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ORIGINAL ARTICLE

Online Oral Hygiene Instructions for Orthodontic Patients in Malaysian Population

MALINI A, ASMA AAA, YAHYA NA

Department of Family Oral Health, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia

ABSTRAK

Alat ortodontik kekal menyebabkan pengumpulan plak, yang membawa kepada pembentukan karies gigi dan gingivitis. Oleh itu, arahan kebersihan mulut yang ringkas (OHI) diperlukan untuk mengelakkan berlakunya penyakit ini. "Massive Open Online Course" (MOOC) memastikan pembelajaran adalah interaktif untuk meningkatkan pengekalan pengetahuan. MOOC mengalihkan tanggungjawab pembelajaran OHI kepada pesakit dengan bimbingan jauh dari doktor, dengan itu mengurangkan masa klinikal. Penyelidikan ini bertujuan untuk mewujudkan kandungan pembelajaran MOOC mengenai OHI dalam praktis ortodontik. Tujuan kedua adalah untuk menganalisis data dari pelajar yang mendaftar untuk kadar penyelesaian MOOC, serta masa yang diperlukan untuk menyelesaikan MOOC. Prinsip-prinsip ADDIE iaitu, "Analyse, Design, Develop, Implement dan Evaluate", digunakan untuk membentuk MOOC. Kandungannya berdasarkan risalah OHI yang diterbitkan oleh Kementerian Kesihatan Malaysia. MOOC telah diuji sebelumnya, dan kandungannya diperbaiki berdasarkan maklum balas pengguna dan pakar. MOOC dinamakan "Penjagaan Kebersihan Pendakap Gigi" menggunakan Bahasa Melayu untuk mendidik para pelajar mengenai penjagaan kebersihan mulut dengan peralatan ortodontik. Enam puluh dua pelajar mengikuti MOOC dan 77.4% dapat menyelesaikan kandungan pembelajaran MOOC. Terdapat empat puluh enam pelajar perempuan (74.2%), sementara pelajar lelaki terdiri daripada enam belas (25.8%). Masa median (jarak interkuartil) yang diambil untuk menyelesaikan kandungan pembelajaran MOOC adalah 31.50 minit, (13.00 minit hingga 55.50 minit). Ini menunjukkan bahawa MOOC dapat menjadi platform alternatif untuk mengajar pesakit mengenai OHI dengan peralatan ortodontik tetap. MOOC berpotensi mengurangkan masa klinikal untuk mengajar OHI kepada pesakit.

Keywords: *aplians ortodontik, kebersihan mulut, pembelajaran atas talian*

Address for correspondence and reprint requests: Nurul Asyikin Yahya. Department of Family Oral Health, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia. Tel: +603-92896621 Email: nurulasyikin@ukm.edu.my

ABSTRACT

Fixed orthodontic appliances causes plaque accumulation, which leads to the formation of dental caries and gingivitis. Therefore, concise oral hygiene instructions (OHI) is necessary to avoid the occurrence of these diseases. Massive Open Online Course (MOOC) ensures interactive learning to improve knowledge retention. MOOC transfers the responsibility of learning OHI to the patients with remote guidance from the clinician, thus reduces clinical time. This research aimed to develop the MOOC learning content on OHI in orthodontic practice. The secondary aim was to assess the overall analytics data among learners enrolled for the completion rate and time taken to complete the MOOC. The ADDIE principles which were, "Analyse, Design, Develop, Implement and Evaluate", were used to develop the MOOC. The contents were based on a published pamphlet of OHI from the Ministry of Health, Malaysia. The MOOC was pre-tested, and content was improved based on the feedback from users and experts. The MOOC named "Penjagaan Kebersihan Pendakap Gigi" utilises the Bahasa Melayu language to educate learners regarding oral care with orthodontic appliances. Sixty-two learners joined the MOOC, with 77.4% achieving a high rate of completion of the MOOC learning content. There were forty-six female learners (74.2%), while male learners comprised sixteen (25.8%). The median (interquartile range) time taken to complete MOOC learning content were 31.50 minutes, (13.00 minutes to 55.50 minutes). This shows that MOOC could be an alternative platform to instruct patients on OHI with fixed appliances. MOOC can potentially reduce clinical time to teach OHI to patients.

