

# Engaging the Millennial Generation Student With e-Learning in Dentistry

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## ABSTRACT

*The need to move from traditional teaching and learning methods to more interactive approaches has been in high demand from the young generation of tech-savvy students. However, this move in dentistry has been very slow in Malaysia, despite the exponential growth of e-learning in other disciplines. Nevertheless, the Centre for Restorative Dentistry Studies (UiTM) is in the transformation to actively embrace the e-learning curriculum structures combined with traditional teaching methods. Three peer-reviewed e-modules were developed with each module comprised audio-visual lectures, video demonstrations and online students' assessments. The concept of flipped classroom were applied where these e-modules were uploaded to i-Learn (the university online learning portal) for students to assess at home. Questionnaires were given to assess their perception towards e-modules received. Conventional lectures (82.4%), e-modules (64.7%) and textbooks (64.7%) were reported as the most often material used by students. After the exposure to e-modules, 15 students (29.4%) suggested replacing lectures with e-modules but 36 students (70.6%) insist on having the conventional lectures combined together. Major drawbacks and students concerns (58.8%) were technical problems and the lack of direct communications with the lecturers. However, all students (100%) stated that they would continue to use the e-modules in the future and request for more in other topics. It was evidently found that the students' perceptions to e-modules are generally positive. However, the drawbacks and their main concerns are points to be considered before further development of a comprehensive blended learning curriculum in the Faculty.*

**Keywords:** dental education; blended learning; restorative dentistry; e-learning

## INTRODUCTION

For more than three centuries, the pedagogical model of delivering education has been the traditional lecture based approach, placing large groups of students in a room and reciting lectures to them. Other traditional teaching methods in dentistry are in the form of lectures, seminars and demonstrations. Students came in different personality and attitudes throughout the years. They are classified by generations that are also known as generation Y or the millennial generation. They grew up in culturally diversified schools, are tech-savvy, enthusiastic, confident, well networked and learning oriented individuals. Finding the best methods to communicate with them is essential in every university's teaching. This calls for the need for a new pedagogical solution of innovative teaching and learning methods to address the demand from the stakeholders to produce competent graduates with exemplary communication and team working skills.

E-learning or Computer Assisted Learning (CAL) is referred to the use of internet technologies to deliver a broad array of information that enhances knowledge and performance (Rosenberg, 2001; Wentling et al., 2000). Globally, there are few dental schools that have executed a method of teaching known as blended learning. The term 'blended learning' mostly involves "combining Internet and digital media with established classroom forms that requires the physical co-presence of teacher and students". It was introduced by Bonk in 2006, but was a concept familiar to most of the educators in the early 21<sup>st</sup> century. The approaches combine e-learning modules with traditional teacher-orientated where as an example; a lecture or demonstration is supplemented with an online material. One of the pioneer institutions in dentistry blended learning module is University of Birmingham where they have developed a website known as Ecourse. This website is a platform where demonstration videos, assessments and lecture series were uploaded and ready to be assessed by the students before the start of any module.

Many factors have driven the development and the increasing number of blended learning in dentistry including the decreasing teaching staff numbers, increasing dental student numbers and cost effectiveness of blended learning in the long term (Bains et al., 2011). A randomized control trial study done by Stockwell et al. (2015) found that blended learning

improved student performances and video assignments increased the attendance. Students were motivated and actively interacted among them together with the lecturers in the teaching and learning environment. In terms of acquiring manual skills and conceptual knowledge, it was found that students who experienced blended learning statistically did better in their grades compared to their traditional learning colleagues (Maresca et al., 2014).

The declining number of academic staff in United Kingdom (UK) dental school was one of the main factors that have driven the development of e-learning material (Murray, 2001). Therefore, there were few studies that investigated the effectiveness of this teaching method in dentistry and various outcomes were obtained (Hobson et al., 1998; Rosenberg et al., 2003; Gupta et al., 2004; Schmid et al., 2009; Kavadella et al., 2012). Generally the results were positive and they concluded that e-learning was superior or at least as effective as the other modes of learning. As for the perception of students' to the use of technology, a study done by Eagleton (2015) found that 46% of the participant that used animated tutorials in physiology subjects said that the tutorials did help in memorizing and understanding a process better with the animation given.

