Developing an Introduction to Actuarial Science MOOC

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Abstract
Financial Mathematics a subject taught under the actuarial science program in preparation for the professional actuarial examination under the SOA as well as getting students to understand the monetary aspect of the current financial system. The present methods of teaching the subject underscore the difficulty students faced in trying to master the subject matters. Major difficulties included difficulties of the subject contents, limited face to face discourse with lecturers, and time limitation on teaching the subject contents. A new platform using the Massive Open Online Course (MOOC) is considered to address the above issues to ensure students have assessed to understand the subject in a more conducive manner.
Keywords: Financial Mathematics, Acturial Science, Massive Open Online Course (MOOC)

Introduction
An actuary can be defined as professional workers who deal with insurance problems such as determining premium rates of insurance, developing insurance products and involving in any risk management issues whereby they will use mathematical ideas, statistical methods and economic indicators to solve the problem that related to insurance environment. In order to align with the current condition specifically human life and industrial problem, Diploma in Actuarial Science under Actuarial Science Department created one course called Introduction to Actuarial Science with the main purpose to provide the learners about actuarial knowledge and concept, actuarial issues and problems that exist in the industry and finally allocated one part on development in insurance products.

Current Issues in Teaching and Learning
Blended learning is a combination of e-Learning, face-to-face and autonomous studies. It has been increasingly popular in recent years, in response to amazing online learning progress. Among them: Online discussions, messages and feedback from lecturers and peers. In the meantime, the course is accessible 24/7 - any time from any location (Spyropoulou, Demopoulou,

Pierrakeas, Koutsonikos, & Kameas, 2015). While student assessment and automatic grading offered by many learning systems can also help students to improve their existing knowledge. This is also according to the style and learning style of each student, creating a more comfortable environment for both parties. If students are having problems with a particular topic, they can reach web resources complementing or getting quick help from their instructors (Leito, Helm, & Jalukse, 2015). Mohd Nor Hajar Hasrol, Mohamad, Rahayu, Nor Azilah, & Azlan, (2013) stated that the current issues in teaching and learning, such as:

i. Lack of space and time
ii. All communications are not archived for future reference
iii. Communication in groups
iv. Motivate students for self-learning
v. Low and medium levels of student interaction and accountability.
vi. Difficult to share ideas and responsibilities

Massive Open Online Courses UiTM
Massive Open Online Course (MOOC) UiTM is an alternative to UiTM's online learning platform. It is an introduction to cater for the new approach to learning that dominates current life styles especially that of younger generation (Spyropoulou et al., 2015).

The four main features of MOOC are course information, learning materials, learning activities and course assessments. These features are consistent with the need of Blended Learning Mode which was listed as one of the main elements in national e-learning agenda. The implementation of MOOC is also guided by the Dasar e-Pembelajaran Negara (DEPAN) formulated by Ministry of Education, Malaysia (Spyropoulou et al., 2015).

MOOC is connected with UiTM's Integrated Academic System. Student and lecturer accessibility to MOOC are concurrent with the course registration module and lecturer's teaching assignment. The use of MOOC starts at the beginning of a semester and student and lecturer may access MOOC's features based on their list of course registration. At the same time, lecturers could upload and update the learning material and information about the course. Throughout the semester, most of the learning activities that involved students and lecturers are available in MOOC. MOOC is accessible through any browser and also from mobile application via Open Learning mobile application (Shuang[a], Azeezeen, Tengku, Thambyraja[a], & Ibrahim[b], 2012).

Advantages of using MOOC
These are specific advantages of using MOOC (Ng, 2014):

i. Decrease dependency on class instructors.
ii. Wider opportunities for students to engage in learning.
iii. Save cost.
iv. Reduce the number of F2F class hours.
v. Enhance students' learning and retentive ability.
vi. Designers and learners are not limited to one medium or delivery channel to meet the learning objectives.

vii. It promotes a continuous learning approach which is more effective at creating change and deep learning.

viii. It provides more opportunities for social learning, collaboration, increased participation and informal strategies.

ix. Using both synchronous and asynchronous approaches can provide more opportunities for learners to cultivate skills and apply them.

x. There is potential for faster development and reduced costs depending on the approaches that are selected.

xi. Technology-enabled delivery can reach a geographically dispersed audience.