Keywords: online education, oral hygiene, orthodontic appliances

INTRODUCTION

Fixed orthodontic appliances are meant to correct malocclusion, improve the function and aesthetics of a patient. The brackets and other components present a favourable environment for plaque accumulation, and if not effectively removed, enamel demineralization (Richter et al. 2011) and gingivitis occur (Zachrisson & Zachrisson 1972). Therefore, oral hygiene instruction (OHI), including tooth brushing and diet advice, is necessary to ensure no plaque is retained inside the mouth during treatment. Receiving knowledge on OHI is insufficient to promote behavioural change if it is not retained. Borkowski's process-oriented model of metacognition shows that with time and repetitive exposure, children who are taught learning strategies can achieve positive change in their behaviour by active participation (Puustinen & Pulkkinen 2010; Sridharan & Kinshuk 2003).

Routine advice previously,

was through verbal instructions supplemented with written or visual information, such as printed materials and video tapes (Lees & Rock 2000; Thickett & Newton 2006; Thomson et al. 2001). The increased use of technology, as well as the need to reduce face-to-face learning interaction, has shifted towards usage of web-based learning to provide information. A computer-based platform to deliver OHI was found to promote significant knowledge retention compared to written and verbal instructions, proving the popularity of online learning methods such as websites and mobile applications (Moshkelgosha et al. 2017; Alkadhi et al. 2017).

The concept of learning away from the traditional classroom setting, which has been the formal education since 150 years ago in Great Britain, was first introduced as long-distance learning through correspondence to ease the students from all lifestyles and geographical barriers (Moe 2015). Over time, computer conferencing has enabled the new generation of students to use online education as a replacement for long-distance learning. A new online learning system, the Massive Open Online Course (MOOC), uses this concept to promote long-distance learning by integrating information technology in learning. MOOC has the advantage of reducing costs of education, saving time of travelling and disseminating information to a wider set of learners globally (Nordin et al. 2016). Thus, it serves as an ideal platform for two-way interaction in lifelong learning (Moe 2015). Despite the notion that a high drop-out rate occurs when students are left to fend for themselves, MOOC platforms should provide high-quality educational materials, support, and assist the users in learning by answering queries from learners using the MOOC (Nawrot & Doucet 2014).

In March 2013, Taylor's University in Malaysia announced the launch of two pilot MOOC - "entrepreneurship" and "Achieve Success with Emotional Intelligence" by Taylor's School of Engineering (Fadzil et al. 2015). Internet usage is widespread across Malaysia, where, the Malaysian Communications and Multimedia Commission (MCMC) revealed in 2012 that almost 19 million out of 28 million Malaysians were internet users. The major populace of this was those under 35 years of age (72%), and, in that subcategory, 80% of the Malaysian were still studying or are educated. These groups were also of the same age as the population of patients who choose to have orthodontic treatment (Fadzil et al. 2015). The Malaysian education blueprint for higher education in 2014 addressed MOOCs as the "globalised online learning" tool to improve quality and widen the access to education (Fadzil et al. 2015).

There are two classifications of MOOCs, namely the Type x MOOC (xMOOC) and the Type c MOOC (cMOOC). The xMOOC is more formal and directive in learning than the cMOOC, which best mimics the traditional learning system. The former has more tutor type learning with more established two-way communication between educator and student

(Fidalgo-Blanco et al. 2015). The cMOOC, on the other hand, is an informal learning concept where it aims to be more interactive to boost the knowledge learned (Stathakarou et al. 2014). In cMOOC, all the information in the learning outcome is given to the students, and they are expected to achieve these learning outcomes (Nordin et al. 2015). Thus, xMOOC can be suggested as a good platform to deliver OHI to orthodontic patients. It can reduce the chair-side time by delivering OHI in an online interactive way to patients. By giving OHI repeatedly at every visit, patients may change their oral hygiene practice behaviour.

