Utilization of e-learning portal for self-reflection to improve students' performance in engineering subject

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ABSTRACT – This study aims to analyze the effect of self-reflection for students using UTeM e-learning portal (ULEARN). It was applied on a tough final year mechanical engineering elective subject, where the performances of students' in earlier preliminary subjects were diverse. The duration for this study was only eight weeks, where reflections were done twice. Performance of students within this short time interval was analyzed through the result of mid semester examination. The result shows that 60% of students in the class have shown some improvement in the final year subject, as compared to that of preliminary subjects that were taken in preceding semesters.

1. INTRODUCTION

Some of mechanical engineering subjects during the final year undergraduate course are found to be tough by students, especially subjects from the mechanical core theories such as control, computational fluid dynamics, heat transfer, and advanced solid mechanics. Although the high performance students can pass the subject with good grades, their mediocre and low performance colleagues usually struggle to even pass with minimum marks.

High performance students usually known to be very diligent. They are also known as effective learners who are reflective about their learning, and have knowledge of themselves, the task they are undertaking and strategies they can implement [1]. They usually address good response in each topic as well as reflect themselves on their understanding towards the topic. Scholars [2, 3] reported that reflection on learning has led to a greater perceived self-efficacy, and improvement in academic performance.

This paper discusses utilization of e-learning portal in guiding final year mechanical engineering students to do self-reflection for Advanced Solid Mechanics (ASM) subject. This will help mediocre and low performance students to have good feel towards the subject, thus can perform better in the tough theoretically calculation subject. This will also give new perspective to junior students to choose this subject as one of their final year elective subject, in which will benefit them in future.

2. METHOD OF STUDY

This study has been done within eight-week duration (half of academic semester), during second semester of academic session 2018/2019 at the Faculty of Mechanical Engineering, UTeM. A tough final year elective subject was chosen, which was the Advanced Solid Mechanics.

The subject was enrolled by twenty (20) final year students. The low number of students has been somehow affected by the reputation of the subject as a 'killer' subject. Therefore, this study was done to help mediocre and low performance students, to learn the subject in a way that can assist understanding by doing guided self-reflection at the beginning of the semester and throughout the eight weeks of subject commencement.

Figure 1 shows the flow of reflective learning that was designed in ULEARN portal of BMCG4123 Advanced Solid Mechanics, semester 2, academic session 2018/2019. Comparison of students' achievements in mid semester examination with that of previous subjects were done and the self-reflections of students' were analysed.

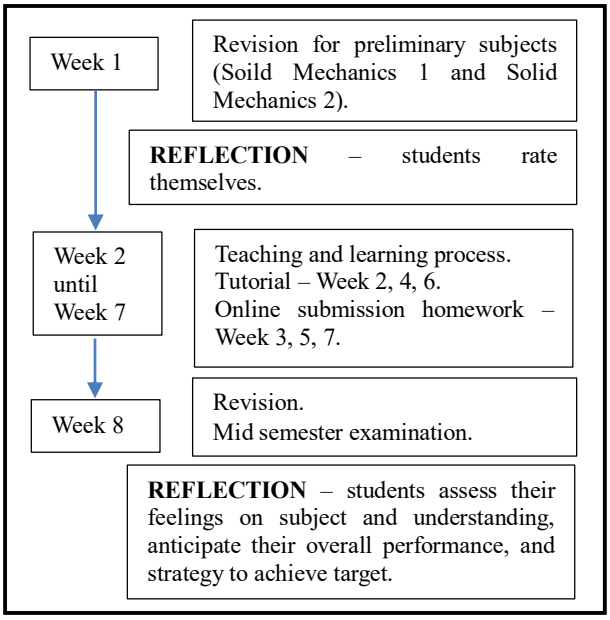

Figure 1 Flow of reflective learning for BMCG4123.

3. RESULTS AND DISCUSSIONS

Figure 2 shows result of students' reflections on their preliminary knowledge, when they were asked to solve revision in Week 1. Meanwhile, Table 1 shows comparison of performance for twenty students in subjects Solid Mechanics 1 (Solid 1 – second year study), Solid Mechanics 2 (Solid 2 – third year study) and

Advanced Solid Mechanics (ASM – fourth year, mid-semester examination). The mid-semester examination marks were converted to grade, and compared to the average grades that students achieved in both preliminary subjects. Performance of students were marked as IMPROVE, NO CHANGE and WORSEN. For example, if students obtained A for Solid Mechanics 1 and B+ for Solid Mechanics 2, the average preliminary grade was considered as A-. Then, if the same student obtained A for his ASM mid-semester exam, this means that the performance of student has been improved (IMPROVE).

