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ELECTROMAGNETIC INTERACTIVE MODULE (MI-EM)

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ABSTRACT

Utilization of innovation in teaching and learning is common in the field of e-learning, including learning Physics. Electromagnetic was one of the most challenging subjects in Physics as most students had difficulty visualizing the abstract concept in this topic and often leading to misconception when using books. Several innovations have been done on learning Electromagnetic through technology that are more efficient, exciting, and vibrant such as a smartphone. An empirical study was carried out among Matriculation Physics lecturers to determine the need to develop a module for matriculation's students and recommend input in preparing the module. Therefore, an invention of the Electromagnetic Induction Module (MI-EM) has been developed in the Electromagnetic Topic for matriculation students as a self-learning to help them learn anytime, anywhere and increase their understanding on the topic. MI-EM module is an interactive module that was developed using Moodle platform. Varied software and websites created all the elements in the MI-EM module as interactive elements. The students from Selangor Matriculation College and Melaka Matriculation College were given pre-tests and post-tests to evaluate the efficacy of the MI-EM Module. The findings indicate that the MI-EM module helped students to increase their understanding of the topic.

Keywords: interactive module, learning physics, electromagnetic, matriculation

1. INTRODUCTION

The utilization of technology for accessible and free education is currently in demand prior to the advancement in technology and the ability of students to make all interactions happen regardless of time and place. Lately, mobile learning is popular among educators and is increasingly used in the education system, as this method offers more enthusiasm, engagement, achievement, and convenience in learning experience for students [1]. Moreover, the learning experience that mobile learning offered will bring a beneficial effect on student learning, notably in studying physics, which has been regarded as a challenging subject. In Physics, Electromagnetism is one of the most challenging topics as students need to understand lots of abstract and non-visualized concepts [2]. Thus, this study aims to help matriculation students by suggesting the development of an Interactive Electromagnetism Module, MI-EM using mobile, which will be used as a self-learning method for matriculation students in Malaysia.

2. METHODOLOGY

MI-EM is developed through Moodle, an open-source system and accessible using mobile in order to allow students learn at anytime and anywhere. For a practical and interactive module of student self-learning in Electromagnetism, MI-EM is developed using ADDIE instructional model. Using this model,

few considerations are outlined, such as the needs to develop a module, the theories behind the development process, the methods, and the development process, how the module is used, and how to assess the usefulness of the module. Before developing MI-EM, this study collected information from matriculation lecturers. All the interactive elements in the MI-EM that had been suggested were developed using a varied software and websites such as Powerpoint, Anyflip, iSpring, OBS Studio, Movavi, Audacity Biteable, Phet Colorado, Physic Aviary. 109 science students from two matriculation colleges, which is situated in Melaka dan Selangor were randomly selected. A pre-test was conducted in which all the students used MI-EM module as a self-learning method for eight weeks. After that, the students sat for a post-test and answered a survey, to give feedback. This study was carried out before the lecturer's formal lesson for the topic Electromagnet. Besides that, experts also gave comments and suggestions for MI-EM improvement.

3. RESULT

The effectiveness of the MI-EM was measured in terms of student achievement (differences between post-test and pre-test). From the student achievement, 86 per cent of the pupils have improved, 10 per cent of them obtained lower scores and 4 per cent of them obtained the same score for both pre-test and pos-test. This finding proves the beneficial impacts of using MI-EM although student use the module for self-learning. In addition, the usability of MI-EM was evaluated among the students after post-test. The data from the survey that uses five-point Likert scale shows mean of 4.01 for MI-EM's effectiveness, 3.98 for efficiency and 3.91 for satisfaction. Thus, all the results indicate that the usability of MI-EM is beneficial and acceptable. Lastly, positive comment from experts such as "MI-EM module was very good, interesting and also can be used as material for flip classroom" also suggests the advantages of using MI-EM.

4. DISCUSSION

To be discussed, MI-EM module can help matriculation students to increase their understanding of the topic Electromagnetism, based from the findings. Besides, MI-EM can expose students in exploring varieties of effective self-learning methods using smartphone and is able to increase the students' interest in studying Physics. Pertaining to the lecturers, MI-EM can help reduce face-to-face consultation time with students and more time and attention can be given to less performed students. Apart from that, lecturers also can monitor students learning progress anytime and anywhere. MI-EM also promotes paperless learning. Even though MI-EM brings lots of benefit, there are still spaces of improvement such as improvising the elements, adding more simulations, and utilizing all the features in the Moodle.

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2. Pihak Perpustakaan ingin memohon kelulusan YBhg. Profesor untuk membuat imbasan (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

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