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Hilmi Mukhtar ● Subarna Sivapalan ● Noreen Izza Arshad
Veeradasan Perumal ● Azella Zaine ● Habibah Shafiai ● Mitra Mesgar

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CONTENT

OUTCOME-BASED EDUCATION – COMFORT AND HARDSHIP?

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Introduction

Malaysian Qualifications Agency (MQA) has been governing the education system in Malaysia. Their main focus is on quality assurance practices in higher education institutions, with reference to the Malaysia Qualifications Framework (MQF). By fulfilling the set of criteria and standards by MQA, this will give assurance to stakeholders about the quality of graduates. However, what should be done to ensure what the institutions to fulfil the promises to the stakeholders?

In the education system in Malaysia, the educational institutions need to adopt Outcome-Based Education (OBE), with reference to MQF. What is OBE? OBE is defined as "*an approach to education that begins with clearly focusing on high-quality, culminating demonstrations of significant learning in context and organising 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 organising the curriculum, instruction, and assessment to make sure this learning ultimately happens to all students*" (MQA, 2013). The next question is: have the education institutions implement OBE in their programmes, and have these been assessed?

The purpose of this study is to discuss the importance of OBE and challenges faced in implementing OBE process in a private higher education institution in Malaysia, using document analyses and observations for ten undergraduate programmes, particularly in the business school.

Sample and methodologies

In assessing the implementation process of OBE, document analyses, including standards and reports, are conducted without a computer-aided programme. This is to identify the criteria the business school needs to fulfil and the best practices suggested by MQA for quality assurance.

Besides, observation is conducted to assess the OBE process and the responses among the academic and administrative staff on the acceptance of the OBE implementation in the business school. This is because a buy-in from academic and administrative is important to ensure successful implementation of OBE process. These methods are used in Dragoo and Barrows (2016); Thian, Ng, and Ewe (2018). Thian et al. (2018)Thian et al. (2018)

The Benefits of OBE and the Hardship in the OBE Process

This section will include discussions on the benefits of OBE and the challenges in implementing OBE process in the business school in a private higher education institution. Some suggestions are also provided.

Having OBE in the business school is important to ensure continuous improvements to curriculum design, taking into consideration intended learning outcomes, syllabus, teaching and learning methodologies, and assessment. This is important to constructively align these components by measuring the students' performance effectively.

Besides, the outcome from the OBE process helps lecturers identify the strengths and flaws of the programme or syllabus. This is important to help lecturers restructuring the programme or syllabus to enhance students' learning experiences, and this should be a continuous process. With this, it could improve the reputation of the educational institutions in terms of quality teaching and enhance students' learning experiences (Kalianna & Chandran, 2012).

However, implementing the OBE process and assessing the outcome from OBE are challenging. The direction and strategic planning of the university are important to educate the lecturers on what to focus. It is important to achieve higher ranking for the education institutions as this can be a good marketing tool, improve institutions' popularity, and help departments/schools in terms of resources planning, and other benefits (Roller, Andrews, and Bovee, March/

April 2003). A balance between teaching and research needs to be communicated to lecturers. A clear human resource policy needs to be structured to reward the lecturers who can perform in teaching or research. With this, the institutions can still maintain quality teaching while having quality publication.

Designing curriculum and aligning curriculum to intended learning outcomes, syllabus, teaching and learning methodologies and assessment can be a pain if one is not equipped with the relevant knowledge and skills. Most of the lecturers are subject-area experts; yet, they may not be trained as professional lecturers (Barradell, 2012; Kim & Helms, 2016). Thus, engaging these lecturers in curriculum design and performance measurement are important – these could be done through constructive alignment and OBE training sessions; or through consultancy and advisory sessions.

Establishing the OBE process in the business school requires expenses and effort (Djoundourian, 2017; Roller et al., March/April 2003). This can be an added administrative work to lecturers, besides teaching and research works – lecturers need to monitor the OBE process and make the necessary adjustments to this process. A necessary reward system should be established to engage these people in this administrative work, and this should also be included in their key performance indicators – where these include yearly reward and promotional criteria.

