

Developing an Introduction to Financial Mathematics MOOC

Mohd Zaki Awang Chek, Abu Bakar Ahmad, Ahmad NurAzam Ahmad
Ridzuan, Isma Liana Ismail, Nor Mariayah Abdul Ghafar

*Center for Actuarial Science, FSKM,
Universiti Teknologi MARA Perak.*

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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: *MOOC, Open Learning, Financial Mathematics, IFoA, ASC303, UiTM*

INTRODUCTION

Mathematics plays an important role in the financial services industry and there is a growing demand for graduates with knowledge and understanding of both financial matters and the relevant mathematics (Haslifah Mohamad Hasim, 2015). This course provides a thorough training in both aspects with a range of modules in economics, finance and mathematics, including specialist modules that deal directly with applications of mathematics in finance (Kellison, 2009). Therefore, this paper illustrated and described

the use of a Massive Open Online Course (MOOC) Universiti Teknologi MARA (UiTM) to deliver financial mathematics for UiTM's Actuarial Science students all around Malaysia. It also provides a platform to deploy innovative techniques enhancing positive thinking through blended learning (Brahimi & Sarirete, 2015).

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 and Azlan (2013) stated that the current issues in teaching and learning, such as:

1. Lack of space and time
2. All communications are not archived for future reference
3. Communication in groups
4. Motivate students for self-learning
5. Low and medium levels of student interaction and accountability.
6. 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 (Shuanga, Azeezeen, Tengku, Thambyrajaa, & Ibrahim, 2012).

Advantages of using MOOC

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

1. Decrease dependency on class instructors.
2. Wider opportunities for students to engage in learning.
3. Save cost.
4. Reduce the number of F2F class hours.
5. Enhance students' learning and retentive ability.
6. Designers and learners are not limited to one medium or delivery channel to meet the learning objectives.
7. It promotes a continuous learning approach which is more effective at creating change and deep learning.

8. It provides more opportunities for social learning, collaboration, increased participation and informal strategies.
9. Using both synchronous and asynchronous approaches can provide more opportunities for learners to cultivate skills and apply them.
10. There is potential for faster development and reduced costs depending on the approaches that are selected.
11. Technology-enabled delivery can reach a geographically dispersed audience.

Introduction to Financial Mathematics MOOC

This course will explain, describe and discuss on the basic concepts, calculations and simple applications of the mathematical modelling used in the financial world. Its goal is to provide students with first-hand exposure in financial modelling and actuarial analysis as basic knowledge before proceeding further to the Advanced Financial Mathematics course in the later semesters of the Actuarial Science Program (Ng, 2014). At the end of the course, students should be able to:

1. Describe the fundamental concepts, key terms and various investment instruments in Financial Mathematics.
2. Apply the key procedures of Financial Mathematics in valuing various stream cash flows and bonds.
3. Analyze the complexity of financial decisions by translating real-world problems into mathematical terms in business and personal arenas.

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 (PelanStrategikPengajian 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 were compared. The passing rate for the two semester (December 2015 – April 2016 and December 2016 – April 2017) were compared by mapping to the course learning outcomes (CLO).

RESULTS AND DISCUSSION

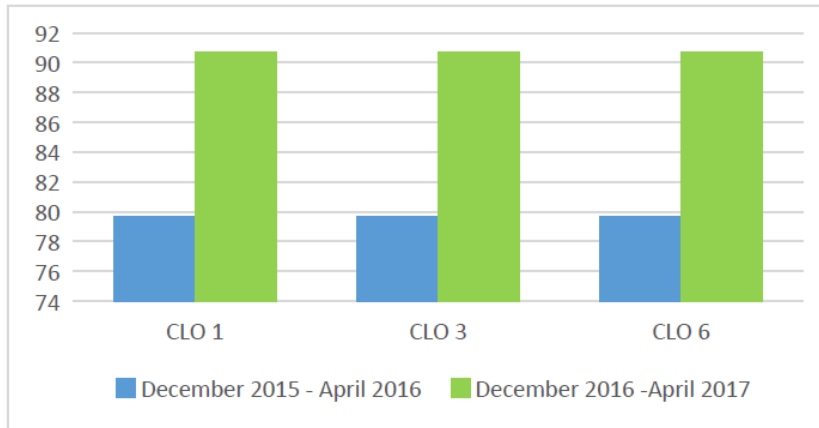


Figure 1: Pass Percentage of the Course Learning Outcomes

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 Brahim and Sarirete (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 et al. (2012) also found that a blended learning environment can support students' learning especially regarding to mathematical thinking.

CONCLUSIONS

Financial Mathematics is a subject taught under the actuarial science program in preparation for the professional actuarial examination under the Society of Actuaries (SOA) and as one of the requirements for CT1 exemption under the Institute and Faculty of Actuaries (IFoA) in UiTM. As students face 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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