4.3 UTM-MIT BLOSSOMS

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4.3.1 Introduction

Universiti Teknologi Malaysia had launched the BLOSSOMS project or a blended learning system for learning Science, Technology, Engineering and Mathematics (STEM) subjects in collaboration with Massachusetts Institute of Technology (MIT), USA on 8 January 2013. The project which includes the collaboration with Ministry of Education Malaysia (MoE) is a new teaching approach to encourage students to learn Science and Mathematics. BLOSSOMS is a video-based learning resource that complements the available curriculum. It is unlike traditional video-based learning because of the teaching duet pedagogy approach - the video lesson is separated in segments including learning activities in between, and facilitated by the content experts. The main focus is to enhance understanding about abstract concepts especially in Science, Mathematics and Engineering subjects.

Fatin, Mohd Salleh, Mohamad and Salmiza (2014) reported that the decreasing number of students enrolling in science streams in Malaysia is alarming. Malaysian students lack the confidence and were troubled by the perception that learning Science and Mathematics would be difficult. Anxiety about learning science-related subjects had withdrawn students' interest to further their studies in science-related areas (Fatin et al., 2014). Hence, BLOSSOMS project becomes very relevant and is significant for Malaysia education system. It plays the role to attract the number of students enrolling in science streams by fostering interest and improving understanding in science-related subjects at school level particularly to resolve misconceptions in a more interactive way. The followings are the important elements of BLOSSOMS:

- BLOSSOMS has interesting pedagogy for effective and meaningful learning. It is especially useful to assist novice instructors or instructors who are lacking of Pedagogical Content Knowledge (PCK). Instructors are able to conduct lessons using BLOSSOMS video, which has been prepared in sections.

- BLOSSOMS supports the idea and the need for nurturing STEM. Using BLOSSOMS video, teaching and learning occurs in an active, creative and critical way. Students' understanding will increase as the activities structured for them involve application of real life. Students will have to analyse, conduct experiment, discuss

and solve problems in a creative way. These approaches are in line with the Malaysia Education Blue Print 2013-2015 that aspires to enhance higher order thinking skills among Malaysian students (KPM, 2012).

BLOSSOMS project hopes to resolve the problem with students' lack of interest to further their studies in STEM-related areas. Possessing a good foundation at school level has proven to be an important factor in determining the quality of university graduates, which in turn leads to the production of high quality professional human resources.

BLOSSOMS project is executed in three phases as shown in Figure 4.3.1.

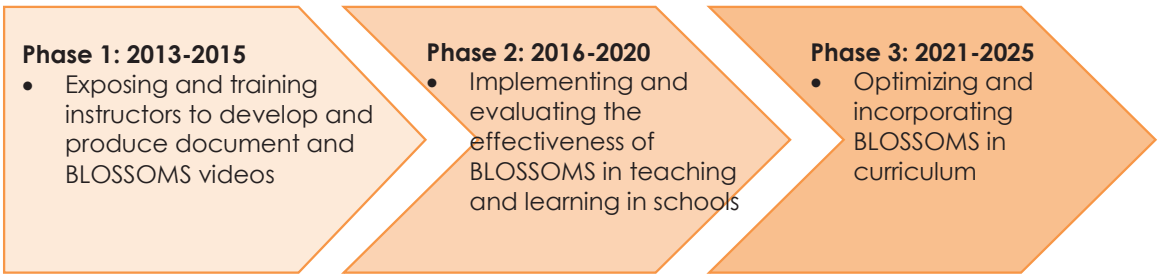

Figure 4.3.1: BLOSSOMS project three-phase planning for 2013-2025

Phase 1 is the development phase, which lasted for two years from 2013-2015. This phase focuses on training instructors who are mainly experienced instructors to produce BLOSSOMS document (concept, architecture and pseudo script) and video. On average, the production of BLOSSOMS documents and videos took approximately nine (9) to twelve (12) months. Production time depends on the quality of the documents being produced, which require approval from the MIT BLOSSOMS experts.

Phase 2 is the implementation and evaluation phase. It involves implementing BLOSSOMS lesson and conducting research to evaluate the effectiveness of BLOSSOMS lesson in teaching and learning. Evaluation is carried out to identify strength and the drawback of BLOSSOMS' implementation. Execution of Phase 2 spans from 2016 until 2020.

In the near future (2021- 2025), BLOSSOMS project aims at incorporating BLOSSOMS as part of the lessons in the Malaysia curriculum (Phase 3).

4.3.2 Processes and Procedures of Implementation

Processes and procedures involve in implementing BLOSSOMS are explained at two levels:

- Processes and procedures for developing a BLOSSOMS video lesson, and

- Processes and procedures for implementing BLOSSOMS in teaching and learning process.