Therefore, the objectives of this research were to develop a learning content on oral hygiene instructions in orthodontic practice suitable for xMOOC and to assess the overall analytics data among learners enrolled for the course.

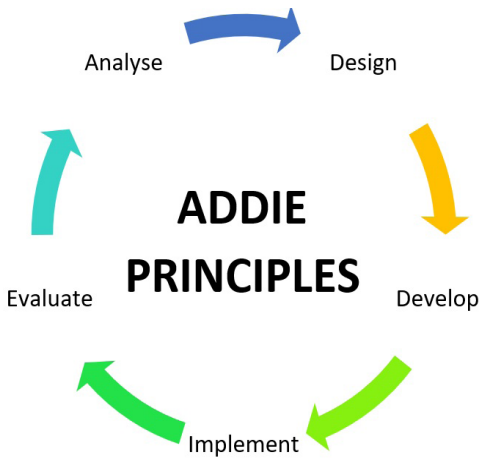

Figure 1: Iterative ADDIE Instructional Design Framework (Nordin et al. 2016)

MATERIALS AND METHOD

Process of MOOC Development

There are few studies looking into the processes of developing a MOOC to provide the right impact of knowledge to the subjects. The focus of this paper will be on the designing process using the framework forming principles of ADDIE (Analysis, Design, Develop, Implement, and Evaluate). The ADDIE principles, as shown in Figure 1, was proposed by (Nordin et al. 2016). This is a continuous process where post piloting a project, the process of the framework needs to be continuously reviewed to allow for correction and maintenance of the created MOOC (Manallack & Yuriev 2016).

Using the ADDIE principles, these steps were followed to develop a MOOC (Nordin et al. 2016). In the Analyse phase, an analysis was conducted to investigate learners' need to discern information regarding care of fixed orthodontic appliances. The standards for OHI was identified from the Ministry of Health, Malaysia, in the form of a published pamphlet in Bahasa Malaysia, which is freely available to the public. It included standard information about OHI for fixed orthodontic patients. The content was discussed with two experts from the public health and orthodontics department to assess its aptness to the population being studied. The content was deemed to be useful to the population being studied; therefore, the learning content of the MOOC was based on the information from the pamphlet. The governance style

of the MOOC has also been agreed upon to be tailored to the xMOOCs type. Although it is formal and has a more traditional learning system, as concluded by Smith et al. (2017), it has a more two-way communication between educator and student (Fidalgo-Blanco et al. 2015). This type of MOOC relies on learning based on a video, discussion forums, multiple-choice quizzes or other types of assignments (Yahya et al. 2019).

The learning outcomes were to recognise the components of fixed appliances and the problems commonly faced in the care of fixed appliances. The learners were also instructed interactively on brushing with fixed appliances and to dental diseases which forms in the absence of pristine oral hygiene practices. The MOOC also aimed to equip learners with knowledge on eating with fixed appliances. The MOOC was named "Penjagaan Kebersihan Pendakap Gigi", which precisely informs learners on its content.

In the Design phase, the learning content and tasks of the MOOC were formed based on the information gained from the analysis in the first phase. Based on the information obtained from the Analyse phase, MOOC was to have three main modules to integrate all the learning outcomes.

In the Develop phase, storyboards and scripts were created and based on the information placed in storyboards; it was turned into a working prototype. Interactive elements were presented to gain two-way communication to test knowledge comprehension in each main module. Learners were required to complete a quiz after each module as their assessment. This was to test their understanding and to reinforce knowledge. Simple tasks in MOOC, such as the "Match It" game, incorporates the concept of gamification in learning. These interactive tasks in learning lead the subjects to comprehend the concepts better, allowing the retention of the information to memory, and appling it in practice (Day-Black et al. 2015). The subjects were encouraged to answer all questions regarding each module. Incorrect answers given prompts the MOOC to allow learners to try again, to motivate the learners and not to punish them. They were not allowed to skip the interactive learning tasks. If they skipped the tasks, it was shown as an incomplete MOOC in the progress bar. The learners were also encouraged to leave feedback and queries in the comments section as a form of two-way interaction to assure the learners that help is available when needed. The questions were attended by the researcher through the platform post-completion of the MOOC. This assurance shows that learning can be self-regulated by the subjects and supported by the educator to create independent learners who are responsible for their learning.