Introduction to Actuarial Science MOOC

This course introduces the students to the actuarial science practices. The syllabus for this course provide with the basic understanding of actuarial science and how to become actuary that exist in the market provided by Malaysian's insurance companies. Students will also be equipped with the fundamentals of insurance in the context of actuarial science. At the end of the course, students should be able to:

i. Explain the tasks of an actuary.

ii. Describe the areas involving actuarial knowledge.

iii. Apply basic actuarial knowledge

This learning style is adapted from the National Learning Policy which consists of 3 items. The main features of MOOC are course information, learning materials, learning and assessment activities courses. These features are consistent with the requirements of the Combined Learning Mode listed as one of the key elements in the national e-learning agenda (Aldon et al., 2017).

Involvement of Students

The implementation of MOOC enable students to achieve the objectives of higher education strategic plan from the three perspectives; cognitive, psychomotor, and affective. The higher education strategic plan strives to produce knowledgeable graduates who are competent and able to put knowledge into practice (Pelan Strategik Pengajian Tinggi Negara, 2007). Online learning course offers flexibility since it allows students to plan their study based on their own time preferences. The virtual classroom can also save time as they can study anywhere. They do not have to go to the library since course materials are always available online. Thus, students can study according to their own pace and composure.

Evaluation of MOOC

The use of MOOC at the beginning of semester enable lecturers to monitor students' performance throughout the semester according to the planned learning activities. Since it is accessible at almost anywhere and anytime and due to the automatic grading system, it will assist students in improving their understanding on the subject matters while making it easy for lecturers to assess their students. If students face difficulty while learning through MOOC, they can easily access any web sources to get immediate additional information to help them understand the subject contents.

In order to measure the effectiveness of using MOOC as an added learning platform for students, the examination results from two consecutive semester in which this course is offered are compared. The passing rate for the two semester (December 2015 – April 2016 and December 2016 – April 2017) are compared by mapping to the course learning outcomes (CLO).
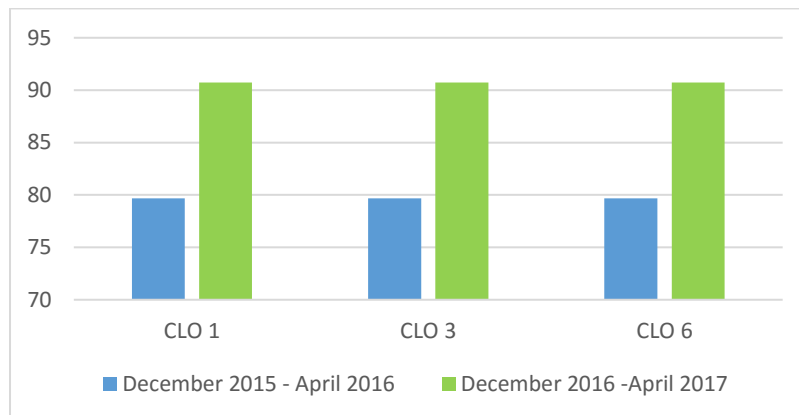
Results and Discussion

Figure 1: Pass Percentage of the Course Learning Outcomes

During semester December 2015 – April 2016, the passing rate is 79.69%. Meanwhile, the result indicated an increase in the achievement of passing rate which is 90.72% when the implementation of MOOC for this subject started in semester December 2016 – April 2017. This result showed that the use of MOOC has a positive impact on students' performance.

As blended-learning combines e-learning with traditional classroom teaching, it is easier for students to have an online discussion and get feedbacks from lecturers as they usually like to spend their time using internet. The study conducted by Brahimi, T. and Sarirete, A. (2015) also states that students tend to use social networking sites to connect with classmates and stay current with class news regarding exams and homework and most of them are active in learning outside the classroom especially for Mathematics subject. Besides, Kashefi, H. et al (2012) also found that a blended learning environment can support students' learning especially regarding to mathematical thinking.

Conclusions
Actuarial science is a unique and interesting course whereby the students will be able to apply and relates the concept of insurance in real-life. It is also help the student to understand the role of actuaries in insurance and other related areas. As students facing difficulties due to the limited face to face classroom learning and time constraint on teaching the subject contents for the lecturers, the implementation of MOOC can help in making the learning process easily accessible with unlimited course resources.

The improvement in passing rate among students between the two semesters proved that MOOC is a suitable platform for students to learn this subject. The features available in MOOC also

making it possible for lecturers to deliver the subject matters in a more interactive and interesting way as compared to traditional classroom teaching.

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