However, it has been emphasized that the main barriers of blended learning were lack of adequate training in information technology (IT), plagiarism of the teaching materials, lack of interaction between students and lecturers and the initial time and cost involved to develop the blended learning might be high (Gupta et al., 2004).

In an effort to understand the current need and benefits of blended learning with e-modules for dental students, this paper describes the step-by-step planning and execution by the Centre for Restorative Dentistry Studies (CoS Restorative Dentistry), Faculty of Dentistry, Universiti Teknologi MARA in the transformation to actively embrace the e-learning curriculum structures combined with traditional teaching methods in teaching dentistry.

## METHODOLOGY

### Development of E-Modules in Restorative Dentistry

In early 2013, the academic staff of Faculty of Dentistry were given a thorough exposure and explanation on university's vision to promote blended learning in all faculties. All staff were then required to attend a blended learning workshop organized by i-Learn centre (the university online centre) in order to develop information technology skills to produce e-content material. The i-Learn Centre provides facilitators to conduct different levels of e-content development to every faculty in the university.

The next step in the material development process was the planning in the CoS Restorative Dentistry. The initial move started by allocating each lecturer a block of lecture topics to design their own e-content materials at the beginning of the semester. The allocations were discussed in the CoS Restorative Dentistry meeting and agreements were achieved from all lecturers on the topics allocated. Then each of them were given a period of three months to produce at least one e-content material with online assessment on a topic to be used in their teaching and learning programme.

Development of an e-module involved different stages, started from the elaboration of the teaching materials, validation of the contents material, discussion on delivery methods and standardization of the modules. During the development of an e-module process, academic staffs did receive technical supports from the i-Learn Centre for their video recording of demonstrations and tutorials on the used of iSpring Presenter 7 (iSpring Solutions Inc, Alexandria, USA) programme. Other than iSpring programme, a few lecturers did explore on other presentation programmes as their blended learning materials including e-book (3DPageFlip Software Co., Ltd, GuangZhou, China) and keynotes (Apple Inc, California, USA).

Three e-modules for preclinical restorative dentistry have been successfully developed using three different programme; iSpring, Keynotes and e-book (Fig.1). Each module comprised audio-visual lectures, video demonstrations, online students assessments and discussion forum. Prior implementation in the teaching and learning programme, these modules were vetted and validated in the department followed by upload at the i-Learn website for the students to access.

## **Implementation of the E-Modules using Flipped Classroom Concept**

The three e-modules were implemented in the Year 2 preclinical restorative dentistry courses. The developed e-module topics were listed in the first semester of Year 2 teaching curriculum. The concept of flipped classroom was applied where these e-modules were uploaded to i-Learn, the university online learning portal (Figure 2) after the topic introduction taught face-to-face (1 hour lecture) and before the practical sessions. Indication for the upload timing between lecture and practical sessions was to give initial exposure on the topic before students go for self-directed learning on the topics. Students with minimal knowledge on a topic should not be exposed to CAL e-module alone as it has been reported that they had difficulty to understand new topics without a teacher support first (Browne et al., 2004). During the implementation of blended-learning modules, students were informed that they were able to access the e-modules anywhere as long as they have Internet services. With these e-modules, students were actively immersed in the online adaptive learning environment, which delivers the learning content to the student outside of the classroom on their own time. The video demonstrations and graphic step-by-step manual guide in the e-modules were indicated as a first exposure for the upcoming practical sessions. The given assessments at the end of each e-module implied as a revision on knowledge delivered through the given face-to-face lecture session.

The one-hour face-to-face discussion on the subject allocated before the practical sessions in the timetables was used for group interaction. Students were engaged in discussion activities rather than watching and listening to the lecturers giving live demonstration. Students would ask questions, solve problems, explain concepts, interpret observations, discuss and apply the information pre-learned online through the e-modules to perform the preclinical projects assigned to them.

