

## DESIGN AND DEVELOPMENT OF PROGRAMMING LEARNING PLATFORM BASED ON HEURISTIC APPROACH IN ASSESSMENT MODULE WITH ITERATIVE AND INCREMENTAL METHOD

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**Abstract** — In general programming learning system there should be a process of measurement. However, a common measurement process are still many shortcomings and the high level of fraud. So the measurement is not accurate and also there are absence of a continuous learning process. The research aims to develop a platform learning based on heuristic approach focussed on assessment module especially in programming algorithm course. This module used to measure a student's ability more accurately and it will be part of a heuristic based learning process. For this platform development, it will use iterative and incremental methodology. By using the learning platform, lecturer and student can joy experience learn programming algorithm with attractive course.

**Abstrak** — Pada pembelajaran pemrograman umumnya harus ada yang namanya proses pengukuran. Namun proses pengukuran yang biasa dilakukan masih ada banyak kekurangan dan tingginya tingkat kecurangan sehingga pengukuran tidak akurat dan juga tidak adanya continuous learning process. Pada penelitian ini akan menghadirkan platform berbasis pendekatan heuristic yang fokus pada modul assessment. Modul ini nantinya akan digunakan untuk mengukur kemampuan mahasiswa dengan lebih akurat yang akan menjadi bagian dari proses belajar berdasarkan heuristic. Pada proses pengembangan platform ini, metode yang digunakan adalah metode iterative dan incremental. Dengan menggunakan platform ini dosen dan mahasiswa dapat dengan mudah mempelajari pemrograman.

**Index Terms**— e-learning, platform learning, assessment, iterative and incremental

### I. INTRODUCTION

Computer science students are expected to be well familiar on programming skills. (Michael McCracken, 2001). But in fact, Programming algorithm is one skill that is difficult to learned. Some study shows that many of the student can not do a simple programming even they have passed their introductory course. From 216 students in 4 different university, the average of students only get 22.89 of 110 points in that test (Michael McCracken, 2001). In the other survey for 188 students in Telkom University, Information System major. The classification students who take algorithm course is 44 %. Many of student confused to answer the question as shown in Figure 1.

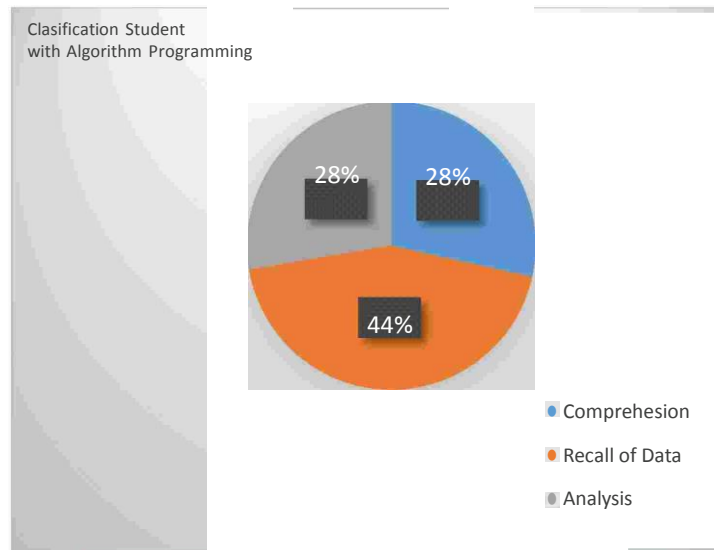


Figure 1.1 Chart of classification student

Ineffective of the current learning system is one of many causes to this issue. In an international survey that takes 500 students and lecturers shows many of student feels that learning by trying it by themselves and doing a course programming is more effective than learning in class (Essi Lahtinen, 2005). This clearly shows that student should try and explore by themselves to learning a programming.

To support the learning system, the assessment mechanism is also the important thing to support the learning system, because this mechanism is the core of the learning system (SR Hamidi, 2013). To assess student ability, usually lecturer gives the practical question of programming in quiz, homework or in practice lab (Kirsti Ala-Mutka, 2004). But in that type assessment, students can't see the result, they don't know about the right answer of the given question. That makes this type of assessment has no learning and improvement services (Hamidreza Mahroeian, 2013). According to Dirk Malzahn, the mechanism of assessment should provide the assessment status, learning and improvement services (Malzahn, 2009). In the lecturer side, the problem is about to get the valid result of the assessment. Because many fraud usually occurred during this common assessment method (Kirsti Ala-Mutka, 2004).

Based on the problem that has been mentioned above, author provide a solution to make a learning platform based on heuristic approach in the assessment module, that can provide the assessment status, learning and improvement services so the lecturers can easily measure the ability of their student and the student also easily evaluate their work.

## II. HEURISTIC METHOD AND ASSESSMENT

Heuristic learning method is a method that place the students as the inventor. It could make the students learn more than merely told a lot of things. In heuristic method, students will be placed ad an independent inventor. There are no assistance from the teachers. In this method, teachers will give a problem that will be solved by the students and the teachers will not involved themselves when the students seek for the answer from the problem.

