ID NO. UMP 004	Smart OBE Academic Planner (SOBEAP): A Novel Approach for Integrating Self-Efficacy Among Student in Higher Education

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Abstract:

In Malaysia, Outcomes Based Education (OBE) is translated through the implementation of Malaysia Qualification Framework (MQF) which is a legal requirement (Malaysian Qualifications Agency Act 2007) for higher education institution in securing program accreditation. However, there are challenges in OBE implementation which it is still at nurturing stage among educators while among student, it might be still at infancy stage and took some time to be established and culturized. With Industry Revolution 4.0 (IR4), universities are demanded to adopt new way of how academic matters been managed, operated and rapidly improvised with targeted opportunities and calculated risks. One of the potential technologies in IR4 to deal with such issues is by using digital technology like software based visual analytics approach. This technology can assist student to manage their academic performance through data driven decision-making approach which strongly impact student's self-efficacy level. Our study aims to develop a technology called Smart OBE Academic Planner (SOBEAP) to instill self-efficacy while internalizing OBE among student. This technology adopts visual digital analytics approach with decision modeling based on MQF. Key outcomes from this study produced specific decision models for student to manage their academic performance by adopting self-efficacy skills through SOBEAP. It capable to analyze the effectiveness of student's study strategies while producing insights (opportunity and risk) for student to manage their future academic performance.

Key words: *OBE, engagement, self-efficacy*

Background

Outcomes Based Education (OBE) is an educational philosophy where teaching and learning approach including assessment that is oriented to the predetermined set of expected outcomes. The outcomes in this context is referring to a set of values or attributes on what the learner or student should acquire upon completion of certain level of learning process. In other words, OBE focuses on what student will achieved at the end to meet the aim of the academic program why it's been created at the first place. In Malaysia, OBE implementation is embedded through the implementation of Malaysia Qualification Framework (MQF). MQF enforcement is governed by Malaysia Qualification Agency (MQA) through the Act of Parliament (Act 679). Now it has been revised and MQA has released the MQF 2.0 which will come to enforcement starting on 2019 (Mohamed, 2018). This means, OBE implementation in Malaysia has been designed in a systemic manner as a legal requirement which means, no one should left behind in adopting OBE in Malaysia higher education.

Adopting OBE or MQF requires a paradigm shift(Chabeli, 2006; Malan, 2000) of the student, educator and administrator themselves which demand the stakeholders to be strategic (William G. Spady & Marshall, 1991). Many claims (Jean & Karen, 1991; Kaliannan & Chandran, 2012; Mamat, Rasul, & Mustapha, 2014; Rasha & Nisha, 2013) that OBE offers many advantages and provide an avenue for transformative education system especially on democratizing education. However, there are also critics, issues and challenges(Rajaee, Junaidi,

Taib, Salleh, & Munot, 2013; W.G. Spady, 1994; Zahorchak, 1994) reported on OBE implementation. It's implementation still at nurturing stage among educators while among student, it might be still at infancy stage and took some time to be established and culturized. Recent research study(Kumpas-Lenk, Eisenschmidt, & Veispak, 2018) discover how disconnectivity of student's learning with the learning outcomes resulting students are likely to lose interest in being responsible for their learning and causing them to participate passively to meet only minimum requirements of the degree programmes.

With Industrial Revolution 4.0 (IR4) impacting the whole industry globally, meeting minimum requirements for graduation and lack of self-efficacy most likely may not securing student to well prepare with the changing landscape of the industry and the skills sets(Arntz, Gregory, & Zierahn, 2017; Eberhard et al., 2017; World Economic Forum, 2016). Not only it impacting the graduates, it also demands universities(Azim, Subki, & Yusof, 2018; Baygin, Yetis, Karakose, & Akin, 2016; Thai, Thi, & Anh, 2017) to design, experiment and adopt unconventional way of how academic matters been managed, operated and rapidly improvised with targeted opportunities and calculated risks. One of the technology highlighted in IR4 is the use of digital analytics. One of the common approach in digital analytics is data visualization or visual analytics. Visual analytics capable to assist people to reason based on the pre-determine analytical model or analysis for decision making. This approach has high potential to promote self-efficacy skills among student by reasoning or self-reflect on their learning performance. Self-reflect or reflection is very powerful thinking skills to improvise learning and builds student's confidence in the ability to achieve goal or known as self-efficacy(Di Stefano, Gino, Pisano, & Staats, 2014). Many research studies(Chemers, Hu, & Garcia, 2001; Collinson, 1988; Joo, Bong, & Choi, 2000; Krumrei-Mancuso, Newton, Kim, & Wilcox, 2013; KUH, 2006; Pintrich & De Groot, 1990; Schunk, 1990; Vuong, Brown-Welty, & Tracz, 2010; Yukselturk & Bulut, 2007; Zajacova, Lynch, & Espenshade, 2005) found that self-efficacy is very important for student success.

