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Application of Web-Based Real Time Assessment for Undergraduate Comprehensive Test

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ABSTRACT

Comprehensive Test is one of the courses in the Petroleum Engineering Undergraduate Program has taken by 7th-semester students to comprehend all of the basic of Petroleum Engineering expertise. The current method is by writing paper then presented it. The weakness of this method is the amount of plagiarism that occurs and the course duration is mostly taken more than one semester, thus A Real-Time Assessment (RTA) the system with a Computer Assisted Test (CAT) is carried out to speed up the graduation period. The stages of this research were software development, question bank, and test implementation. The results of the questionnaire showed that 75% of students felt the conventional learning method was less effective in mastering 3 fields of expertise, and only 5% of students were able to master the field. Question banks are made using the moderator and panel methods. The initial assumption of the difficulty level based on the semester course was taken. The distribution of exam questions consisted of 15 questions for each field category and 5 integration questions where the classification included 33% easy questions, 60% medium questions, and 7% difficult questions. The passing grade was determined at 60%. From the test results, it was found that students need 3 exams to reach 95% graduation. While the question feasibility evaluation was done by looking at the participants' answers per question, it was found that 4% of the questions had to be "dropped" from the test and 96% of the questions were feasible to be tested.

INTRODUCTION

One of the competencies of an undergraduate student is to master the theoretical concepts of a particular field of knowledge in general and depth. Theoretical concepts are specifically and deeply tested with the final project, while general theoretical concepts are tested with comprehensive test, where students are expected to graduate with general mastery of the field.

Comprehensive Test is one of the courses in the Petroleum Engineering Undergraduate Program taken by 7th-semester students to comprehend all of the basic of Petroleum Engineering expertise, which are Drilling, Reservoir and Production Engineering. The current method that has been running is by writing paper about minimum two expertise then it is presented in front of examiner. This stage is very important because in the process, students need a thorough understanding of the petroleum engineering field.

Over time, the usage of same topics repeatedly make students commit plagiarism. This reduces the essence of the original purpose of forming this course. So the measurement of learning outcomes by students is difficult. In addition, many students spend more than one semester to complete this course. Therefore, for uniformity and improvement in the quality of understanding of the fields of petroleum engineering expertise, a Real-Time Assessment method was made with the Computer Assisted Test software by making questions through several processes and evaluating the feasibility of the questions. Preparation of learning test results should be able to measure learning objectives, is a representative sample of learning material, a format that suits the students needs and reliable assessment results. (A. Muri Yusuf, 2005).

To find out the urgency of developing this new method, questionnaires are distributed through the Google form to students who are currently taking comprehensive courses. The questionnaire contains satisfaction survey in the current comprehensive learning methods and about students' confidence in mastering the material in the fields of expertise. It was intended as a material evaluation method that is currently running.

Questionnaires were given regarding satisfaction in mastering the three fields of expertise and what fields were considered mastered by the students. The results of the questionnaire show that 75% of students are less satisfied with the current method. Whereas in mastering fields, 45% of students only master 1 (one) field, 50% of students master 2 (two) fields and only 5%

master 3 (three) fields. This shows that the use of learning methods currently was not meet the objectives of forming this course because 95% of students have not mastered the three basic fields of petroleum engineering expertise. Students are dominated by mastery of one and two areas of expertise. Therefore, it is necessary to have a uniform or standardized assessment of competency understanding. The expectation is that students who have completed comprehensive courses have mastered all of basic material in the field of Petroleum Engineering expertise.