Having to implement OBE process without a computerised system can be challenging. This is because having to study the documents and assess students' performance can be time- and resources- consuming. However, it is important to understand the needs before the purchase of the computerised system, so that customisation to the system can be done. This can only be done when the lecturers have sufficient knowledge in OBE and in assessing students' performance.

Conclusion

This study is to discuss the importance and challenges of the OBE process in a private education institution, while some suggestions are included to have smooth-running OBE implementation. The OBE process is continuous improvement to programme and syllabus, and the outcome from OBE is important to assess students' learning experiences. However, this should be done collectively among the lecturers and administrative staff to ensure the successful implementation of the OBE process.

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DEVELOPMENT OF UNDERGRADUATES ANALYTICAL THINKING SKILL USING CONSTRUCTIVE ALIGNMENT APPROACH

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Introduction and Background

Analytical thinking skills is highly in demand now days (Few, 2015) (Korczak & KaĨmierczak, 2017), especially jobs involve with data analytics and data visualization. In producing good data scientist and data analyst, many researchers suggested these skills been develop at undergraduates' level. Recent study by (Li, Xia, Wu, & Chen, 2018) stated analytical thinking skills helps to make quality decision making and (Li et al., 2018) believed individual who have analytical thinking less mistake in making moral judgement. (Korczak & KaĨmierczak, 2017) have suggested topics for analytical thinking development at undergraduates' level because it gives individual capability to solve problems quickly and effectively. Complex problem can be easily break down into manageable components using this thinking skill. Not limited to that, it requires capability to compare a set of different sources of information, different sets of decisions, and identify the best quality decision making that appropriate solution to the problem addressed. This kind of thinking skill is really required and highly in demand especially in the field of Big Data Analytics.

For the teaching and learning approach to develop the analytical skills, Constructive Alignment (CA) was selected as the best approach for this study. CA allows students go through a learning environment that expose them to the opportunity to construct knowledge and skills specified in the desired outcome (Biggs, 1996; Treleaven & Voola, 2008; Walsh, 2007; Yoon & Gruba, 2017). CA teaching and learning activities is illustrated in Figure 1. Three main CA components (Learning Outcome; Instruction; Assessment) and Six main components Bloom Taxonomy (Remember; Understand; Apply; Analyze; Evaluate; Create-RUAAE) will be align.

This learning approach believed able to improve students understanding on Big Data concepts and applications. The study also will measure the impact and effectiveness of CA learning in teaching and learning Big Data courses among students. Three main identified problem statements will be solved through this study:

1. difficulties of students to develop analytical thinking and problem solving from industry complex problem
2. unable to undertakes complex tasks and breaks them down into manageable in a systematic way
3. difficulties to thinks alternatives for certain identified situation and effectively solved them

Figure 1: Constructive Alignment + Bloom Taxonomy Teaching and Learning Approach

CA teaching and learning approach creates an environment that allows students to understand, visualize and apply the Big Data concept in their learning throughout their undergraduate program. This teaching and learning approach will help students develop necessary skills for Big Data Analytic competency. Due to that, Universiti Teknologi PETRONAS(UTP) selected as domain for this study. Early 2018, UTP academic has decided to start introducing Big Data Analytics courses to undergraduates and postgraduate level and currently follows the National Big Data Framework designed by Malaysia Digital Economy Corporation (MDEC). With these big initiatives, teaching and learning modules for both undergraduates and postgraduates' level carefully designed to ensure we can produce solid graduates that fit current industry needs.

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ENHANCING COOPERATIVE PROBLEM-BASED LEARNING (CPBL) IN GEOSPATIAL INFORMATION SYSTEM SUBJECT FOR BTECH PETROLEUM GEOSCIENCE

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Abstract

The CPBL model is a combination of PBL and cooperative learning to emphasize learning and solving problems in small student teams (consisting of 3-5 students) in a medium sized class, of up to 60 students for one floating academic staff or facilitator. The model requires the problem to be realistic, if not real, with a scenario that serves to contextualize and immerse students in the problem. E-learning or U-Learn may also be integrated into the learning environment to include activities to reach the desired educational objectives, such as creating realistic problems to encourage immersion, facilitating students and providing scaffolding, as well as providing additional platform for discussion and peer teaching. The framework designed based on constructive alignment serves as scaffolding for guiding students in going through CPBL. A geospatial information system or geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data in order to support decision making for planning and management of natural resources and environment. Suggestion of incorporate CPBL in this GIS subject is considered as good alternative teaching-learning techniques for the students to understand, working and implemented within short period thru the modelling processes in spatial analysis.