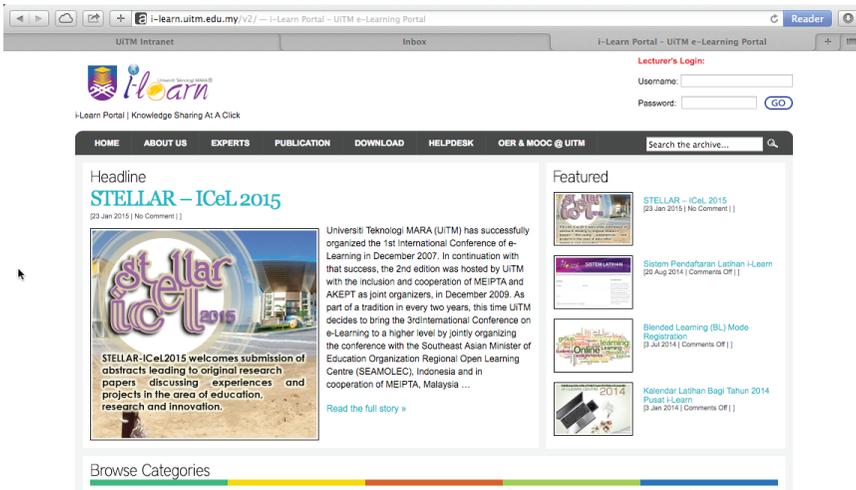
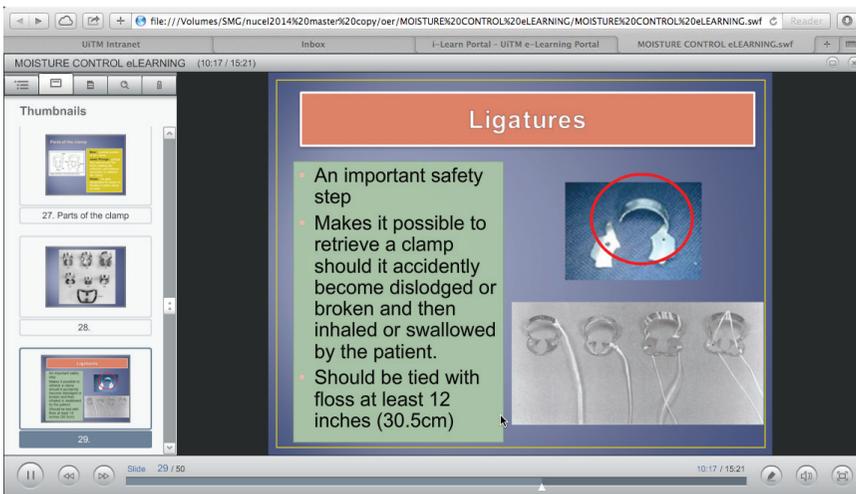
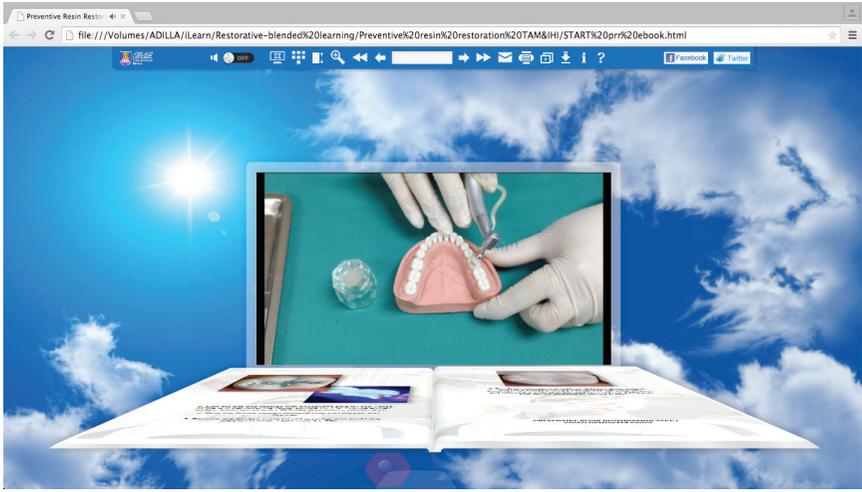


