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## **THE DEVELOPMENT OF A MASSIVE OPEN ONLINE COURSE (MOOC) IN MASTERING SMOKING CESSATION INTERVENTION IN DENTISTRY**

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### **Abstract**

**Purpose** – Massive Open Online Courses (MOOC) has appeared as one of the most explored trends of online learning. In September 2014, the Ministry of Education Malaysia has collaborated with four of its public universities; including The National University of Malaysia (UKM) to launch the Malaysia MOOCs initiative. As part of this collaboration effort, our faculty developed a MOOC for Smoking Cessation Intervention in Dental Practice course for our faculty teaching and learning. **Methodology** – This course was developed using Iterative ADDIE (Analyse, Design, Develop, Implement and Evaluate) Instructional Design Framework. The smoking cessation intervention content of this course was adapted from the Smoking Cessation Intervention Delivered by Dentists (SCIDD) Training Module and UKM's Oral Health Curriculum. The analytics data was collected from the MOOC via OpenLearning.com's analytics tool and analysed in SPSS version 23.

**Findings** – Eight modules were developed for this course. The learning content of each module contained a video, a power point lecture slides and quizzes in English language. The structure of learning tasks was loosely structured and learner controlled. A total of 224 learners enrolled for the course. Mostly were dental undergraduates (n=72, 33.6%). Sixty-three percent of the enrolled

learners completed the course. Significantly more dental auxiliaries ( $p < 0.000$ ) completed the course compared to other types of learners. MOOC could be an alternative online learning platform for the topic of smoking cessation in the dental practices for all learners.

Significance – MOOC would be an alternative platform for curricular teaching among students and lifelong learning for employment and personal fulfilment for health professionals or those with special interest in tobacco control.

*Keywords:* Massive Open Online Course, MOOC, Malaysia MOOCs, smoking cessation, ADDIE (Analyse, Design, Develop, Implement and Evaluate), online learning, dental students, dental auxiliaries, dentists

## **1. INTRODUCTION**

Malaysia was declared as the first country in the world to implement Massive Open Online Courses (MOOCs) for all public universities and we are also currently the only country where MOOCs are implemented at a national scale through the Government (Rajaendram, 2014). The vision behind MOOCs is for knowledge to be disseminated to a global set of learners in an open learning environment (Nordin, Embi & Norman, 2016). The main goal of MOOC is to provide knowledge through free high quality education, to support the learning process through social interactions and to empower research on learning (Nawrot & Doucet, 2014). Four public institutions including The National University of Malaysia (UKM) have been tasked by Ministry of Education to coordinate and develop the official portal for MOOCs (known as Malaysia MOOCs).