The aim of this paper is to describe and discuss the applicability of CPBL in Geospatial Information System (GIS) in Petroleum Geosciences Department, Faculty of Science and Information Technology, Universiti Teknologi PETRONAS. Some experiences of implementing them in our GIS subject course was described and discussed. This subject is meant for second semester of final year students was conducted using these CPBL framework in their mini-projects since September 2017 semesters. In mini project or case studies, the students were face hiccup as they struggled to understand the problems and the usage of software altogether especially in the modelling part in the spatial analysis. Therefor the modelling part processes needed the assistant from facilitators frequently. The result of implementing CPBL environment was evaluated using a methodological tool based on surveys, filled by the students at the end of the courses. The most clear and concise comparison was final exam results, were compared to the other courses based on more passive-learning methods for the same groups of students.

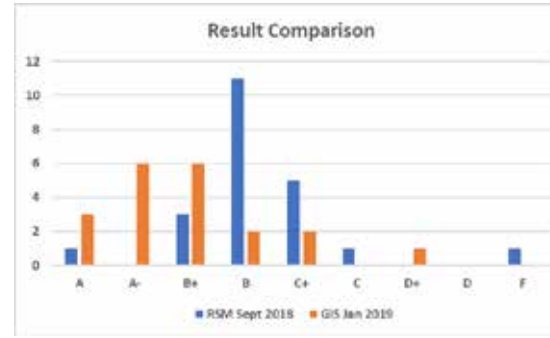

Figure 1 : Result comparison between active and passive learning method subjects for the same group of students.

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APPLYING TEAM-BASED LEARNING APPROACH IN ELECTRICAL TECHNOLOGY COURSE FOR COMPUTER ENGINEERING PROGRAMME

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Introduction

Methods of learning are vital aspects to facilitate students in learning process. Some people feel that studying in a group is more beneficial than individual learning while others probably have a different opinion. Team based learning integrates independent learning and group learning in enhancing students' deeper conceptual learning. Although individual learning has certain benefits, some studies claimed that active or group learning will bring more benefits than individual learning [1], [2]. Educational research has shown that student-centered active learning can produce much deeper conceptual learning than can traditional lecturing [1]. With the aid of group-based learning environment, such as problem-based learning (PBL) [3], project-based learning (PjBL) [12], or team-based learning (TBL) [4], various professional functioning skills, such as problem-solving, written and oral communication, independent learning, team work, etc. can be developed by students.

In TBL, there exists primary objectives shift from knowing concepts to using concepts. In regard to the educator, there needs to be a shift for them from expert (sage on the stage) to moderator (guide on the side). The teacher will need to design and manage the overall instructional process instead of just dispensing information and concepts. As for students, they will need to shift from passive learners with limited responsibility for their learning to active learners with an increased responsibility for their learning. It is reported that changes of this magnitude can happen when the teacher is able to implement the four essential principles of team-based learning [14]; 1. groups must be properly formed and managed, 2. students must be made accountable for their individual and group work, 3. group assignments must promote both learning and team development, and 4. students must have frequent and timely feedback.

O'Connell and On adapted TBL for use in the required sophomore-level electric circuit theory sequence [5]. This study selected a TBL approach over a PBL approach to avoid the so-called knowledge gap which is one of the biggest challenges to properly using problem-based learning. This is due to some items of course content will not be learned by students as they will find ways of solving the problems designed without having to learn and use the intended content knowledge. This knowledge gap can be worse when a problem is not designed with extreme care to ensure course learning outcomes and content are all adequately addressed [6, 7].

Problem Statement

The Electrical Technology (ETech) course introduces the fundamental concepts related to the principles of electrical engineering, the passive components, the techniques of analyzing electrical circuits and the concepts of power.