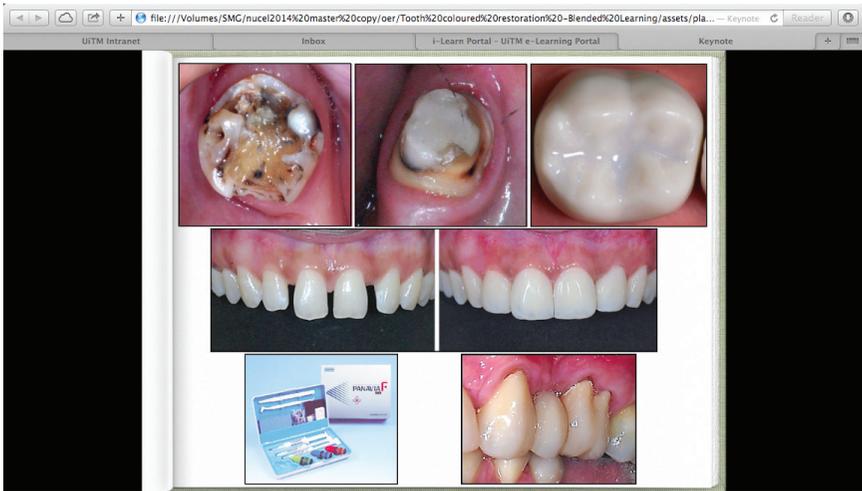
Figure 1: The University Online Learning Portal



(a)



(b)



(c)

**Figure 2: The Different Programme of Developed E-Modules  
(A) ispring (B) e-Book (C) Keynote**

## Assessment of Students' Perception on the Given E-Modules

The Year 2 students enrolled in the preclinical restorative dentistry course were the targeted cohorts of students for the study on their perception to e-modules. They were the selected group because they have just entered the course with zero base-line knowledge.

Questionnaire forms by Gupta et al. (2004) were adopted and modified for the suitability of the study to assess students' perception. Once the three e-modules have been delivered to the Year 2 students (54 students), questionnaires were given to them through their students email accounts using an online questionnaire (Google Forms, Google, California USA). All responses from the e-questionnaires were treated anonymously and it was stated before they did answer the questionnaires.

## RESULTS

A total of 51 e-questionnaires were received through Google Forms from 54 students, giving a 94.4% response rate. In the learning material section of the questionnaire, students have been reported to most often use conventional lectures (82.4%), e-modules (64.7%) and textbooks (64.7%) as their learning materials as shown in Figure 3. After the exposure to our three e-modules, 15 students (29.4%) did suggest to replace lectures with e-modules on the three topics, but 36 students (70.6%) still insist on having the conventional lectures combine together as shown in Figure 4. The common reasons stated for replacing lectures were; the e-modules were more interactive, allow them to have notes and videos accessible at all time and to reduce their face-to-face interactions which will reduce the hours in timetable. However, these groups of students did inform specifically that only simple and selected topics could be replaced by e-modules only. For the group of students that insisted to maintain conventional lecture and only have the e-modules as supplements, their major reason was that they prefer direct interactions with lecturers and to see the lecturers faces.

Figure 5 tabulated the comments on drawbacks and concerns in using the e-modules. The two major drawbacks and students' concerns are technical problems (31.3%) and the lack of direct communications with the

lecturers (27.5%). Comments were also received regarding the content of the e-modules where 9.8% stating that videos require subtitle, background music should be more catchy and speakers' voice should be clearer. However, all students (100%) stated that they would continue to use the e-modules in the future and request for more in other topics.