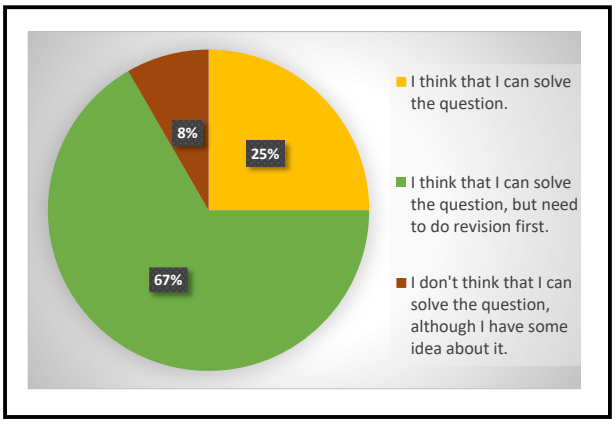

Figure 2 Reflection during Week 1 revision.

Table 1 Comparison of performance.

Student ID	Solid 1	Solid 2	Mid-sem ASM	Performance
ASM01	B	D	B	IMPROVE
ASM02	C	D	D+	NO CHANGE
ASM03	D	D	B-	IMPROVE
ASM04	A	B+	A	IMPROVE
ASM05	D+	B-	B	IMPROVE
ASM06	A	A-	A	IMPROVE
ASM07	C	C	C	NO CHANGE
ASM08	B	B	A	IMPROVE
ASM09	A	B+	A	IMPROVE
ASM10	C+	B+	B	NO CHANGE
ASM11	A	B-	A	IMPROVE
ASM12	A	B-	A-	IMPROVE
ASM13	B-	B	B+	IMPROVE
ASM14	C	C+	B-	IMPROVE
ASM15	C-	C+	D	WORSEN
ASM16	C	C+	C	NO CHANGE
ASM17	D	B	E	WORSEN
ASM18	B	B	A	IMPROVE
ASM19	B+	B-	B	NO CHANGE
ASM20	D	D	E	WORSEN

Figure 3 shows percentage distribution of students' performance as detailed in Table 1, while Figure 4 shows result of students' feelings on their current understanding.

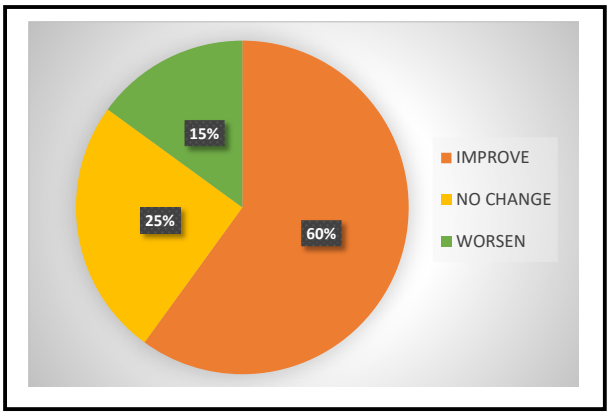

Figure 3 Percentage distribution of performance.

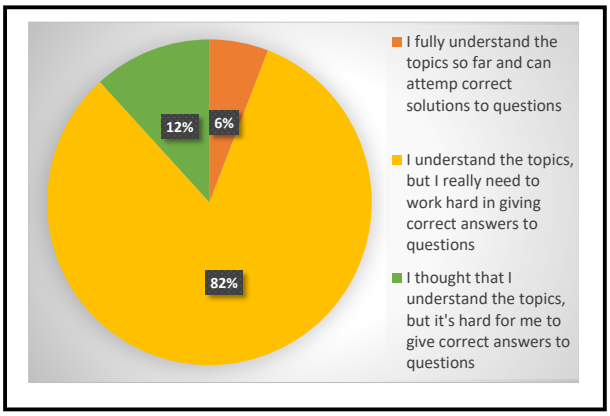

Figure 4 Students' feeling on current understanding.

4. CONCLUSION

This short interval study on the effect of guided reflection learning (learning by thinking) for Advanced Solid Mechanics subject shows that 60% of students have shown improvement in their performance. From the reflection process, 82% of the students feel the urgency of working hard in order to succeed in the subject. This shows positive students' attitude during enrolment in tough subject. Analysis for the whole semester will be further discussed in full paper publication, where the comparison with findings from established rubric as measurement tool will be included to highlight novelty.

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