There were five modules in the MOOC, including the introductory module, three main learning modules and a conclusion module. An introductory module was made to list out the learning objectives of the MOOC and to introduce users to the MOOC platform and is navigation.

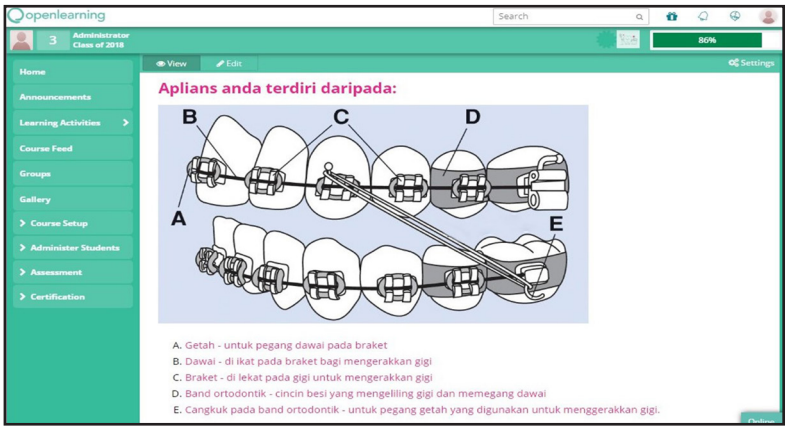

Figure 2: Components of fixed appliances.

The second module introduced components of the fixed appliance, such as brackets, bands, archwires and problems that may arise with fixed appliances using pictures. The pictures were royalty-free pictures obtained from the internet, which were freely available to the public. Figure 2 shows a picture with the components of brackets that were used in the MOOC. Learners were armed with the knowledge of emergency protocols in the event of appliance damage. The interactive element of module 2 was a "Match it" game where users would have to match five components of the fixed appliance to their relevant description with the hopes of testing their basic understanding.

The third module starts by laying out tools of oral hygiene practices, including pictures and description of the following: super floss, interdental brush, soft-bristled brush, fluoridated toothpaste, mouthwash. The module was aimed to be interactive where three videos of procedures adapted to fixed appliances were shown on flossing, using an interdental brush and using a soft-bristled brush, which

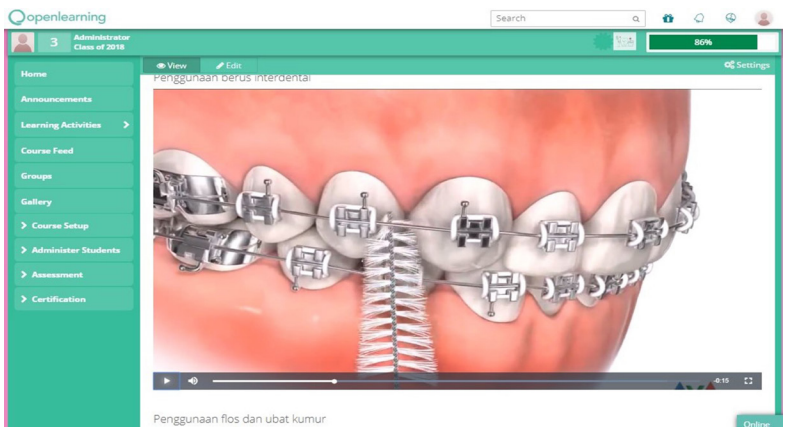

Figure 3: Video snapshot on the usage of the interdental brush to clean fixed appliances