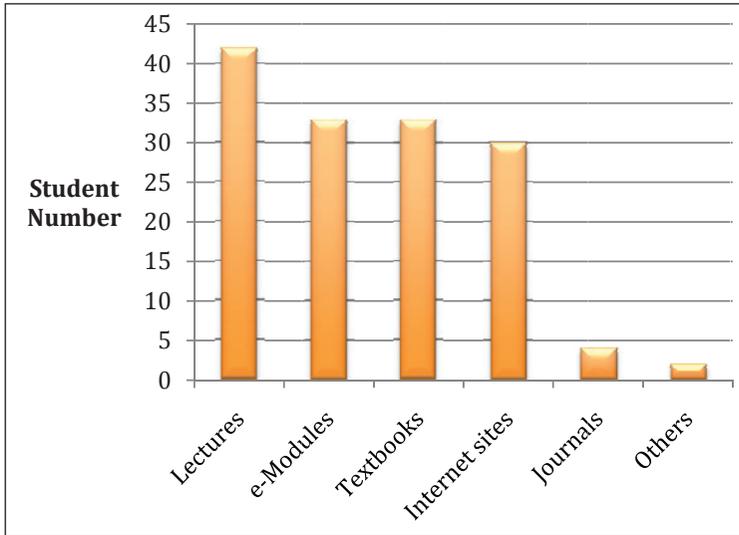


Figure 3: The Sources of Material Used by Students in Learning Dentistry

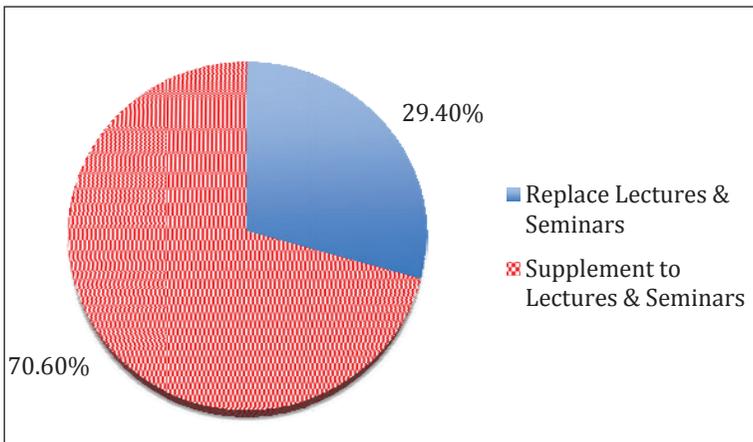


Figure 4: The Perception of Students for E-Modules Replacing the Conventional Teaching Style

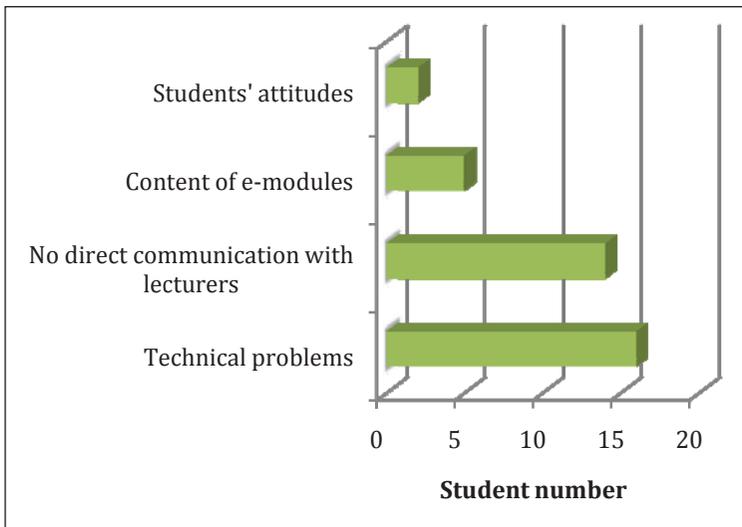


Figure 5: The Drawbacks and Concerns by Students in Using E-Modules

## DISCUSSION

The delivery of e-module in the CoS Restorative Dentistry was done in a blended learning concept where the combination of traditional teaching method and CAL were implemented. This is in agreement by many researchers that CAL alone is not sufficient to engage students' understanding on certain topics (Scittek et al., 2001) and not all students have the learning style suitable with CAL (Ess, 2000). As for the delivery of the e-module part, it can be either synchronous or asynchronous (Wentling et al., 2000). Synchronous delivery refers to real-time and instructor mediated learning for all learners simultaneously such as in a classroom or computer laboratory where learners can communicate directly among them during the learning session. This will also ensure that all students will undergo the e-modules as instructed. This delivery method would be preferable for the 27.5% students who requested for direct interactions with lecturers during the e-modules. The disadvantage on this delivery type is that it will require allocated time in the timetable. The asynchronous method can curb the high number of face-to-face hours for a course by reducing the allocated hours in the timetable. The e-modules are viewed at their own time out from the normal timetable with the approach of flipped classroom. Flipped classroom

is a form of blended learning which brings interactive engagement pedagogy to classrooms by having students learn content online, usually at home, and homework is done in class with teachers and students discussing and solving questions after the e-modules. Teachers' interaction with students are more personalized and guided instead of lecturing methods. Park and Howard (2015) implemented a flipped classroom for a predoctoral course and found that students' participations in class and learning accountability increased. Feedback after the experience was generally positive with regard to the collaborative and interactive aspects of the flipped classroom.