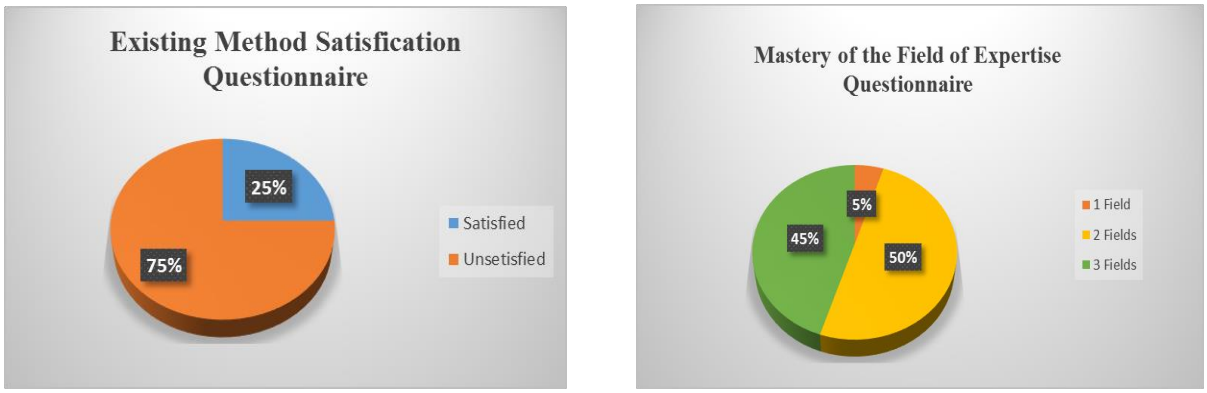

Figure No.1: Questionnaire Result

MATERIALS AND METHODS

The study was conducted through several sequential stages so that a high level of confidence was obtained to implement this application. These stages are:

1. Developing a question bank, conducted by lecturers with expertise in reservoir, production and drilling engineering. The question bank is made by collecting, evaluating questions and distribution of the difficulty level of each category. The category in question is the area of expertise, while the level of difficulty in question is easy, medium and hard. In developing question banks, the qualitative analysis uses the moderator technique and panel technique (Mujimin, 2010). The question analysis is carried out by the heads of their respective fields of expertise and the heads of departments with a form template.

Question Analysis

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Subject : Comprehensive
Consentration : Drilling/Reservoir/Procution/Integration
Academic Year : ……..

Subject	Basic Competency	Number of Question	Question Level (easy/intermediate/difficult)	Literature Source	Anntation

Figure No. 2: Questions Analysis Form

A good question is one that can provide data or an overview of the mastery of learning material by participants so that the teacher can improve the quality of teaching and learning process (Endra Susila, 2012).

100 multiple choice questions were collected for each category. The development of this problem is done by discussion lead by a moderator. The discussion is done for each question item by lecturers of the expertise with one mediator. This technique is used very well because the question bank that is made up consists of various subjects so that each lecturer can combine his competency in that area of expertise. After the question bank has been collected, an analysis using panel techniques is carried out. They filled in the form for each item.

2. The next stage is, the questions are classified based on the level of difficulty of the questions. The assessment of the difficulty level referred to the semester which the course is taken. The course of the early semesters is certainly the most basic, easiest material while the following semester increases its level because the subject is developing.

Table No. 1: Question Difficulty Level

Difficulty Level	Subject Semester
Easy	I and II
Medium	III and IV
Hard	V, VI and VII

From the results of questions classification, 50 questions were then selected with a question distribution.

Table No. 2: Question Distribution

Question Category	Difficulty Level			Total
	Easy	Medium/	Hard	
	33%	60%	7%	
Drilling	5	9	1	15
Reservoir	5	9	1	15
Production	5	9	1	15
Integration		4	1	5

Questions that have gone through the evaluation phase are then entered into the RTA-TMUPNYK software. With this application, we can set the portion of questions for each category, the minimum passing grade (passing grade graduation), exam time and scoring.

3. Developing Real-Time Assessment (RTA) software which has features that are customized to the needs of comprehensive exams. Computer Assisted Test (CAT) is a computer-assisted test method to speed up the report on exam results, create standardized assessments, increase objectivity transparency, accountability, and efficiency (Dewi Saadah, 2015). The Computer Assisted Test system test with multiple choice questions is conducted as a comprehensive set of courses to standardize the basic understanding of petroleum engineering.

The appearance of the RTA software for logging in is shown below.

