REFLECTION OF STUDY IMPLICIT DERIVATIVE BY USING TEIKEI-BUN HISTORY SHEET

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ABSTRACT

The laws of mathematics govern everything around us, and without a good understanding of them, students can encounter major problems in learning. Assessment in the form of history sheets is an instrument or tool to collect information to determine the extent to which the student shows the desired learning outcomes. This study aims to look at how this history sheets could help learners' progress. Thus, to have a good model of assessment in classroom-based learning, it must reflect what has been learned. This study utilized learning history sheets or writing templates that allow students to develop their expressive abilities concerning mathematics lesson they learn. It also includes TEIKEI-bun history sheet using fifteen polytechnic students as respondents. Data were analysed using qualitative analysis. Two core skills were identified: the willingness and ability to express their thought on mathematics learning. The two skills could be used to strengthen the social development of students' writing. Furthermore, the assessment of students' responses using the TEIKEI-bun history sheet is the research instrument to gather information from respondents. The findings indicated that students felt that mathematics was difficult. It also indicated that for the students to be in active learning involves them in doing something and thinking about what they are doing. Therefore, there was a significant improvement in respondent knowledge in Before Study and After Study in TEIKEI-bun history sheets. The application of TEIKEI-bun was observed to be a feasible tool for the student to be actively involved in education and also the assessment of the students is done more effectively.

Keywords – *TEIKEI-bun, Learning history sheets, Active Learning, Qualitative research, Lecture*

1. INTRODUCTION

A didactic method is one of the teaching methods that are teacher-centered and is content-oriented. This method is commonly used in the modern education system. For decades, educators and educational researchers have questioned the effectiveness of entirely lecture-based teaching methods (Barr & Tagg, 1995). Educators and researchers have come to recognize the "complexities of teaching and learning for understanding as opposed to just knowledge retention" (Ritchhart, Church, & Morrison, 2011, p.7). Bonwell and Eison defined

strategies that promote active learning as "instructional activities involving students in doing things and thinking about what they are doing" (Bonwell and Eison, 1991). An approach that emphasizes active learning focuses more on students' skills in disseminating information and requires students to do something like reading, discussing and writing that requires higher thinking. They also tend to place more emphasis on students' exploration of their attitudes and values.

During the teaching and learning process, students must ensure they can understand all learning items. Many researchers have shown that the development of critical thinking skills can improve mathematics achievement (Chukwuyenum, 2013). Examining for understanding is a critical part of teaching and learning that assist to determine whether the students understand what they need to. Besides, students' preparation for class is also an essential component of their college education. There simply is not enough time in class to accomplish the learning objectives for most courses (Ewell & Rodgers). To measuring how many improvements students have improved in one duration of the lesson, the assessment tool can be a valuable tool for diagnosing more effective teaching. The assessment also viewed as a tool to diagnose and also to use in measuring students' achievement of learning outcomes and objectives and evaluating student performance in education (Fook & Sidhu, 2013). This can be done by giving the students a set of questions for lecturers to gather information and also to monitor the students' progress. The general difficulties for students are when they do not understand what they study. Students learning outcomes are, "contemporary indicators of quality in the field of education" (Al-Shammari, 2011, in press). When the students are being assessed, they are likely to be self-motivated towards their studies.

2. PROBLEM STATEMENT

Engineering Mathematics 1, 2 and 3 are requisite courses for engineering students in Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA). These courses are offered for Semester 1, 2 and 3 of the academic year respectively. From the previous examination result, there was a substantial number of students failed their courses. In Department Mathematics, Science and Computer (JMSK) specifically, already have conducted many revision programs to cater to weak students as an initiative to help students achieved good grades for their

courses. However, despite programs conducted for them, the failure percentage for mathematics still arise. For some students, difficulties in mathematics are the consequence of a history of underperformance due to an unaddressed learning difficulty, or gaps in their learning history. When students participate in the learning process in the class, does it help them from just remembering to understanding to analyzing and creating? The goals of assessment are to assess student achievement in the topic implicit derivative and to identify trends in achievement over specific periods. Assessment in higher education needs to be renewed because innovative types of assessment methods are needed to meet the demands of 21st century learners (Kearney & Perkins, 2011).

1. METHODOLOGY

3.1 Research Design

This study employed a qualitative research design to explore the application of TEIKEI-bun history sheets among students in Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA). Burns and Grove [2009] have provided their opinions that qualitative research is a systematic and subjective approach to highlight and explain daily life experiences and to further give them proper meaning. This study was conducted in PSA in Shah Alam, Selangor, Malaysia. A tentative number of 15 students from the Department of Electrical Engineering were selected. Both genders, second- semester students were represented by respondents. The sample size was determined based on students who take course Engineering Mathematics with Implicit Derivative in the syllabus contents. This study applies the TEIKEI-bun history sheet as the research instrument to gather information from respondents.