Since OBE implementation demand stakeholder to be more strategic and there is lack of research emphasize on using digital tools for student to strategic engage with OBE implementation, our study aims to develop a prototype digital tool to facilitate student engagement in OBE implementation utilizing visual analytics concept in academic planning.

Innovation Description

Smart OBE academic planner is a digital tool developed in spreadsheet for student to manage their course planning and learning outcomes performance. The smart feature embeds auto-calculation with pre-determine analysis model of student learning performance. It also incorporates feature where student need to perform reflection on their performance, action plan and status of the plan. To better sense of belonging of OBE adoption among student, we called this tool as myOBE.

Figure 1(a)

Bil	CODE	COURSE	Sem	Credit Hours	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	Overall Grade	Status	Point Value
1	BCC1032	APPLICATION DEVELOPMENT WORKSHOP	1	2	A-		D+				A	B	D+	Pass	2.66
2	BCN1053	DATA COMMUNICATION & NETWORKING	1	3	A				B+				B	Pass	9
3	BCS1023	PROGRAMMING TECHNIQUES	1	3	A	E		A-		B+			A	Pass	12
4	BCS2283	INTRODUCTION TO SOFTWARE ENGINEERING	1	3	C	C				C-			B		9
5	BUM1213	FUNDAMENTAL DISCRETE STRUCTURE	1	3	A					C-		B	A-		11.01
6	UHM2022	ETHNIC RELATIONS	1	2	A	B		C-					C		4
7	UHS1021	SOFT SKILLS	1	1	A					A		A-	B		3
8	UQB1011	BRIGED SISWA (KO-KURIKULUM I)	2	1	C-		B				B		A-		3.67
9	BCC1012	ICT COMPETENCY WORKSHOP	2	2	B-					C+		A-	A		8
10	BCN1043	COMPUTER ARCHITECTURE & ORGANIZATION	2	3	C+	D		D					C-		5.01
11	BCS1093	DATA STRUCTURE & ALGORITHMS	2	3	B				A	C+		A-	C+		6.99
12	BUM2223	DISCRETE STRUCTURE & APPLICATIONS	2	3	B		B			A-			A-		11.01
13	UHF1131	JAPANESE FOR BEGINNERS	2	1	D+					C		D	C		2
14	UHL2412	ENGLISH FOR ACADEMIC COMMUNICATION	3	2	A-	B+		A-	A				C		4
15	UHR1012	ISLAMIC AND ASIAN CIVILISATIONS 1	3	2	A-	B+		A-					C		4
16	UQS2091	FITNESS	3	1	A	B-		A-					C		2
17	BCS1093	DATA STRUCTURE & ALGORITHMS	3	3	D+					C		D	C		6
18	BCS1133	SYSTEMS ANALYSIS & DESIGN	3	3	C-			D	C-			D	C		6

Figure 1(b)

Grade	Quartile	Level
A		
A-	Q1	Excellent
B+		
B		
B-	Q2	Good
C+		
C		
C-	Q3	Weak
D+		
D		
E	Q4	Poor
F		

Figure 1(c)

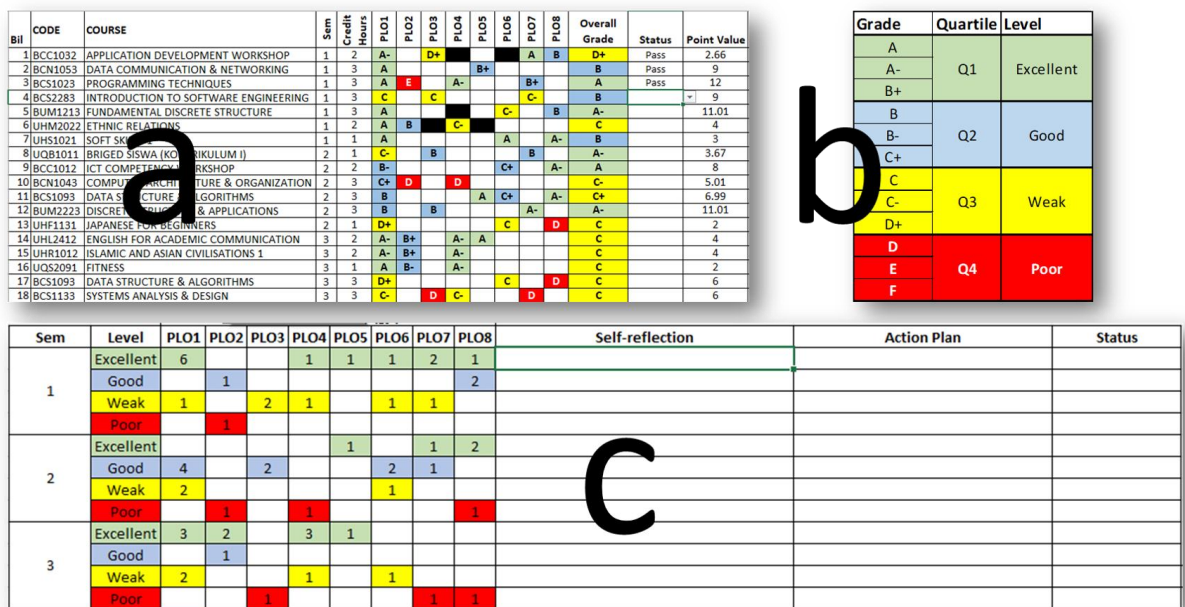| Sem	Level	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	Self-reflection	Action Plan	Status
1	Excellent	6			1	1	1	2	1			
	Good		1						2			
	Weak	1		2	1		1	1				
	Poor		1									
2	Excellent			1		1	2					
	Good	4	2		2	1						
	Weak	2			1							
	Poor		1	1				1				
3	Excellent	3	2		3	1						
	Good		1									
	Weak			1	1							
	Poor			1			1	1				