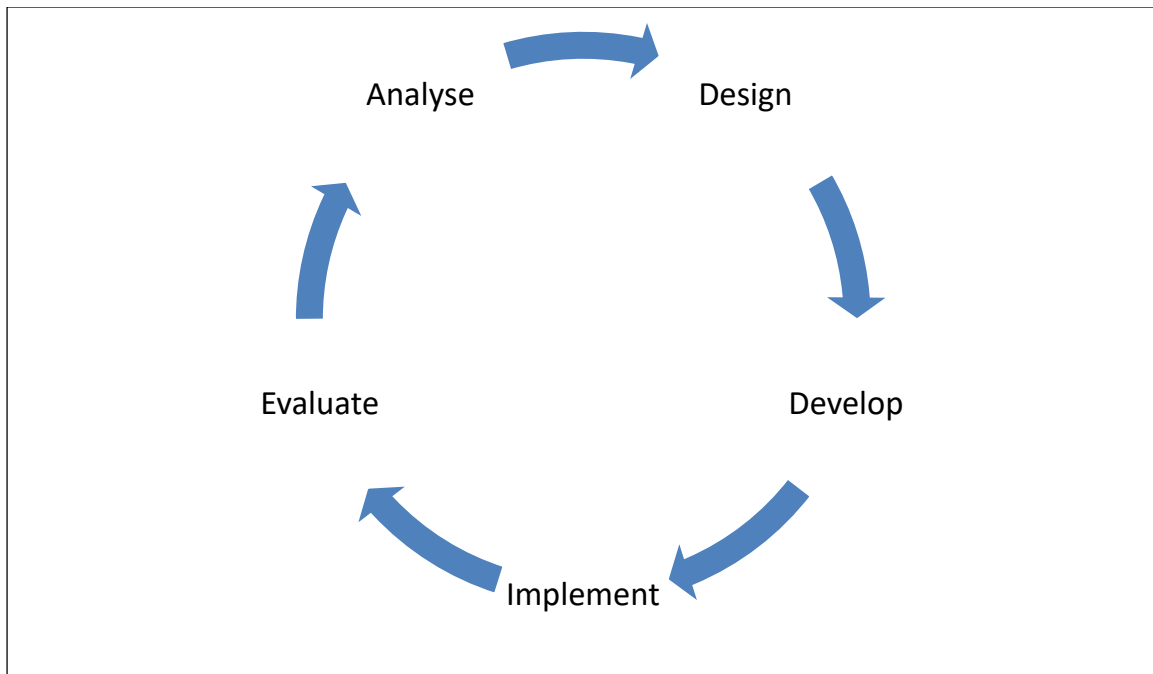
A vital aspect to reflect in education is how students learn. MOOC are different from the traditional learning management systems due to the fact that the online courses are open to a massive number of students. The use of technologies alone does not guarantee that teaching and learning will transform. Sutherland et al. (2014) stated that the combination of new pedagogies with technology use is what leads to improved teaching and increased student learning. The pedagogy of MOOCs differs as students are more independent in learning due to the lecturer-student ratio, where there could be one lecturer to hundreds or thousands of students enrolled for a course (Liyanagunawardena, Adams, & Williams, 2013). Since MOOC's learning environment is open to public, it can be utilized in several different ways depending on the learners' requirements and their objectives in learning could be diverse.

Online learning saves time, reduces costs, offers various multimedia matching different learning styles, allows students to learn anywhere at any time outside classroom, overcomes shortage of faculty, and has the potential to shift the learning process from passive teacher-centred learning to active learner-centred learning (Pahinis et al., 2007, Ruiz, Mintzer & Leipzig, 2006, Ramlogan, Raman & Sweet, 2014). This proves that positive impressions on the role of information and communication technology (ICT) in education were acknowledged. Therefore, most of higher educational institutions considered online learning as an important part of their educational strategy (Allen & Seaman, 2011).

In dentistry, Reynolds, Rice & Uddin (2007) proved that dental students' perceptions of their ICT skills has increased, matched by better equipment and greater appreciation of e-learning. Addition to that, a study by Asiry (2017) concluded that dental students were positive regarding online learning. Schönwetter et al. (2010) suggested that online learning could be a solution to an increasing global shortage of dental academics to teach future dentists by reducing the time students spent in lectures where learning can take place anytime, anywhere. Thus, as part of Malaysia MOOCs collaboration effort, there is a need to develop an online course for the faculty's teaching and learning on smoking cessation intervention in the dental practice. Therefore, the objectives of this research were to develop the learning content on smoking cessation intervention in the dental practice suitable for MOOC and to assess the overall analytics data among learners enrolled for the course.

## **2. METHOD**

Mastering Smoking Cessation Intervention in Dental Practice Course in the MOOC was developed for the dental team which includes dentists, dental therapist, dental hygienist; oral health educators, dental undergraduates and other relevant medical and team and pharmacists to learn and expand knowledge and skills in smoking cessation. This course was developed using a modified version of the ADDIE (Analyse, Design, Develop, Implement and Evaluate) framework called the Iterative ADDIE Instructional Design Framework (Figure 1) (Nordin, Embi & Norman, 2016).