In our undergraduate computer engineering program, ETech is the only course that covers the fundamental concepts related to the principles of electrical engineering, the passive components, the techniques of analyzing electrical circuits and the concepts of power. Teaching this course to computer engineering students for more than 3 semesters, it is found that they show little interest in the course as most of them see it as an electrical course, which does not provide knowledge for the discipline of computer engineering. Unlike our undergraduate electrical and engineering program, a similar course to the Electrical Technology, the Circuit Theory course, serves as a pre-requisite to Electrical Circuit Analysis Lab (ECAL). In computer engineering program, ECAL or any other lab-based course on electrical circuit theory is not offered. By implementing the team-based learning approach, it is expected that students will not only be motivated to study and learn new material outside of class, they will also be motivated to engage appropriately in group work as they are learning in a team.

The class will also be embedded with hands-on circuit lab activities to enhance students' interest and help them in grasping the fundamental principles and concepts. Formative assessment in the form of group reports, feedback surveys and mini viva will be done. Summative

assessment will consist of preparation and readiness quizzes and final exam.

Literature Review

In a TBL [4, 5], in the individual-learning phase, students are provided with specific content material to be learned prior to the subsequent application phase. A readiness test can be given to ensure students commitment in the individual-learning phase and to check on their understanding. A subsequent brief corrective lecture before beginning of the application phase will be given to emphasize important content. Thus, there is much less risk of creating knowledge gaps when using TBL. Essentially, TBL is a specific form of the flipped classroom pedagogical strategy, variously defined as an approach in which the usual lecturing and homework elements of a course are reversed. TBL in its basic form has been used to teach some basic engineering courses, e.g., engineering materials [8], [9], mechanical engineering [10], and heat transfer [11].

Outcome from a systematic, narrative review of the educational literature with respect to TBL, Haidet et al. [14] found early evidence of positive educational outcomes in terms of knowledge acquisition, participation and engagement, and team performance. The authors also concluded that TBL asks both teachers and learners to believe that practice with concepts (rather than memorization of or telling about them) in messy, uncertain application exercises is the key to actually being able to use such concepts in real life.

Proposed Method

Michaelsen et al. claimed that application activities which is considered as the TBL main event, must be built using 4 S's (significant problem, similar problem, specific choice and simultaneous report) to get the most consistent and powerful results [13].

Taken [13] into account, the flowchart in Figure 1 below depicts 3 phases involved in the proposed team-based learning approach for each major content unit. It will be done for the first 4 chapters of our textbook that cover the key to the basic of electric circuit theory, fundamental laws and theorems, and circuit analysis techniques. For each topic, 5 questions/problems will be formulated that should cover the fundamental aspects. Two weeks will be given for each TBL. This is to fulfil the needs for the students discuss, teach each other, brainstorm etc. to arrive to the problem solutions. In class, student will be seated according to their teams. The instructor facilitates their mutual learning, in which each student is required to be an active participant and to be responsible for what he/she learns. At the end of the course, qualitative survey will be conducted to assess students' perception-of-learning in the course.

Figure 1

Innovation and its impact based on research evidence
For the Phase 1, materials form instructor will be provided to students a week before class. Short lecture videos (less than 30 mins) and a set of narrated dynamically worked-out problems with difficulty levels that students are encouraged to watch will be prepared by instructor using PC tablet, Power Point slides, One Note and a capturing software such as Camtasia.

The TBL also promotes both self and peer teaching which requires students to understand the material at a deeper level and engage in discussion, problem solving, and learning. This discussion can be for the purpose of getting information or for disseminating information. Hence, in this study, we propose to incorporate the element of lab activities (hands on using breadboard in Phase 2) adopted from ECAL to a team-based learning approach for our Electrical Technology course to not only spark interest among the computer engineering students in learning circuits in a more engaging way but also to help the students develop various professional skills, such as problem solving, written and oral communication, self-directed independent learning, and teamwork early in their program.

Strong understanding of the basic of electric circuit theory, fundamental laws and theorems, and circuit analysis techniques is very critical for students of Electrical & Electronic Engineering. If this AL model proved to be able to help improve the understanding of the fundamental of electric circuits among the Computer Engineering students, the same model can be adopted for the EEE students in their Circuit Theory course.

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