The TEIKEI-bun history sheet contains four main sections. There are 'before study', 'summary', 'after study' and 'thoughts about the lessons'. This history sheet challenges students to observe and write their views and answers accordingly. The student respondents must be able to observe and reflect on the topic. This exercise inspires students to express their thought in mathematics learning. The session which was conducted during the lecture hours was started with an explanation regarding the concept of the implicit derivative. The student also wrote a reflection of the lesson learned. Within two hours of the lesson, the students proved that they could relate some relevant connection between a previous lesson

and the next lesson. In the 'before study' section of the TEIKEI-bun history sheet, the students stated that they mainly did not know implicit derivative. The objective of the section 'before study' and 'after study' is interesting to the respondent's level of alertness regarding the topics learned. This study was conducted to determine whether TEIKEI-bun history sheet was effective in enhancing students' attention and increase learning specifically in the topic Implicit Derivative.

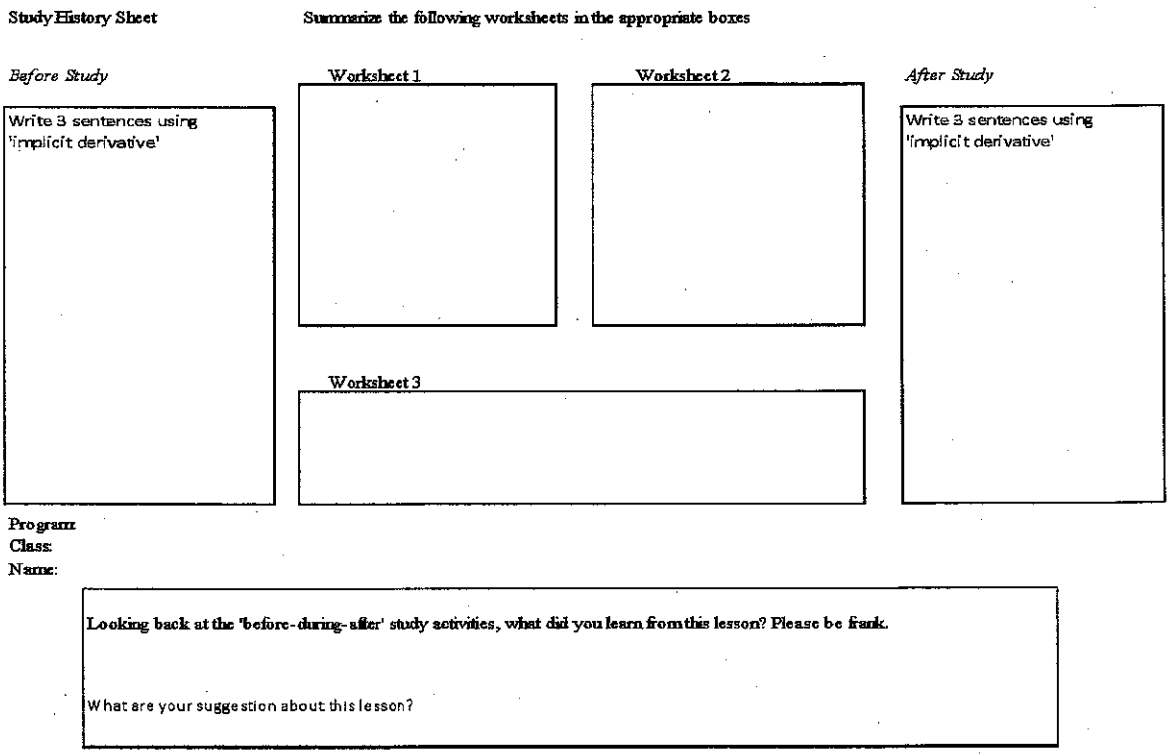

Fig. 1. The TEIKEI-bun History Sheet.

1. FINDINGS

A total of fifteen participants were chosen for this study. In the analysis of data, the editing analysis style (Crabtree & Miller, 1999) was employed. Acting as the interpreter, the researcher read through texts in search of meaningful segments. Once segments were identified and reviewed, a category scheme that can be used to sort and organize the data

were developed. Each experience was analyzed and significant statements extracted. The researcher identified and extracted about seven significant statements.