*Figure 1: Iterative ADDIE Instructional Design Framework*

In the Analyse Phase, need analysis was discussed among 4 Dental Public Health Consultants teaching the faculty's Oral Health Course. A consensus was reached that the content and modules should be almost similar with the existing curriculum content for the undergraduate and postgraduate teaching (Faculty of Dentistry, Universiti Kebangsaan Malaysia, 2016-2017). We have also agreed that the learning content should be tailored to the xMOOCs type (Conole, 2013), which uses a cognitivist-behaviourist approach, and relies primarily on video, discussion forums, multiple-choice quizzes or other types of assignments. Type xMOOCs confine the learning process where "teachers are regarded the expert" and "learners are regarded as knowledge consumers" (Siemens, 2013), creating a "tutor-like" presence during learning. During this phase, a consensus on the learning objectives were obtained and are as follows: 1) To provide knowledge on tobacco use and its effects; 2) to explain the steps involved in the current approaches of smoking cessation intervention, and 3) to develop skills in conducting behavioural counselling in smoking cessation.

In the Design Phase, these Dental Public Health Consultants, with the faculty's E-Learning Coordinator and Content Developers of UKM MOOC produced the page design via workshops on MOOC development conducted by the Centre for Teaching and Learning Technologies, UKM.

In the Develop Phase, all 4 modules from the existing curriculum for Smoking Cessation in the Oral Health Course were selected to be included in MOOC. Additional module contents

which were 'Audio Visual Aids in Promoting Smoking Cessation' and 'Setting up a Quit Smoking Program in Your Dental Clinic' were included to complete the dynamic learning of MOOC. The smoking cessation interventions for this course were adopted from the Smoking Cessation Intervention Delivered by Dentists (SCIDD) Training Module (Yahya, Saub, & Nor, 2015). Relevant videos were selected appropriately from YouTube.com ensuring the sources were reliable to use. Mainly live action videos were used. An example of a live action video is on a life-scene sending an emotional and meaningful message to the community about the bad consequences of smoking towards a person and their family (Figure 2).