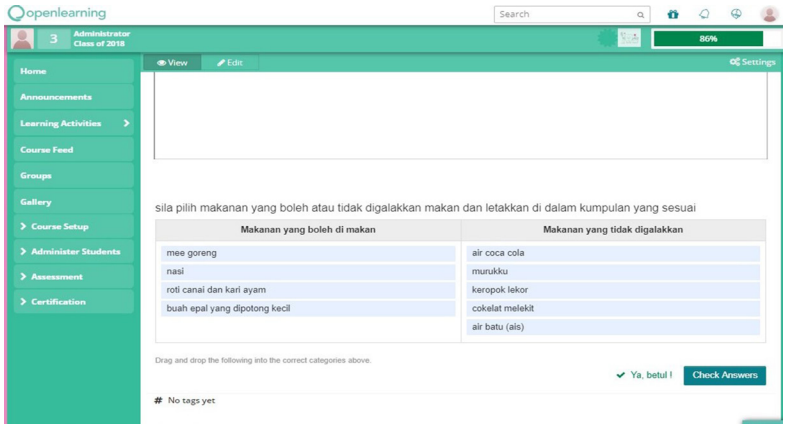

Figure 4: Category matching interactive game for module 3

has to be used at a 45 degree angle after every meal. All the videos were freely available videos from YouTube. Figure 3 shows a snapshot of the video that was used to demonstrate to patients the usage of the interdental brush. To beguile the audiences, they were incorporated with voice-overs to engage other sensory input. The owners of the videos were credited at the end. Caries and periodontal disease formation as the leading sequelae of poor oral hygiene in fixed appliances were introduced with pictures that best describe them. The interactive element was a "crossword puzzle" game to match the description of brushing technique and disease formation to their relevant puzzle position. There were six questions in total for this game.

The fourth module aimed to advocate good eating habits to avoid dental disease formation and breakages of appliances. These were shown interactively through an animated video that described the types of food to avoid and those that are encouraged during fixed appliance therapy. The diet advice included avoiding carbonated drinks and hard or sticky food. "Category matching" was chosen as the interactive element for this module, where audiences were expected to sort out foods that should be avoided as well as foods that are safe to be consumed after watching the video. Figure 4 shows the category matching game that was used in module 4 to test patients on their understanding regarding eating with fixed appliances. They were given nine samples of food and were instructed to divide them into food that can or cannot be consumed with fixed appliances.

The MOOC was concluded in Module 5 with hopes that new information learned could be utilised for patient care during fixed appliance treatment. The learners were also encouraged to initiate communication with the educator in case there were queries regarding the MOOC content through the comments section. A completed MOOC was automatically issued with a certificate on the last page to praise and encourage learners

to use the information gained. Rewards of participation, such as certificates and badges at the end of the MOOC was used to motivate the subjects, giving a sense of achievement for them to continue learning (Villagrasa et al. 2014). The learners could choose not to complete the MOOC at the first attempt. The MOOC was designed to be used at anytime and anywhere, offering flexibility to the users to complete at their leisure. The progress of the learners was shown in a progress bar on the MOOC. Learners who did not complete the MOOC were reminded by the educator via email; every two days for a maximum of three times. However, non-completed learners were reminded to complete the MOOC upon each access if they did not respond to the email.

In the Implementation phase, the MOOC prototype was verified with the subject matter experts to gain helpful feedback regarding learning content, user interface, tasks and assessments. The MOOC was completed by October 2018 with a trial run by experts on the subject, an Orthodontic Specialist and a Public Health Specialist. The feedback given was taken into account to allow for modifications of the MOOC. The input provided was on arranging the sequence of the module to allow for a flow in the content of MOOC. The sequence of MOOC was amended accordingly.

