centered learning average score. No significant correlation is also reported between OBE grade score and student online grading. However, there is a significant negative correlation between OBE grade score and class size. This implied that the smaller the class size, the higher OBE grade score can be expected. Analysis of Variance revealed that there is a significant difference in OBE grade score among different parts of the students. Independent samples t-test revealed no significant difference in OBE grade score between Semester April 2011 and Semester October 2011 students. This study concluded with some recommendations for future study.*

I. INTRODUCTION

In Malaysia, numerous issues in higher education are debated severely. Few of the issues include graduates are not capable of the needs of industry, high unemployed rate of graduates, unaccredited programmes, programmes accreditation for outcome-based education (OBE) in higher education institutions and so on. Among these, opinion concerning the implementation of OBE paradigm is recently seriously argued among the higher education institution. The controversy includes problematic or not to successfully implement OBE, its impact on students and lecturers, and also its effect on the whole education system.

McDaniel, et al. (2000) commented that in many ways outcome-based education is radically different from the current credit-for-contact model of higher education; and its implementation requires significant adjustment to most institutional policies, procedures and structures. The benefits for student learning and the challenges and rewards of these new roles make 1877-0428 © 2012 Published by Elsevier Ltd. Selection and/or peer review under responsibility of Prof. Dr. Hüseyin ArasliOpen access under CC BY-NC-ND license. doi:10.1016/j.sbspro.2012.09.108

Re-thinking higher education structures and policies well worth the effort. Wang (2011) reported a clear message conveyed to higher education institutions in Hong Kong, that OBE should be implemented in a systematic manner in tertiary education programmes. The motivation is to improve education and to assess the quality of teaching and student learning in an effective way.

In view of the importance of properly implementing OBE, this study seeks to investigate the impact of the implementation of OBE incorporating technology innovation in the teaching and learning of a higher education institution in Malaysia. The following sections discuss the literature review of OBE and

its implementation and impact on one public university in Malaysia.

II.   LITERATURE REVIEW

2.1. Obe : Theory and Principles

William Spady, a leading developer of outcome-based education introduced the OBE paradigm into the U.S.A some 20 years ago. Spady (1994:1) defines OBE as a process of 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 means starting with a clear picture of what is important for students to be able to do, then organizing the curriculum, instruction and assessment to make sure this learning ultimately happens.

According to Harden et al. (1999:8), OBE is an approach to education in which decisions about the curriculum are driven by the outcomes the students should display by the end of the course. OBE is viewed as 'results-oriented thinking' that place the emphasis on the education process and is opposite of 'input-based education'. Biggs and Tang (2009:7) reported that OBE educators strive for student achievement at a level appropriate for each individual, the outcomes are specifically to enhance teaching and assessment, always allowing for unintended but desirable outcomes.

2.2 Research Related to OBE

Researches related to the implementation of OBE encompass a variety of diverse opinions. Some parties advocate the implementation while the others do not advocate by stating there exists various disadvantages associated with OBE system.

Many reviews reported the success stories with respect to the implementation of OBE. OBE is reported to be able to increase student's self-esteem, improve student's attendance, result in high achievement of student's outcomes and result in better grades (Brown, 1988; Sambs, 1990).

Nevertheless, Towers (1994) reported that outcome-based teacher education makes job more difficult. Concern was raised on how the implementation of outcome-based teacher education affects education faculty members. However, according to Towers (1994) poorer class attendance was reported, for some students assumed the right answers on the evaluation instruments outweighed the importance of the education process and their participation. Many studies reported that it is proven problematic to successfully implement OBE, due to the unclear understanding of what to be implemented (Berlach & McNaught, 2007; Lee, 2003; Griffiths, et al., 2005; Vambe, 2005; de Jager & Nieuwenhuis, 2005; Vandeyar, 2005).

2.3 OBE Implementation: The Malaysian Experience

In Malaysia, OBE is the prime criteria for engineering accreditation, whereby Engineering Accreditation Council (EAC) require the implementation of OBE in engineering education sector. Starting from year 2004, all the engineering programmes in Malaysia have been instructed to adopt OBE by the EAC as a part of the requirement for Board of Engineers Malaysia (BEM) to be a full member of the Washington Accord. This act is to ensure that the engineering degree produced by the Malaysian universities would be recognized by the Washington Accord member, such as United States, United Kingdom, Australia, South Africa and other countries (Shahrir, et al., 2008).