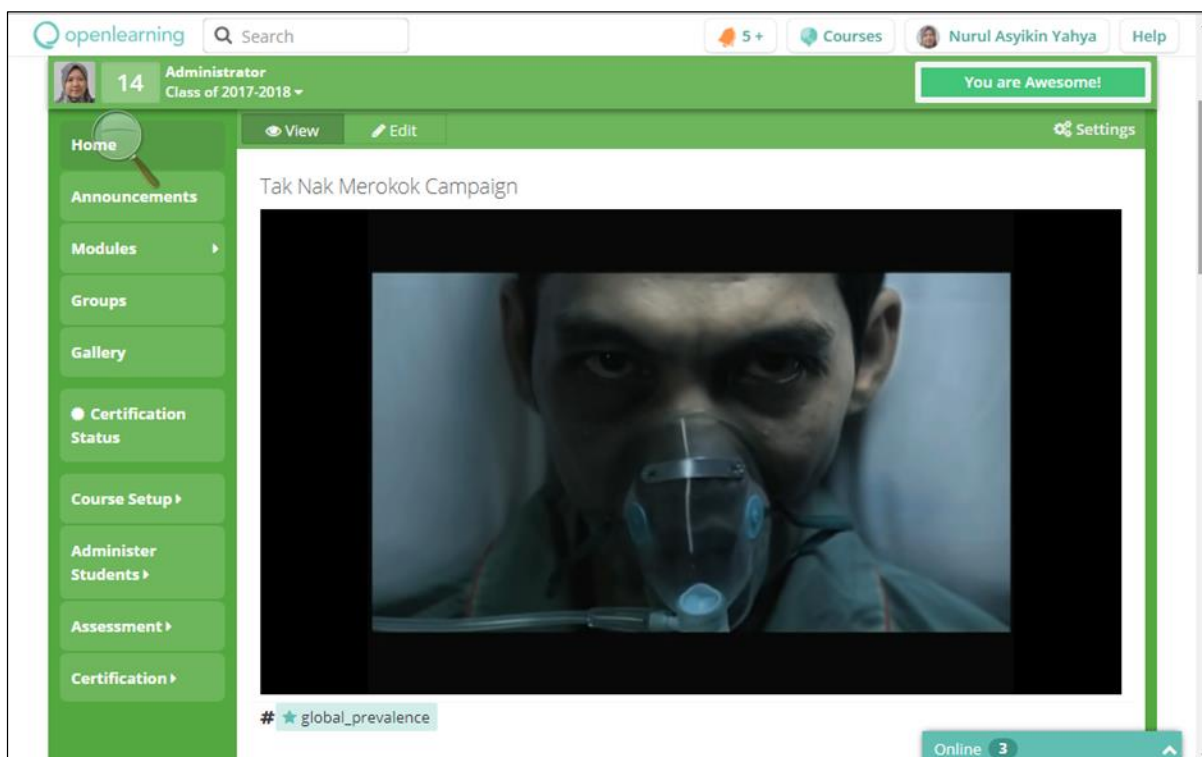


Figure 2: An example of a live action video in the MOOC

The structure of learning tasks was mainly loose structured and mainly learner controlled. The social settings of learning tasks were individual learning. Learners were required to complete a quiz after each module as their assessment for this course. Example of the learning tasks developed were closed-ended questions in the form of a quiz (Figure 3).

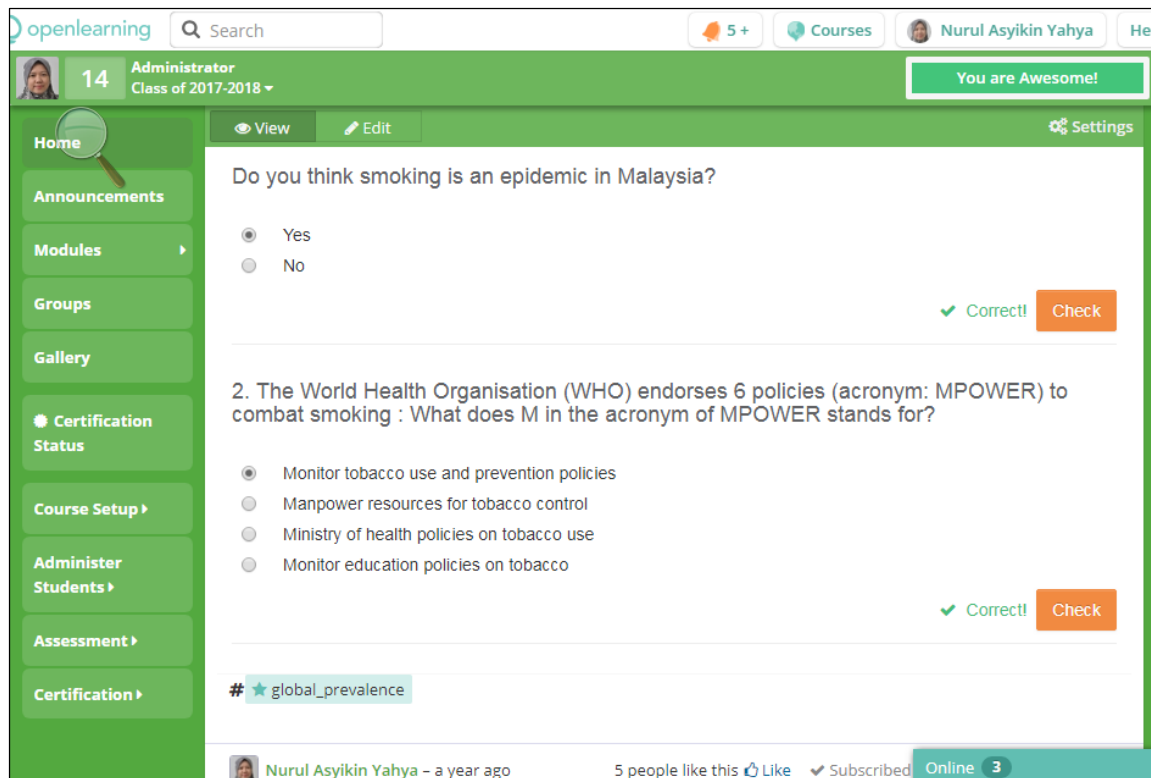


Figure 3: Close-ended questions in learning activities

The MOOC prototype was fully developed in July and the UKM MOOC committee evaluated the prototype. Feedbacks given were on improvements to provide clearer rubrics for task that accompanies the videos in each module. Good choice of colours, clarity of content and activities, simple and engaging were among other feedbacks given. On 8<sup>th</sup> August 2016, the MOOC Mastering Smoking Cessation in the Dental Practice was launched online and opens to public. In terms of certification, a badge will be given to anyone who signed-up for this course and another badge after completing it. A certificate with Continuing Professional Development (CPD) points will be awarded after completion.