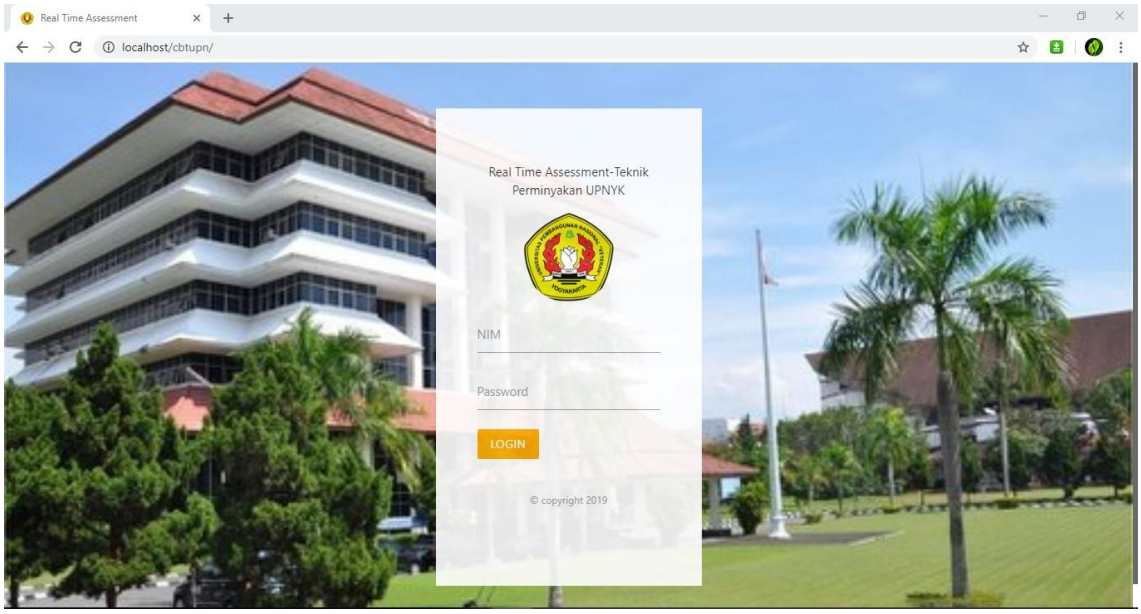

Figure No. 3: Login Page

This login page can be opened and used by both administrators and students. Before the test begins, students register the Student Name and Student Number (NIM) to the administrator of Petroleum Engineering Department (TU) to get the password. The software will randomize the password for each participant. The password can only be used at the time of the test and is only used once. The admin page can be used to determine the number of questions, types of questions (pictures or writing), passing grade, exam time, scoring system.

The page for participants after logging in will bring up 1 page with 2 main columns namely questions and indicator number of questions that have been answered. Students can either do random or sequential examinations. The test can end by pressing the end button or because the time is up. At the end of the exam, the new page will immediately appear on the monitor screen whether or not the student have passed the exam. After the exam is complete, the page is set so that it cannot be returned again and a graduation certificate can be printed immediately. Real Time Assessment application data flow can be from input until the results obtained by participants.

Figure No. 4: Students Exam Page

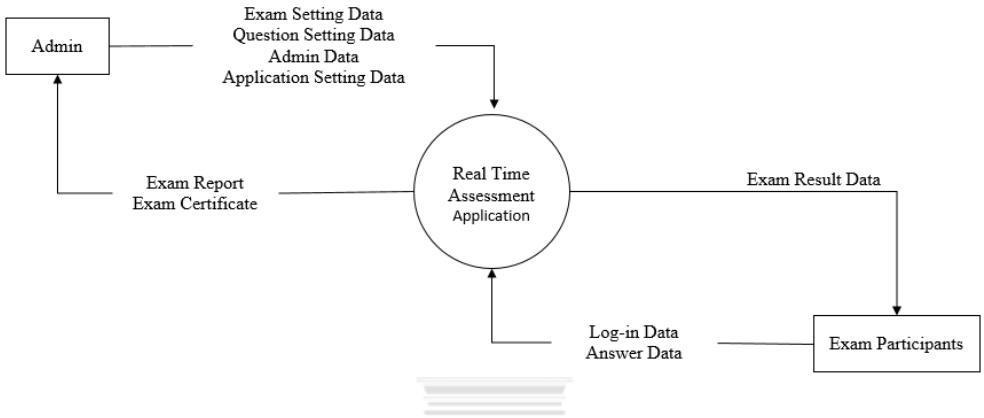

Figure No. 5: Flow Chart Data

RESULT AND DISCUSSION

The sampling technique was carried out for 20 students who took the test. The results of this test can give an idea of the feasibility of the questions and examine the frequency of student taking the test until he/she passed it. The test is conducted on the same 20 students with an interval of 2 weeks per exam schedule with the number of questions. The exam takes 60 minutes and the passing grade is 60%. In the first exam, there were only 6 students who passed. This low passing grade is due to lack of student preparation in each question category. A significant increase in graduation was seen on the 2nd exam. Student graduation reaches 80%. The third exam resulted in 19 people passing (95%). This is a consideration of the Petroleum Engineering Department to carry out the examinations 3 times in a semester for each student. So students who have not been able to pass one exam can repeat it but are given time to prepare for the next exam.