4.1 Before study

In this study, we want to bring a change to the passive way of learning where there is no active participation by students. The TEIKEI-bun history sheet was demonstrated and briefed of the items and wording of responses by the students. Our aim of distributing the history sheet before the lecture is to analyze the extent to which students are engaged in this topic and also to make the students more focused on lectures and to evaluate students' key concept learning of implicit derivative. In this context, as the teaching of the topic Implicit Derivative process begins, we will assess the background of knowledge on topics to be taught to students.

The lecture of course Engineering Mathematics 2 was conducted with the introduction of a TEIKEI-bun history sheet to the students before the lecture begins. The TEIKEI-bun history sheet contains sections on 'before study', 'summary', 'after study' and 'thoughts about the lesson'. In the 'before study' section, whereby students must write down everything about their knowledge to the subject matter which is delivered on that day. In normal circumstances, a lecture was delivered for about 2 hours and following which students are required to fill in again in the worksheet for the 'after study' section when the lecture for the topic has been completed.

Fig. 2. Students Answering the 'Before Study' section in TEIKEI-bun history sheet.

Fig. 3. Students Writing Answers in the History Sheet.

Students wrote:

Statement	Score
1. I do not know what is implicit derivative	12
1. Mathematics is difficult	10
1. I have never heard about it	8
1. I do not remember	2
1. I am not sure	1
1. I forgot	4
1. I cannot imagine	1

4.2 After Study

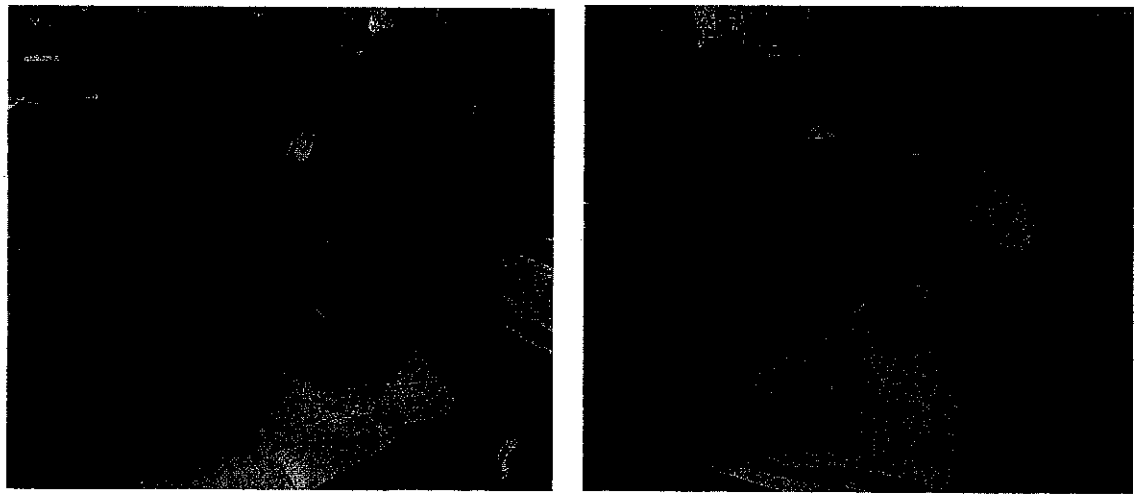

Fig. 4. Students Discussing issues for the 'After Study' section in TEIKEI-bun history sheet