The overall analytics data was collected from the MOOC via OpenLearning.com's analytics tool and analysed in SPSS version 23. The overall analytics was collected according to the course period which was from August 2016 to March 2018. Frequencies and percentages were calculated for categorical data. Chi-square test was used to analyse associations between course completions with learners' occupation. Significance was set at p-value < 0.05.

### 3. RESULTS

#### 3.1. Development of MOOC Learning Content

Eight modules were developed for this course. Table 1 summarizes the developed modules, its learning activities and learning outcomes for each module. Modules 1, 2, 4 and 6 consist of a video, PowerPoint lecture slides and quiz. Other modules consist of PowerPoint lecture slides and quiz. Formal English language was used in all learning contents and quizzes.

Table 1: *Modules, Learning Activities and Learning Outcomes for Mastering Smoking Cessation in the Dental Practice Course*

Modules	Learning activities	Learning outcome
Module 1: The Tobacco Epidemic	<ol style="list-style-type: none"> <li>1. Video: 'Tak Nak Merokok' Campaign</li> <li>2. Lecture slides</li> <li>3. Quiz</li> </ol>	Learners were able to describe the global prevalence of tobacco use.
Module 2: The General and Oral Health Effects of Smoking	<ol style="list-style-type: none"> <li>1. Video: Tobacco and Oral Health</li> <li>2. Quiz</li> <li>3. Video: Self-mouth examination</li> </ol>	Learners were able to describe general and oral health effects of tobacco use.
Module 3: Understanding Nicotine Addiction	<ol style="list-style-type: none"> <li>1. Lecture slides: Understanding nicotine Addiction</li> <li>2. Quiz</li> </ol>	Learners were able to explain nicotine addiction.
Module 4: Behavioral Therapy (1)	<ol style="list-style-type: none"> <li>1. Video: 30 seconds to save a life</li> <li>2. Lecture slides: Smoking cessation in the dental practice</li> </ol>	Learners were able to conduct behavioral counselling in smoking cessation.



3. Quiz		
Module 5: Behavioral Therapy (2)	<ol style="list-style-type: none"> <li>1. Video: 5A's method role play</li> <li>2. Quiz</li> </ol>	Learners were able to conduct behavioral counselling in smoking cessation.
Module 6: Aids to smoking cessation	<ol style="list-style-type: none"> <li>1. Video: Nicotine replacement therapy</li> <li>2. Lecture slides: Aids to smoking cessation</li> <li>3. Quiz</li> </ol>	Learners were able to describe the different types of nicotine replacement therapy (NRT) used in assisting patients to quit smoking.
Module 7: Audio Visual Aids in Promoting Smoking Cessation	<ol style="list-style-type: none"> <li>1. Lecture slides: Preparing health education materials</li> <li>2. Quiz</li> </ol>	Learners were able to develop audio visual aids used for smoking cessation intervention.
Module 8: Setting up a Quit Smoking Program in your dental clinic	<ol style="list-style-type: none"> <li>1. Lecture slides: Helping patients to quit smoking</li> <li>2. Quiz</li> </ol>	Learners were able to plan a smoking cessation clinic set up.

At the end of this MOOC, all learners would benefit from the following learning outcomes (Table 1): cessation; 5) describe the different types of nicotine replacement therapy (NRT) used in assisting patients to quit smoking; 6) develop audio visual aids used for smoking cessation intervention; 7) plan a smoking cessation clinic set up. Learners were able to 1) describe the global prevalence of tobacco use; 2) describe general and oral health effects of tobacco use; 3) explain nicotine addiction; 4) conduct behavioral counselling in smoking cessation; 5) describe the different types of nicotine replacement therapy (NRT) used in assisting patients to quit smoking; 6) develop audio visual aids used for smoking cessation intervention; 7) plan a smoking cessation clinic set up.