There were many challenges encountered by the lecturers in the development and implementation of e-modules in the CoS. The main obstacle was the capability of the lecturers to develop the e-content as an interactive module. It was a struggle for everyone in the beginning because of the new concept and skills to be adopted, however with the support and facilities provided by the university i-Learn Centre and the faculty itself, the process was facilitated. Clark (2002) has denoted that it is very important that an e-module to be well designed and interactively developed to enable a self-directed learner to be more active and engaged in learning, not just display text and images as in a textbook.

In the questionnaires given to students for this study, 9.8% of them commented on the e-module content with 3.9% reported that the content made them sleepy due to less interaction. Therefore, a suggested approach to make an e-module interactive is by having an online forum. However, it is one of the components that consume more time due to the boundless time and duration for a discussion to be on a topic. The lecturers have to always login to the e-learning platform to give feedback to the students' comments and questions asked in the topics. As a consequence, the time consumed would be significantly higher in the lecturers' preparation and implementation for a teaching and learning material. This matter has been raised and discussed in the university management and currently, it has been agreed that any lecturers registered as a provider of a blended learning module, will receive 2 hours per week of lecturer's duty responsibility. The given 2 hours will reduce their in-office teaching and learning duty from 39 hours to 37 hours per week.

Other encouragement from the University to enhance the participation of lecturers in blended learning module is the recognition of an e-module as a publication with given honorarium. The recognition of an e-module will be done at the University i-Learn Centre. As per the faculty role to drive blended learning modules among the academicians, every Centre of Studies were instructed to present their progress on blended learning material in the monthly Academic Faculty Committee meeting chaired by the Dean. During this meeting, the head of department will report the progress and the drawback, if any, in their development and implementation of blended learning modules.

Despite the instruction from University, the decision for the CoS Restorative Dentistry to move from traditional teaching to blended learning was also due to the students' interest and the limited human resource. The increased numbers of undergraduate students to 80 intakes per year and the curriculum taught from second semester Year 1 up to Year 5 have stretched the teaching personnel to the maximum. The increase number of groups in the class might cause less interactions and focus of a lecturer are to the bigger crowd of students. By implementing blended learning, students who come to classes with questions or topics to discuss after going through the e-modules will create an interactive student-lecturer communication. Other benefits are the reduced face-to-face time indicated in the timetable for the lecturers and students. Therefore, more time can be allocated for lecturers to do other activities such as research, publication writings and administration work. As for the students, they will not have an 8am-6pm timetable.

There are always limitations in any pedagogical methods applied in teaching and learning. This study found that technical issues (31.3%) were the main drawback reported by students during the usage of e-learning modules. Grimes (2002) faced the problem when he implemented an e-course in dental terminology. Klein et al. (2012) reported the same problem even after 10 years from Grimes where they stated that technological challenges could be very frustrating for learners and can negatively impact their perception of electronic learning materials. Eagleton (2015) found that 54% of the students who were given animated tutorials did not access the content due to no access to computer and internet outside from the faculty. Unavailability of internet and computer, slow internet line, limited computer capability to download and play large file size modules were the

comments received for the technical drawbacks in our study. Majorities of these comments were from students who are renting accommodation nearby the campus where they do not have access to internet at home. To curb these limitations, it has been planned in the future that the new dental campus will have sufficient hostel rooms for all students and will be fully equipped with wifi services and a computer laboratory.

The overall perceptions of online learning concluded from this study were positive, and although some drawbacks were apparent, all of the students stated that they learned a great deal and found the e-modules valuable, which was a similar finding with the study carried out by Reissmann et al. (2015). The satisfaction ratings were high and further qualitative evaluation revealed that most responses were positive, with not a single negative comment regarding the blended learning concept. Students really enjoy the convenience of taking the e-modules at a time that fits their schedule and a place that they did not have to commute to attend. They also assured that they will 100% utilize the modules again in the future and requested for more e-modules in different topics.

## CONCLUSION

It was evidently found that the students' perceptions to e-modules are generally positive and the students appreciated the e-learning modules. However, their main concern of direct communication with lecturers and the technical problems are points to be considered and resolved before further development of a comprehensive blended learning curriculum in the Faculty of Dentistry, Universiti Teknologi MARA.

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