The next stage of validation of the MOOC included obtaining the opinion of content developers and end-users, where the MOOC was pre-tested to ten samples from November 2018 to early December 2018 on those who fulfilled similar inclusion and exclusion criteria as required by our study. There were six females and four males in this pre-testing who were recruited from the list of patients undergoing orthodontic treatment in the Universiti Kebangsaan Malaysia (UKM) polyclinic. They were pre-tested to assess the learning content of the MOOC and user interface. The subjects were included in this study if they are undergoing fixed labial orthodontic appliance at the Unit of Orthodontics, UKM. They were retrieved from the waiting list of fixed appliances in UKM, where the severity of malocclusion was standardised by including patients with Index of Orthodontic Treatment Need (IOTN) grade 4 and 5. All the patients were screened for the absence of dental diseases such as periodontitis before starting fixed labial orthodontic appliances. They were bonded with conventional labial MBT brackets 0.022 slot (American Orthodontics WI, USA) from the first molar to the first molar upper and lower arch. The subjects understood the Malay language with the age ranging between thirteen to thirty-five years old. The subjects also had to be computer literate, which, was assessed by their ability to search for information via the internet and to navigate through websites. The subjects were excluded from the study if there was presence of any disability that hindered their oral hygiene measures, such as syndromes, cleft lip and palate. They were also excluded if there was a history of previous orthodontic treatment, removable appliances or prostheses

usage. Subjects who were detected as a smoker were also excluded. Finally, the presence of poor general health, immunosuppressed state or pregnancy were grounds for exclusion from the study.

The comments from pretesting were encouraging especially regarding the videos on tooth brushing. Most of the comments included that the videos were easy to understand and attractive to the patients. However, in submodule "B", which had the "crossword puzzle" to check their understanding regarding brushing with fixed appliances, six patients had a difficult time in guessing the answers. There were mainly comments that highlighted difficulties in guessing that the brush should be held at 45 degrees angle to clean the teeth. They also had to spend extra time to think of the answers, hence, some of the learners did not complete the MOOC. The learners could choose to move on with the MOOC until they completed other segments and returned to the portion that was left out. The MOOC was deemed to be complete when all the segment of the modules were completed. In the event the learner failed to complete the MOOC, the test was deemed incomplete, thus affecting the completion rate. The learning duration with MOOC was not limited to allow the learners to learn at their leisure.

The Evaluation phase commenced with analysing the results from both validations, and necessary adjustments and improvements were made. The adjustments were made to the interactive element of the third module task, as per the comment on the pre-testing. Instead of a "Crossword Puzzle", a "Match It" were made instead to test them on the same knowledge, but was represented differently. They had to match the description of the brushing technique and disease formation to pictures describing them. The " Match It" game was chosen as it fits the aim of matching the type of brush to their function and disease formation to the pictures describing them. The content was again checked with experts on the subject, an Orthodontic Specialist and a Public Health Specialist for feedback. The MOOC was then agreed to be released to the public.

The sample size was taken from the randomised controlled trial (RCT) from which this MOOC was developed. The subjects in the RCT were randomised by simple randomisation. A total of 30 participants took part in the study; in addition to the 32 that participated in the pre-testing phase. The subjects from pretesting and from the RCT who fulfilled the inclusion criteria were included in this study.

The MOOC was released in January 2019 to the public through openlearning.com. The analytics data was collected from the MOOC via the www.openlearning.com analytics tool and analysed using SPSS version 25 (IBM Corp., Armonk, NY, USA). The data analysis included descriptive statistics. The data was not normally distributed; hence, the median and interquartile range was reported. The percentage frequency of MOOC completion and time taken to complete MOOC were reported.