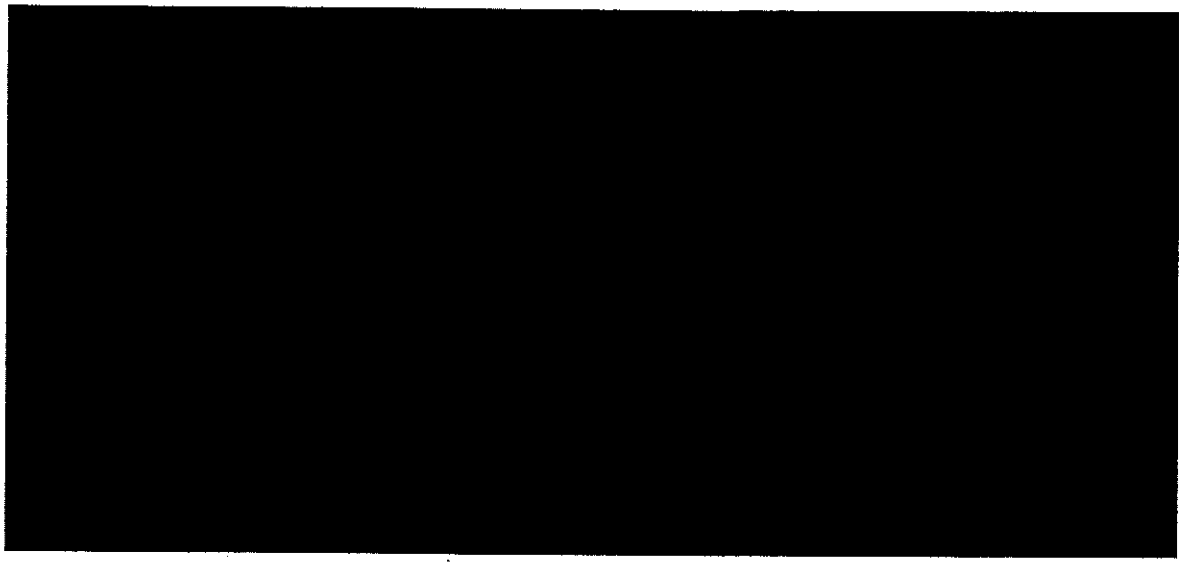

Fig. 5. Part of the student's response to the 'After Study' section in the history sheet.

As the purpose of the survey which was carried out by using the TEIKEI-bun history sheet is to assess the progress of the learning and teaching process and to show that there was an increase in knowledge prior to lectures attended by students. Consider the following figure.

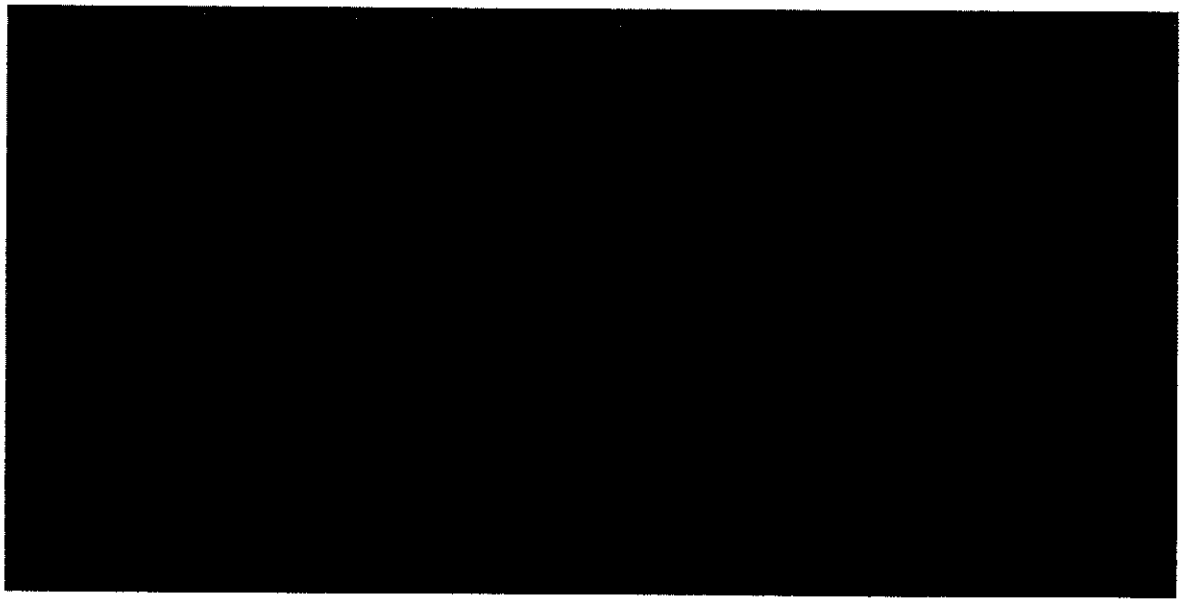

Fig. 6. Comments from students regarding their reflection.

1. DISCUSSION

Generally, active learning is defined as any instructional method that gets students to participate in the learning process. This definition includes activities such as homework and any other activities that are introduced to students. In short, active students need to do meaningful learning activities and think about what they are doing. The key elements of active learning are student activity and their engagement in the learning process. Active learning is often contrasted to the traditional lecture where students passively receive information from the instructor. Students today are intensely social and interactive learners. Those surveyed by (Willms, Friesen, and Milton (2009)) stated that they want to interact with people both within and beyond the classroom and school environment. The results of this study show that the TEIKEI-bun history sheet can contribute to improving the participation of students in the class. It also shows that when the teaching method engages students in the learning process, they have to think about what they are doing. Therefore, there was a significant improvement in respondent knowledge in 'before study' and 'after study' in TEIKEI-bun history sheets. The application of TEIKEI-bun was observed to be a feasible tool for the student to be actively involved in class and also the assessment of the students is done more effectively. To answer the question in the history sheet students also can develop their writing skills.

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