Later, in year 2010, OBE was also introduced and piloted in disciplines of sciences and technology, social sciences and humanities in many universities in Malaysia as parallel with the Ministry of Higher Education reform policy and Malaysian Quality Assurance of higher education.

In Mara University of Technology (UiTM), Faculty of Electrical Engineering has introduced OBE knowledge amongst its staff since year 2005. Beginning 2007, all degree courses have OBE elements printed in each of its syllabus (Husna, et al., 2009). Components of outcome-based education (OBE) and student-centered learning (SCL) in UiTM comprise National Aspiration which is high income economy by year 2020, Malaysian Quality Assurance (MQA) and Ministry of Higher Education (MOHE) learning outcomes and soft skills university's vision mission UiTM's graduate attributes programme educational objective, programme outcomes, course outcomes, students learning times, teaching delivery or student learning activities, student assessment and finally programme monitoring and evaluation (Academic Quality Assurance Unit UiTM, 2010).

III.   METHODOLOGY

3.1 Sample

All students in the campus under study participated in this study. The campus is a small branch campus with two hundred fifty capacities of students. All OBE course code offered for Semester April

2011 and Semester October 2011 were used for the analysis. However, religious codes and co-curriculum codes were excluded in the analysis as it might lead to bias result since students normally scored well in these codes.

3.2 Instruments
The instruments of this study consisted of OBE report that contains information regarding average gap and OBE-student centered learning average score. Student online grading was generated from the computer system, as had been rated by the students. Report on OBE grade score, class size and semester of all OBE course codes offered was also analyzed. Report on OBE implementation was prepared by each lecturer for all OBE course codes at the end of every semester. The compilation of the report generated the overview of the outcome of implementing OBE system. All the instruments were standard as it was used throughout the whole system.

3.3 Data Collection Procedures
Early of each semester, normally before the lecture began, the lecturer of the respective course code distributed the entrance survey to be filled by the students. The entrance survey determined the level of knowledge students equipped before exposed to outcome-based education. Throughout the semester, the lecturers taught the students based on the OBE syllabus.

Students were taught with the assistance of technology innovation, for instance, being facilitated with internet access at computer lab while following a course code. More examples and contexts were illustrated through different computer programme. Students also assessed to a computer system named i-Learn whereby all sources of teaching material of a respective course code can be retrieved or downloaded.

Near the end of each semester, the students were asked to rate the OBE-student centered learning score through a given form which enable respective lecturer to evaluate the outcome of OBE implementation. The OBE-student centered learning average score was then calculated based on the rating of all the students for each course code, which lead to the identification of OBE-SCL Level. Exit survey for each course code was filled by the students at the end of the semester, more or less four to five months time to determine the level of students-knowledge after being exposed to OBE system.

3.4 Data Analysis Procedures
Descriptive statistics, such as frequency, mean and standard deviation were performed to describe the data collected. Inferential statistics, such as Pearson Correlation Analysis, Analysis of Variance and Independent Samples t-test were performed to determine if there is any significant correlation or any significant difference among the variables under study.

Findings
4.1 Correlation between OBE grade score and other components
As illustrated in Table 1.1, there is no significant correlation between OBE grade score and average gap of entrance and exit survey ($p>0.05$).

Table 1.1: Correlations between OBE grade score and average gap of entrance and exit survey

Correlations		average_gapSurvey	grade
average_gapSurvey	Pearson Correlation	1	.244
	Sig. (2-tailed)		.107
	N	45	45
grade	Pearson Correlation	.244	1
	Sig. (2-tailed)	.107	
	N	45	45

As shown in Table 1.2, there is also no significant correlation between OBE grade score and OBE-student centered learning average score.

Table 1.2: Correlations between grade score and OBE-student centered learning average score

Correlations		grade	obe_scl_averageScore
grade	Pearson Correlation	1	-.177
	Sig. (2-tailed)		.244
	N	45	45
obe_scl_averageScore	Pearson Correlation	-.177	1
	Sig. (2-tailed)	.244	
	N	45	45

No significant correlation is also reported between OBE grade score and student online grading (refer Table 1.3).