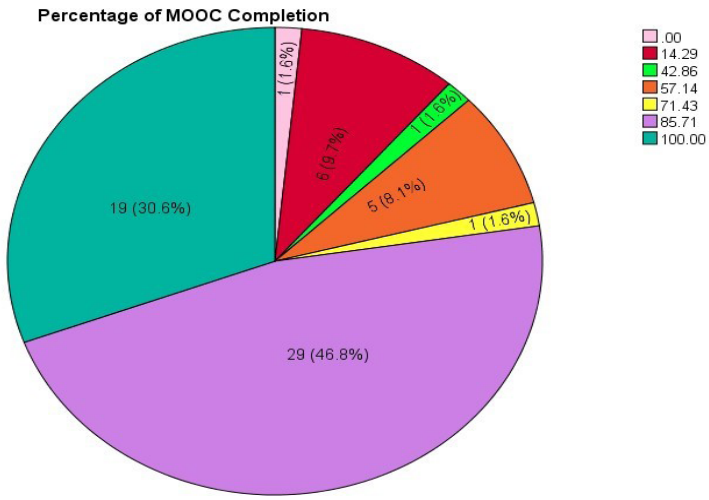

Figure 5: Percentage of MOOC completion

RESULTS

Analytics of the MOOC

Sixty-two learners joined the MOOC over the course from December 2018 to July 2019. Frequencies and percentages were calculated for categorical data. The learners are considered to have completed the MOOC of they have completed the MOOC up to the last content page which will translate to 85% completion. Forty-eight learners (77.4%) had completed the MOOC; 19 of them (30.6%) had completed 100.00%, and the other 29 (46.8%) had only completed 85.71% of the MOOC. The 29 learners had completed the contents portion of the MOOC, however failed to view the last page, which shows the certification of completion. They were included in the completed category as this oversight of the learners were of minor consequence to the learning objective of the content. These findings are summarised in Figure 5, which shows the percentage of MOOC completion.

Table 1: Demographic profile of learners

Variables	Frequency
Age (Mean ± SD)	21.24 (±4.36)
Gender, n (%)	
Female	46 (74.2%)
Male	16 (25.8%)
Educational status, n (%)	
Primary education	10 (16.1%)
Secondary education	14 (22.6%)
Tertiary education	38 (61.3%)
Ethnicity, n (%)	
Malay	35 (56.5)
Chinese	14 (22.6)
Indian	12(19.4)
Others	1(1.6)

The majority of the learners were females, 46 (74.2%), while male comprised 16 learners (25.8%). The majority of the learners involved were Malays who comprised 35 (56.5%), followed by Chinese 14 (22.6%), Indians 12 (19.4%) and one learner was from Belgium (1.6%). The mean age of learners was 21.24 (±4.36) and ranged from 13 to 24 years old. The education level of the

Table 2: Time taken to complete MOOC

	Frequency	Percentage
<31.5mins	31	50
>31.6mins	31	50
Total	62	100

learners was broadly divided into the primary level of education if they have passed checkpoint examination at primary schools, the secondary level of education if they have passed checkpoint exams at end of secondary school and tertiary level of education if they possess a diploma or higher qualifications. This was summarised in Table 1. Half the respondents took 31.5 minutes to complete the MOOC; with a median of 31.50 minutes and interquartile range of 13.00 minutes to 55.50 minutes. This was shown in Table 2.

DISCUSSION

A total of 62 participants enrolled in the MOOC for the duration of November to December 2018. The subjects recruited for the MOOC were from those attending the orthodontic postgraduate polyclinic in UKM to enhance their knowledge and skills to care for their fixed appliances. As the students of the class voluntarily entered the trial, it was taken to reflect an interest in the class to care for the hygiene of their teeth with orthodontic appliances.This is in concordance by Hew & Cheung (2014) who proposed students' sign-ups are due to an interest to learn about new subjects, a personal challenge to themselves regarding new knowledge, curiosity on the subject matter and to complete certificates offered by MOOCs

The proportion of the learners who completed the MOOC in its entirety was about 30.6%, followed by 85% completion in 46.8% of the learners. The rest of the learners had varying degrees of completion rates. It could be concluded that the drop out of MOOCs was generally due to a lack of incentive to complete the MOOC as they had no obligation to see through the MOOC. Other possible reason include, failure to understand content material, having other priorities to fulfil as suggested by Hew & Cheung (2014) and an inability to find time to keep up with the course because of insufficient self-regulatory ability (Davis & Hauff 2017).. Social comparison could be allowed between learners to their peers, or "role models" as a possible solution to help them regulate their learning behaviour. This is because people are found to establish their social and personal worth by comparing themselves to others (Davis & Hauff 2017). These findings could be incorporated into the design of future MOOCs to achieve a better completion rate in future studies.