(i) Processes and procedures for developing BLOSSOMS video lesson

There are ten (10) processes involved in producing a BLOSSOMS video. The processes include the development of concept, architecture and pseudo script documents; a series of evaluation from UTM and MIT content experts; thorough discussion with CTL video production team before video shooting; shooting and editing video; and approval from MIT in between. Several improvements have to be done iteratively at several levels of video production to ensure a good video production and as such, it is time consuming. Figure 4.3.2 describes the ten (10) processes.

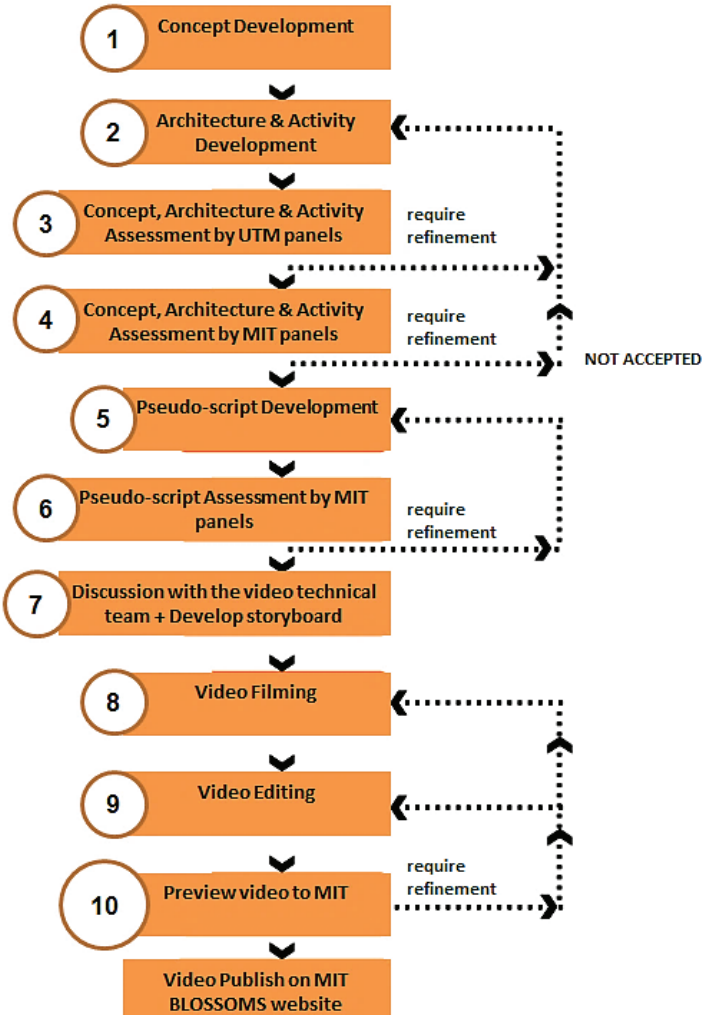

Figure 4.3.2: Ten (10) Processes in BLOSSOMS video Production

(ii) Processes and procedures for implementing BLOSSOMS in teaching and learning process

A BLOSSOMS video contains several segments and several learning activities. BLOSSOMS lesson adopts a blended learning approach, where students in the classroom will be watching the video segment (a segment lasts for maximum of four minutes). This will be followed by the in-class activities (as suggested by the video) facilitated by their instructor. After each learning activity, the video is turned on again (another segment). The iterative process proceeds until the learning objectives of the video are achieved. A complete BLOSSOMS video lesson usually lasts for approximately 50 minutes (estimated including duration of all segments and time taken for in-class activities). Figure 4.3.3 shows procedures in the design of a BLOSSOMS video lesson while Figure 4.3.4 is a screen view of UTM BLOSSOMS video on the MIT website.

To use the BLOSSOMS video in a classroom, instructors may want to choose video(s) from the BLOSSOMS website (https://blossoms.mit.edu/videos) that has been arranged according to subjects (for example, Chemistry, Physics, Mathematics, Engineering, Technology). For every video, there is a 'For Instructors' tab, which contains all the necessary handouts, instructions and materials needed to conduct the chosen BLOSSOMS video. The BLOSSOMS video content expert (video developer) gives his or her recommendations and guidelines in order to have a successful BLOSSOMS lesson.