By using heuristic learning method which is based on the important psychological principle of learning by doing, it may help the students to develop their research skills such as habits of neatness and patiently attending to details. Besides that, this method lays stress on individual practical work, careful observations and independent thinking which makes the students more reliant. Since this method lays stress on individual practical work which is pays more attention to skills than on knowledge. In consequence, heuristic learning method could lead to an imparity in learning since this method puts knowledge as secondary consideration.

Since the teachers are not involved when the students solve the problems, the teachers have to give appropriate problems to the students. Moreover, the teachers would be better give the students detailed

instructions sheets in order to give the students better understanding. Teachers also have to keep thinking about the age, ability, level of the students and existing facilities.

Assessment is a mechanism that used to quantify the ability of a person. With assessment, someone could know the level of their abilities. There are four types of assessment, formative, summative, adaptive, and diagnostic. Formative assessment is used to give feedback during the learning process. Summative assessment serves to quantify the achievements level, success, and performance of a person in the end of teaching process. Adaptive assessment has changed into progress from assessment themselves. And the last one is diagnostic assessment is the initial step of requirements identification, abilities or readiness of a person.

### III. RESEARCH METHODOLOGY

Iterative and incremental method is consists of two words namely: iterative is a step in the cycle of the overall system development and the results can contribute to the project construction scheduling strategy in which part of the system developed is done in time and the level' different. Incremental refers to the growth of the overall project and its results.

1. Inception phase  
This phase focuses on the initial creation of applications, publishes business background, draw up a business problem, identify critical risks, define the scope of the project to understand the problem, and make the documents that describe the business problems encountered
2. Elaboration phase.  
This phase focuses on the manufacture of high-level analysis and design, publishers basic architecture for projects, making the construction plan that supports the achievement of project objectives.
3. Construction phase  
This phase focuses on developing software that is progressive to produce prototype or software products.
4. Transition phase  
This phase focus on the introducing the products to the user, completing beta testing, complete the performance tuning, training for users, and user acceptance testing.

The advantages of iterative and incremental methods are as follows:

- Accommodating if there is a change at this stage of development that have been implemented
- Adjust so that the system can be used during the life of the computer software
- Suitable for system development and large-scale software.
- Developers and users can more easily understand and react to the risk of each stage because the system continues to work during the process.
- Easy to find fault.

The resulting system is more satisfying

### IV. SYSTEM ANALYSIS AND DESIGN

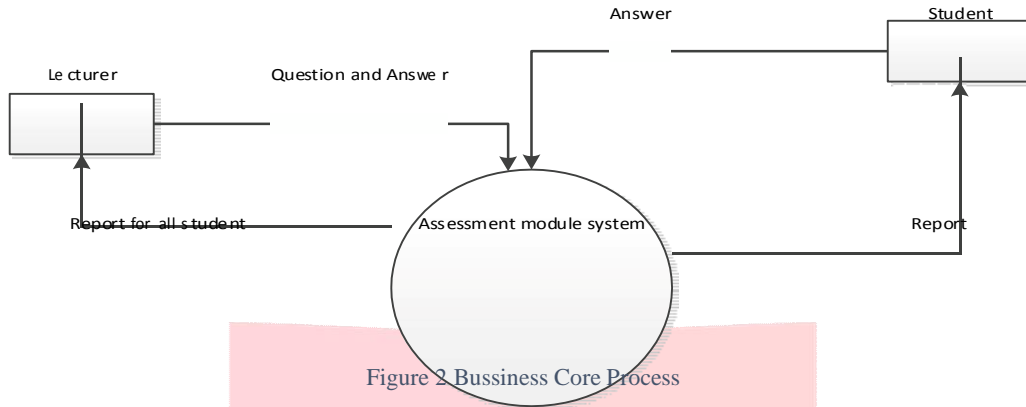
#### A. Functional Requirements

These are the 3 main feature of programming learning platform in assessment module :