Time taken to use the MOOC platform was less than 31.5 minutes for 50% of the population studied. Poor time management was suggested as being the primary factor the learners did not complete the MOOC. The time available each day is precious to the learners, and they need strong internal motivation to complete the MOOC (Nawrot & Doucet 2014). MOOC platforms should assist the learners in optimising time consumed during

the learning process by analysing of the students' life cycle and providing appropriate reminders (Nawrot & Doucet 2014). As such, self-reflection on their achievement could possible improve the time management of the learner, leading towards a higher rate of completion of the MOOC (Nawrot & Doucet 2014).

Good infrastructure also assures effective and smooth learning. Poor internet connection or inability of the server to cater to high usage may disrupt learning (Shaari et al. 2018). Poor internet connection, in particular, causes the poor download of materials, especially videos which slows down the learning process. This may lead towards learners becoming impatient and subsequently decide to postpone due to lengthening of the time spent on MOOC. As such, the learners need good internet speed to access the materials of MOOC and continue learning.

To the best of our knowledge, this is not the first MOOC in Malaysia regarding oral care of patients with an orthodontic appliance. "Bersih Braces" was one of the earlier made MOOC in the English language to educate dental students on the importance of oral hygiene during orthodontic appliance wear (Asma 2017). However, the MOOC in the present study was the first MOOC in Malaysia to utilise the Malay language to educate Malay speaking learners regarding oral care with orthodontic appliances. Through interaction provided by the MOOC, queries could be addressed, allowing them to learn from anywhere.

Malaysia is at the forefront of E-learning by using MOOCs as part of the Malaysian Education Blueprint 2015-2025 (MOE 2015) having the potential to become an educational hub. In line with the aspiration of the Malaysian Education Blueprint which emphasizes increasing proficiency in Bahasa Malaysia to educate our population, thus, MOOC was also produced in the national language of Malaysia.

In the current COVID-19 pandemic, where limited movement order was imposed to control the infection, implementation of an online-based health education platform would be beneficial to continually support the patients remotely. MOOC can be used to assist patients to prevent untoward problems with their appliances. Our effort aims to educate the public regarding the importance of oral health when using orthodontic appliances. The benefit of MOOC is that learners with an internet acess can access online courses available on MOOC platforms free or for a small fee at their convenience in terms of time and place. Learners can obtain access experts in the field of interest without any constriction of age and location generally seen in traditional classroom-based learning.

It is essential to introduce MOOC to educate learners wearing fixed appliances so that they take an interest to care for their oral health. Moreover, it can help reduce chairside time in teaching patients to care for their teeth with fixed appliances.

The process of developing a MOOC is complex and time-consuming. However, with the right motivation

given to learners by allowing the comparison to other peers, this could be a boost to help them complete their journey of learning (Davis & Hauff 2017).

The significant challenges of MOOC include evaluating the learning process and its impact on the patients' oral hygiene and progress of orthodontic treatment in minimising disease risk. As MOOC learners were variable, assessment of the patients learning is complex. Therefore, it is suggested to assess learning not only in evaluating compliance but also in the behavioural change of the patients. Other challenges include poor internet connectivity, which may delay the download of materials and therefore, risk an increase in completion time or reduce compliance (Shaari et al. 2018). Consequently, it is imperative to ensure good internet connectivity is available to allow future usage of MOOC as a learning tool.

CONCLUSION

This paper has outlined how the MOOC was constructed using the ADDIE instructional design framework which could be applied for teaching oral hygiene instruction to orthodontic patients. This is useful so that the clinical time spent on teaching oral hygiene to orthodontics patients can potentially be reduced. Hence, MOOC could be a valid alternative to transfer the responsibility of learning to the patient, equipping them with a remote learning tool, controlled by a manager to aid them in the learning process.

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