Figure 1 : myOBE - Smart OBE Academic Planner

The steps how to use myOBE as illustrated in Table 1.

Table 1: myOBE functionalities and Smart Features

Step	Description	Smart Feature
Step 1	Student enter course information (course code and name) based on curriculum structure of their academic program.	Automatic extraction the credit hours based on the course code.
Step 2	Student enter the grade attainment of course learning performance according to the designated learning outcomes (Figure 1(a))	Automatic cluster the grades with colour mapping based on reference colours in Figure 1 (b). The grades performance clustered into four quartiles Q1, Q2, Q3 and Q4.
Step 3	Student view the analysis in Figure 1 (c) where frequency of grade performance based on grade cluster.	Automatic quantify the frequency of grade according to grade cluster, semester and learning outcomes with colour mapping.
Step 4	Student enter self-reflection text.	System keep the records for future reference.
Step 5	Student enter action plan and status based on self-reflection.	System keep the records for future reference.

Significance of myOBE for Education

1. Planning is very important meta-cognitive skills in education for student (Chuvgunova & Kostromina, 2016). myOBE assist students to plan their course registration with data driven decision making by considering their learning performance.

2. Self-efficacy skills is very important for student success(Alegre, 2014). myOBE assist students to recognize their strength and weaknesses in study with visualization.
3. Data analytics is one of important component in IR4(Campbell, DeBlois, & Oblinger, 2007). myOBE equip student or getting student familiarize with academic analytics in their study and help them to meet future career needs.
4. OBE and MQF adoption require student engagement(Trowler, 2010) since students are the primary stakeholder. myOBE facilitate student to fully aware, engage and develop planning strategy to achieve the goal or the learning outcomes of their study.
5. Academic advising program can be done in more effective way with analytics(Dahlstrom, 2016). myOBE can facilitate academic advisor to advise student accordingly based on the visual analytics.
6. Digital transformation is a must in education(Rovai & Downey, 2010). myOBE facilitate institution to embrace digital transformation through digital technology adoption in core business (academic). myOBE can be embedded in existing Learning Management System (LMS) or uploaded in other online system.
7. Self-reflection is very important for student to make sense and realize the meaningful learning experience(Bugg & Dewey, 1934). myOBE assist students to document or record their reflection based on the analysis of their learning outcome performance.
8. myOBE has potential impact on minimizing attrition rate in education by empowering student with data driven decision making, reflection (thinking skills) and self-efficacy skills(Peterson-Graziose, Bryer, & Nikolaidou, 2013).
9. myOBE has potential impact on graduate employability(Rahmat, Ahmad, Idris, & Zainal, 2012) and institution to optimize their resources in producing human capital for the industry needs and meeting the purpose of education.

Advantages of myOBE

1. myOBE is been developed with common spreadsheet application which is Microsoft Excel. Excel has widely been used globally and is free for student in Malaysia public universities to use through Office 365 subscription program.
2. myOBE is a software based in nature. Thus, it does not require paper usage which promote paperless environment in campus. It can be shared through Internet and hosted on the cloud platform for global accessibility by community of educator.
3. Automatic features in myOBE save time for students to make strategic decision of action plan on their learning outcome performance. All calculations are made through Excel formula and no script or macro been used in myOBE which avoiding the risk of malicious code through Excel macro.
4. Promote United Nation Sustainable Development Goal through increase the quality of education by minimizing attrition rate or eliminating the risk of student's drop out.
5. Promote United Nation Sustainable Development Goal through decent works and economic growth by equipping student with visual analytics.

Commercial viability of myOBE

1. myOBE can be customized to meet any curriculum for academic institutions through license subscriptions. myOBE has been registered with myIPO under copyright with file number LY2017000704.
2. myOBE license can be subscribed as personal license with RM10.00 per student or campus license with RM1.00 per student.

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