

Exploration of action video as an innovative assessment in mechanical engineering laboratory

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ABSTRACT – This study explored the students experience in the innovation of laboratory assessment from written report to action video for Mechanical Engineering students. Camera phones were used to record the activities in the experiment and used to produce a video as a form of communication to inculcate a positive learning culture that support safe laboratory practice and digital literacy. A survey was undertaken to measure student engagement with the action video, and its impact from the students’ perspectives. Findings shown that the action video was perceived positively by students, and appreciated the activity as a constructive learning method.

1. INTRODUCTION

Student nowadays is identified as digital natives or millennials [1]. Recent studies suggested that the millennials prefers technology and online applications in their learning process [2], [3]. Instructional video for conducting experiment has been extensively used as part of the teaching in many engineering laboratories, mainly because of high cost of repair and replacement for improper management of high cost instrument [4]–[6]. The technology has proven to increase student engagement to learn thing faster and better.

Yet, adaptation of new learning and teaching styles for the students is not sufficient unless they are assessed in preparing the digital contents. Assessment of laboratory work is fundamental to any engineering curriculum. Traditional laboratory written report has limited learning benefits and poorly groom students in design or conduct experiments [7]. Extending the digital literacy to mechanical engineering undergraduates is essentially a new approach in developing the students’ ability both on skill and knowledge in mechanical engineering lab. perception

This study investigated the perception of the student’s skill and experiences on preparing video action for mechanical lab.

2. MOTIVATION

Mechanical Engineering Laboratory 1 (BMCG1011) is a subject with 1 credit in Faculty of Mechanical Engineering (FKM), Universiti Teknikal Malaysia Melaka (UTeM). This subject introduces the students to mechanical engineering practices and work safety. It is an instruction driven lab experiments as the students are given a set of instruction to be completed in

order to achieve some designated objectives and guided to prepare a technical written reports.

The laboratory assessment was redesigned to adapt new learning and teaching styles for the students. The students were required to submit experiment report in terms of video, instead of written report. The motivation of the new type of assessment mainly is due to equip the students with the 21st century digital skills in line with the emerging of industrial IR 4.0.

3. METHODOLOGY

This is an exploratory study conducted for mechanical engineering lab at FKM, UTeM. There are nine laboratory session in BMCG1011. The experiments were conducted to study the fundamental engineering concepts in statics, dynamics, and material sciences.

The total students registered for this subject were 153. The students were grouped into eight groups. Generally, each group has maximum of four team members. There are eight experimental sessions runs simultaneously every week. As a pilot study, only experiment L1 Microstructure Analysis and L2 Heat treatment need to be submitted in video. They were given two consecutive weeks to plan, perform and edit the still image and video and submit the video in a CD. The work flow for the video reporting for the experiment is illustrated in Figure 1.

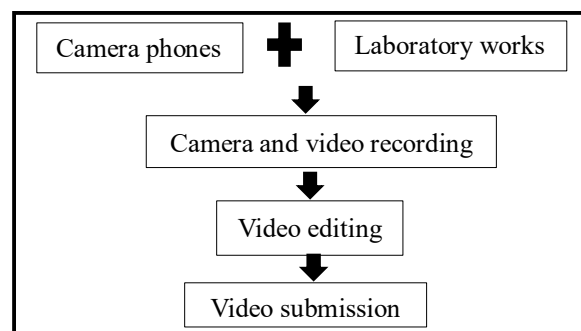


Figure 1 Action video process flow.

A survey was conducted at the end of semester. 23 students (15.0%) participated in the survey were the group leaders to gather the students’ feedback on the implementation of the new laboratory assessment.

4. STUDENT FEEDBACK AND STUDENT PERFORMANCE

The survey was an open ended online questionnaire on reflection of their video making journey. The open-ended survey questions are tabulated in Table 1.

Table 1 Open-ended Questions

Item	Question
Q1	Reflect your personal experience when you prepare the video report
Q2	How the experience helps you in understanding the theoretical and practical application of the laboratory
Q3	What do you like when preparing the video?
Q4	What do you dislike when preparing the video?

Results from the survey indicated that the students were surprised and nervous to do their first video report. However, they enjoyed the laboratory session as they gained new experiences during the video making process. Most of the student reflected that they understand the experiment better because they need to really understand the experiment in order to produce a good video. Some pointed out that they need to plan the outline of their video reporting and details out the essential ideas. They coherently echoed that the video reporting enhanced their teamwork, cooperation and communication. All the students agreed that editing the video was very time consuming and they required to learn more on editing skills. Some students highlighted a good camera will enhance their video quality.

At the end of the survey, using a 5-point Likert scale, student assessed their confidence level during and after the video report. All of the students (100%) agreed that the video making experience increase their confidence level on the experiment, both during and after the video submission. It was found that the students have appreciated video as a constructive learning method. The whole video making experience was great and they felt happy with their video.



Figure 2 Confidence level of the students.

The survey confirmed that the video report provides a useful experience to understand the experiment. This results indicated that recorded the mechanical engineering laboratory execution and reported it in terms of video is an excellent medium to promote better learning path on the students. Student becomes more

confident, independent, can execute the experiments faster and can relate to the real equipment better. On overall, the use of the video promises many positive outcomes particularly to promote engineering education.

Nevertheless, the video action ensures that the students becomes digitally literate in the digital world. The students also want the submission in their own YouTube channel instead of a CD. This is a way forward for the upcoming semester. The uploading in YouTube channel allow the students earn ownership on their own creative work.

5. SUMMARY

The introduction of video action as part of assessment in BMCG1011 Mechanical Lab 1 is a strategy to promote active participation of students in their laboratory session. The use of camera phones facilitates learning and encourage team works to complete works at limited time frame. The production of video action fosters better digital skills amongst the students.

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