### 3.2 Overall Analytics of MOOC

A total of 224 learners joined the course from August 2016 till March 2018. About 63.8% of the learners completed the course. The learners were mostly female (n=166, 76.9%). Most of the learners were Malaysians (n=203, 90.6%), a few were British, Egyptian, Indian, Indonesian, Korean, Motswana, Palestinian, Philippines and Portuguese. Undergraduate dental students (n=72, 33.6%) were the most type of learners, followed by dental auxiliaries (n=64, 29.9%), health professionals (n=40, 18.7%) and postgraduate dental students (n=38, 17.8%).

Figure 4 shows the highest number of enrolment for undergraduate students was in May 2017 (n=48) and March 2018 (n=14). While postgraduates enrolled mostly in December 2016 (n=12) and October 2017 (n=21). The enrolment of health professionals was seen consistent throughout the course period. However, enrolment by the dental auxiliaries was mostly in February 2017 (n=61) (Figure 4).

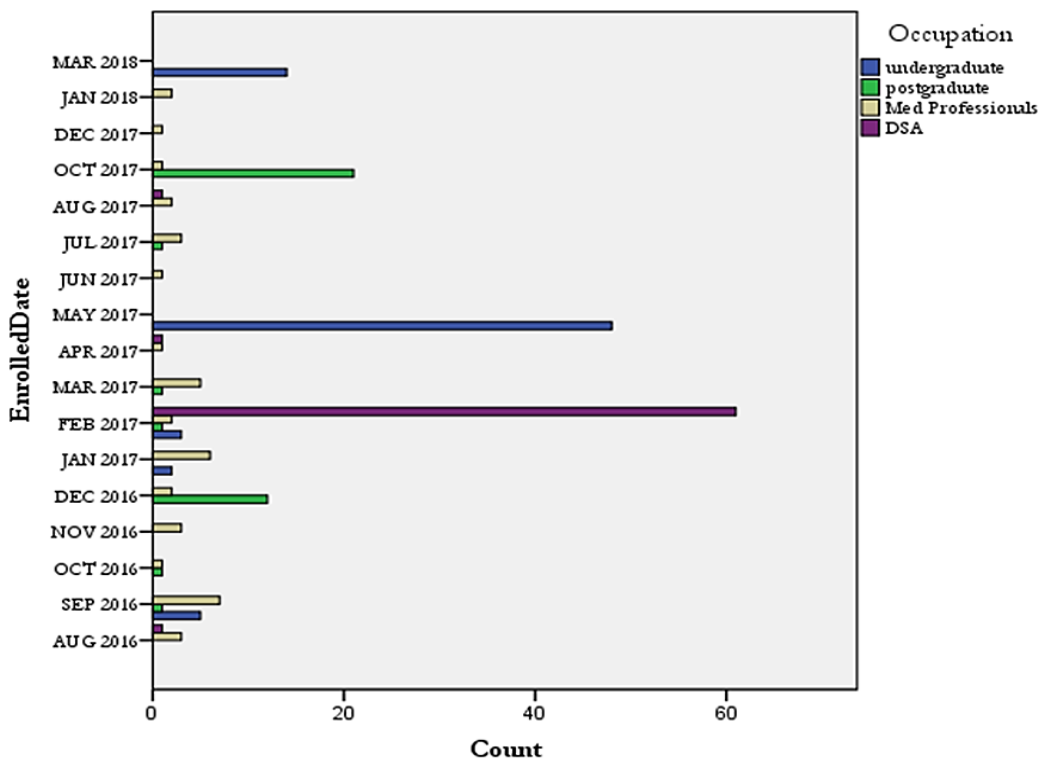


Figure 4: Enrolment according to month, year and types of learner

Table 2 shows the distribution of course completed by learners' occupation. Significantly more (p<0.001) dental auxiliaries (43.4%) fully completed the course followed by dental undergraduates (32.9%), postgraduates (20.3%) and health professionals (3.5%).