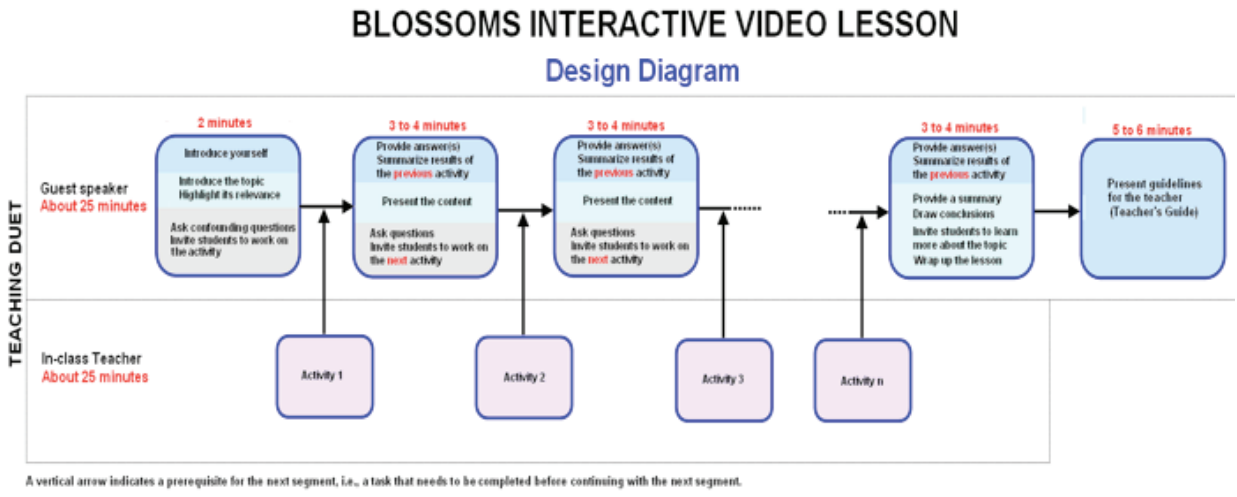

Figure 4.3.3: Procedures in the design of a BLOSSOMS video lesson

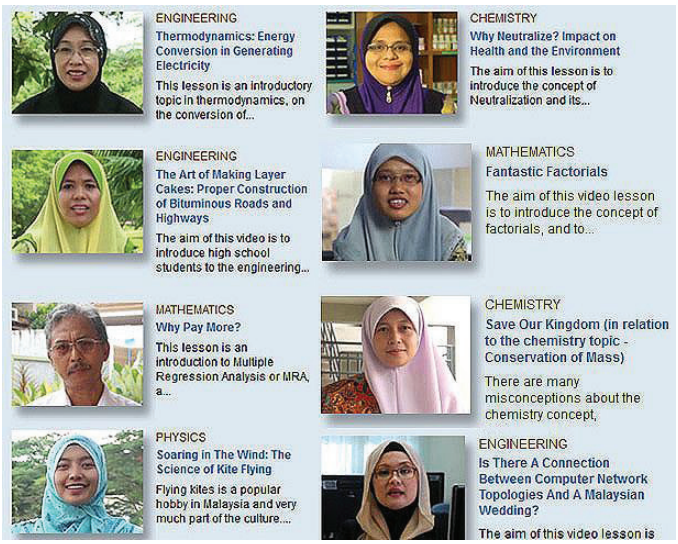

Figure 4.3.4: BLOSSOMS video from Malaysia being listed on the MIT website at: https://blossoms.mit.edu/videos

4.3.3 Outcome / Preliminary Outcomes

Assessment of products and student learning is best done through creation of opportunities for product showcasing at departmental, faculty, school or national and international levels. Patenting and commercialization of products should be encouraged. Examples of BLOSSOMS' implementation and assessments through showcases include the followings:

- 14 new STEM videos published on the MIT BLOSSOMS website with Intellectual Property (IP)
- 25 video translated with Malay sub-title
- MIT special recognition: UTM BLOSSOMS in comparison to other 11 country partners is Number One in all aspects of BLOSSOMS, not just inclusion of culture and family
- Average of 1400 Hits accessed globally
- 12 Scopus journals, 5 more in 2016
- Awards: National e-Learning Award for Creative & Interactive Video at the National University Carnival on E-Learning (NUCEL) 2014; Gold Medal award under the category of Invention, Innovation & Design on e-Learning (IIDEL) 2014; Gold Medal award for the Innovative Practices in Higher Education Expo (I-PHEX) 2015); Shortlisted for The Wharton-QS Stars Awards Reimagine Education 2015
- More than 500 instructors and instructors have been trained to develop BLOSSOMS videos

- Service Learning: Implementation in schools
- Collaboration with Petrosains and NGOs

4.3.4 Summary

In conclusion, BLOSSOMS not only anticipates producing high quality educational videos for local and international community references but also has the potential to increase the percentage of students' enrolment in Science and Mathematics as a result of more interesting and meaningful learning. BLOSSOMS project is beneficial in several ways that is establishes university branding with MIT, assisting Transfer of Knowledge and Technology among UTM instructors. Also, STEM instructors and staff involved in the project are able to produce high impact and high quality research publications, they able to assist science and mathematics teachers to teach STEM subjects in schools in more interesting and interactive ways. In summary, BLOSSOMS aims to improve students' perception and anxiety towards learning STEM subjects and also train teachers to implement student-centered pedagogy.

References

Fatin, A. P., Mohd Salleh, A., Mohamad, B. A. & Salmiza, S. (2014). Faktor Penyumbang Kepada Kemerosotan Penyertaan Pelajar Dalam Aliran Sains: Satu Analisis Sorotan Tesis. *Sains Humanika*. 2 (4), 63-71.

KPM. (2012). *Pelan Pembangunan Pendidikan Malaysia 2013-2025*. Putrajaya: KPM.