Table 1.3: Correlations between OBE grade score and student online grading

Correlations		grade	obeScore_sufo
grade	Pearson Correlation	1	-.115
	Sig. (2-tailed)		.452
	N	45	45
obeScore_sufo	Pearson Correlation	-.115	1
	Sig. (2-tailed)	.452	
	N	45	45

As revealed in Table 1.4, there is a significant negative correlation between OBE grade score and class size ($p<0.05$; $r=-0.380$). This implied that the smaller the class size, the higher OBE grade score can be expected.

Table 1.4: Correlations between OBE grade score and class size

Correlations		grade	classSize
grade	Pearson Correlation	1	-.380[*]
	Sig. (2-tailed)		.010
	N	45	45
classSize	Pearson Correlation	-.380[*]	1
	Sig. (2-tailed)	.010	
	N	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

4.2 Analysis of Variance of OBE grade score among different parts of students

Analysis of Variance revealed that there is a significant difference in OBE grade score among different parts of the students (refer Table 1.5). As shown in Table 1.6 and Table 1.7, the mean OBE grade score of Part 3 students is the highest (3.1020), and is significantly higher than the mean OBE grade score of Part 1 students (2.4856). The mean OBE grade score of Part 1 students is the lowest among the three parts of students. Students spend one semester to finish each part. Each semester takes four to five month's time.

Table 1.5: Oneway ANOVA of OBE grade score among different parts of students

grade	Sum of Squares	df		Mean Square	F	Sig.
Between Groups	2.570		2	1.285	5.276	.009
Within Groups	10.229		42	.244		
Total	12.799		44			

Table 1.6: Descriptive Statistics on OBE grade score

	Part		Statistic
grade	1	Mean	2.4856
		Std. Deviation	0.54587
	2	Mean	2.8153
		Std. Deviation	0.51618
	3	Mean	3.1020
		Std. Deviation	0.31636

Table 1.7: Post Hoc Test - Multiple Comparisons

Tukey HSD				95% Confidence Interval	
(I) part	(J) part	Mean Difference			
		(I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
1	2	-.32974	.16691	.131	-.7352	.0758
	3	-.61644[*]	.19465	.008	-1.0893	-.1436
2	1	.32974	.16691	.131	-.0758	.7352
	3	-.28671	.19668	.321	-.7645	.1911
3	1	.61644[*]	.19465	.008	.1436	1.0893
	2	.28671	.19668	.321	-.1911	.7645

*. The mean difference is significant at the 0.05 level.

As illustrated in Table 1.8, Independent Samples t-test revealed no significant difference in OBE grade score between Semester April 2011 and Semester October 2011 students.

Table 1.8: Independent Samples test of OBE grade score between Semester April and October 2011

	vene's Test for uality of Variances			st for Equality of Means		
dependent Samples st				g. (2- led)	ean fference	l. Error fference
de ual variances assumed	6	7	39	9	0653	775
ual variances not sumed			38	479	0	0653	334

IV. CONCLUSIONS AND DISCUSSIONS

As a conclusion, no significant correlation were reported between OBE grade score and average gap of entrance and exit survey, and OBE-student centered learning average score, and student online grading respectively. As illustrated from the finding of this study, it would seem that OBE grade score of the students was not related to students-scl -rating on the average gap score of entrance and exit knowledge. Neither does OBE grade score of the students related to students-assessment on OBE- students centered learning average score. This finding also suggested that OBE grade score of the students was not related to student online grading on their respective lecturer.

It might be suffice to say that OBE grade score of the students was not likely to relate to students' own opinion on the implementation of OBE. Nevertheless, a big drawback might due to smaller sample size of 45 course codes as compared to more amounts of course codes.

This finding revealed a significant negative correlation between OBE grade score and class size. This finding suggests that higher OBE grade score can be expected if the class size of the respective course code is small. This may due to the fact that when the class is small, the lecturers are more capable of monitoring the outcome of each of the students. Meaning that, the lecturers can easily monitor what the students learn and make sure they learn successfully at the end of the lecture when the class size is small. Future study can investigate on a larger sample size so that comparison or verification of results can be made. In addition to the replication of the study, the future study should focus on all higher education institutions in Malaysia to gather clearer and in-depth analysis of the implementation of OBE. The clarity of focus will help to better improve the quality of OBE implementation in Malaysia.

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