Table 2: Distribution of course completed by types of learners (N=224)

Course completion	Types of learners				Total n (%)	P value
	Undergraduates	Postgraduates	Health Professionals	Dental Auxiliaries		
	n (%)					
Completed	47 (32.86)	29 (20.27)	5 (3.49)	62 (43.36)	143 (63.84)	0.000
Not completed	25 (35.21)	9 (12.68)	35 (49.30)	2 (2.82)	71 (31.70)	

#### 4. DISCUSSION

For the academic session 2016/2017, UKM and Open Learning Global Sdn. Bhd. has collaborated an online learning platform offering 35 new MOOCs, which exceeded its initial target for the year, which were 25 MOOC courses (Amri, 2016). Mastering Smoking Cessation Intervention in the Dental Practice Course was one of the 35 courses offered by UKM MOOC in 2016. It was also the first MOOC offered by the Faculty of Dentistry, UKM.

The uptake of this course was compulsory for undergraduate and postgraduate students thus, enrolment were seen during a certain period of time throughout the course. The four-hour lectures for undergraduate students and two-hour lectures for postgraduate students in a traditional classroom style were replaced by this MOOC. However, the case-based seminar was still conducted in a traditional classroom setting. Therefore, the enrolments by these groups were high on a particular month where the smoking cessation course in the curriculum was being offered. On the other hand, dental auxiliaries signed up for this MOOC during a one-day workshop on smoking cessation as part of their key performance index (KPI) on lifelong learning which they need to fulfilled each year. However, consistency of signed-ups by the health professionals was seen most likely due to their self-interest to foster the continuous development and improvement of the knowledge and skills needed for employment and personal fulfilment. These findings could support Hew and Cheung (2014) suggestion on four reasons why students sign up for MOOCs: the desire to learn about a new topic or to extend current knowledge, they were curious about MOOCs, for personal challenge, and the desire to collect as many completion certificates as possible.

It is interesting to note that the completion rate observed in this study was higher than previous studies have typically found, with more than half of learners completing their course. This suggests that using a MOOC as a learning opportunity within the context of a broader, University accredited programme is beneficial in terms of increasing the likelihood of completion. Compared to a study by Alraimi, Zo & Ciganek (2015), he concluded that learner retention rates in MOOC are on average less than 10%. Five factors were found to increase learner retention which was: 1) problem-centric learning; 2) instructor accessibility and passion; 3) active learning; 4) peer-interaction and 5) using helpful course resources (Hew, 2016). One or more of these factors could contribute to the high completion rate of our MOOC in this study.

Evaluation is the limitation for this MOOC course. MOOCs are difficult to assess because there are no established evaluation criteria, low completion rates, varied instructor involvement and accessibility issues. However, that does not mean that MOOCs are impossible to evaluate. In this study, although the course foresees explicit learning goals or outcome, it has not yet encompassed some instrument to test whether these were achieved during the planning of the course. In an effort to manage this, we hope to develop one to collect necessary information to evaluate the achievement of outcomes.

## **5. CONCLUSION**

This paper has presented that ADDIE instructional design framework could be applied to develop a health course particularly in dentistry. MOOC would be an alternative platform for curricular teaching among students and lifelong learning for employment and personal fulfilment for health professionals or those with special interest in tobacco control. Even so, other dental courses which require hands-on and one-to-one teaching in the clinic might not be suitable. By providing badges and certificates with CPD points may increase the retention and completion of a MOOC particularly among health professionals. We would recommend a combination of both MOOC (theories and concepts) and clinical teaching for a dynamic teaching in dentistry. Nonetheless, the variation in the level of participation and engagement among the learners makes the comprehensive and accurate assessment of meaningful learning progress remains a major challenge for evaluating the effectiveness of MOOCs for providing dental education. Moreover, the impact of MOOC on the learners' perception on their attitude, self-efficacy and anxiety should be explored for future improvements.

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