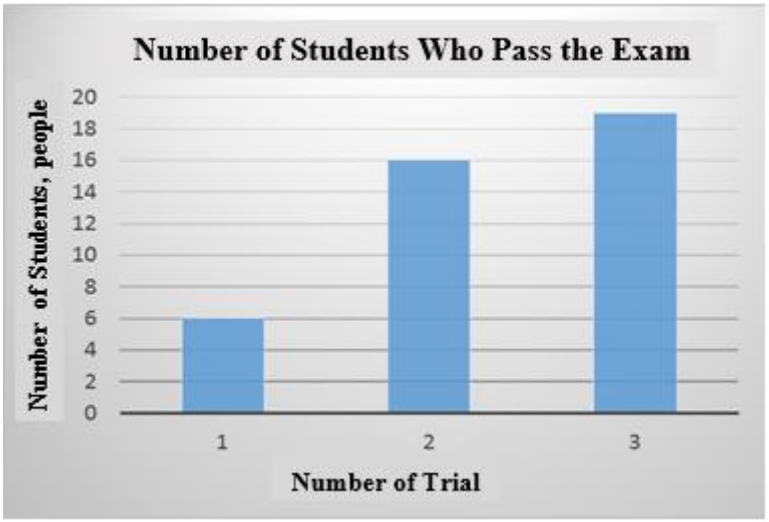

Figure No. 6: Development of Passing Grade

Besides the frequency of examinations taken, the answers to the results per question are collected and recapitulated on the second exam. It can be seen in the type of question 1 for the reservoir category, all students can answer it, while number 15 only 6 people can answer it. This is an indication that the question no. 1 in the reservoir category is too easy to test so it is said to not represent this comprehensive goal. As for the type of question 15, it can be said that it is not yet feasible to be tested. But the cause of the few who can answer correctly must still be investigated because this can occur due to unclear information or poor mastery of the material. So that it can be said that the questions made and tested are sufficient with 96% level of confidence.

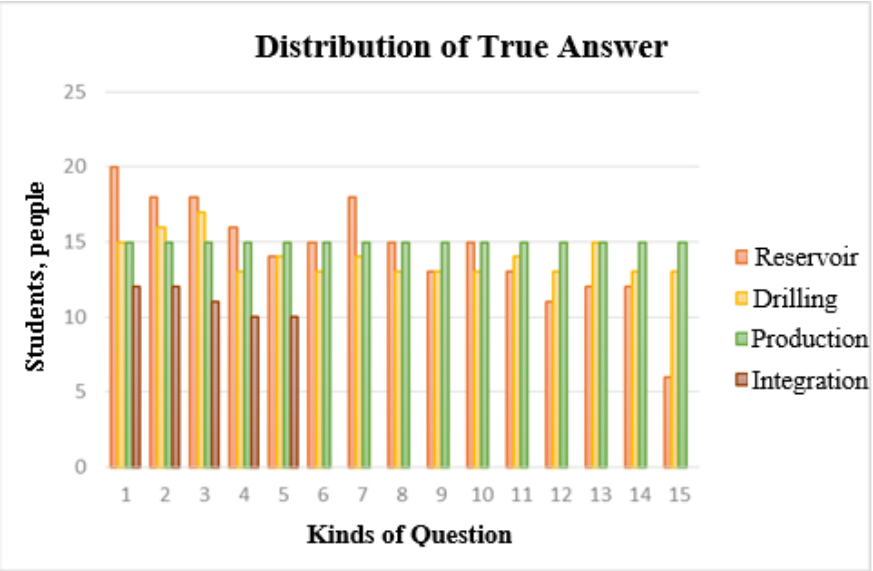

Figure No. 7: Correct Answer Distribution

CONCLUSION

From this research, it can be concluded that:

1. The old comprehensive test method was still ineffective in achieving the goal of mastering basic material in all areas of expertise.

2. A minimum of 3 repeat exams are required for almost students to pass.

3. The results of the question evaluation show that 96% of the questions are appropriate and are in accordance with the learning objectives.

In order to make the implementation of this new system can take place properly, it is recommended to make regulations and standard operating procedures (SOP) for the implementation of subsequent examinations with Real-Time Assessment software with Computer Assisted Test.

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