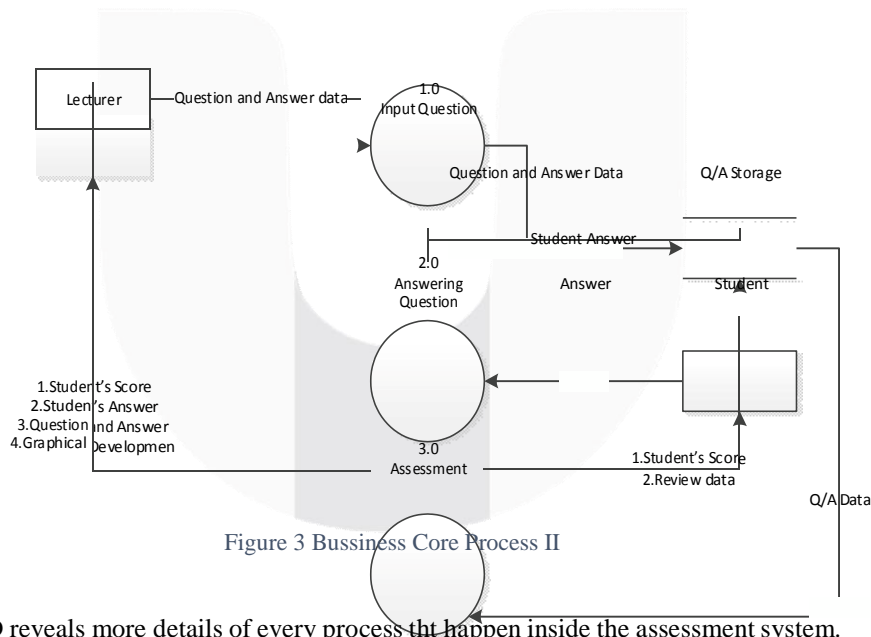
1. Add assessment question.  
Lecturer can add assessment question in course material in this platform.the question divided in three types first is rearrange. In matchmaking, student should arrange the correct answer to question. The answer is provided like multiple choice. The second is live code, in live code the student should code into the right expected output and compile by the platform itself. Third is rearrange, in this type student should arrange to the correct way to get the right answer.
2. Reporting detail.  
Lecturer and Student can able to show reporting result of reporting details. The details is including the progress of the student development such as showing the previous and current ability of student.
3. Assessment review  
This feature can make student know where they are going wrong. It shows their answer and the

right answer also their point and their result of that assessment.

B. Core Business Processes



The level 0 DFD only show the core process that running in the system. It shows the process of assessment system.



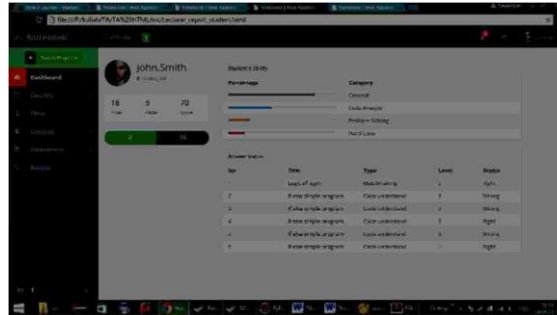
The level 1 DFD reveals more details of every process that happen inside the assessment system.

C. Application and Technology Architecture

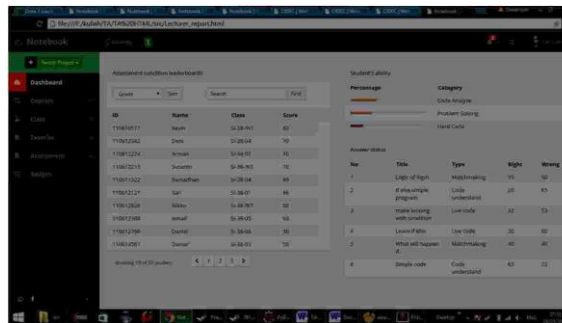
This application is implemented using a client-server system where the Application, MySQL and the java jdk is installed in the server. Applications can be accessed via client computer. Jdk is for compile the live code

D. Result of Application

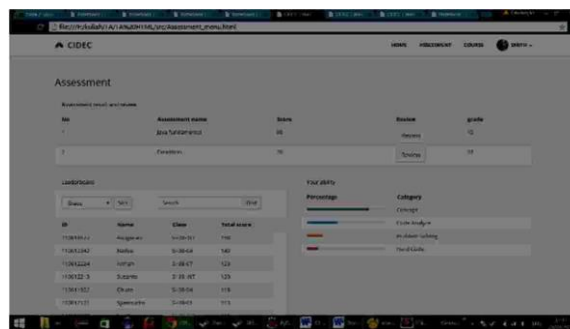
The UI of assessment module will be show by the figures below.



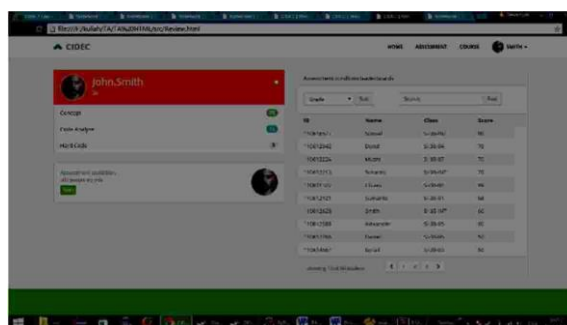
Reporting detail on student. By lecturer.



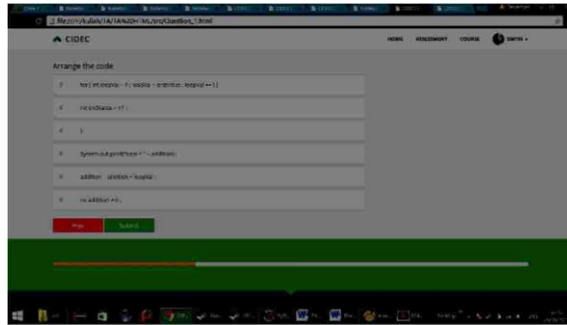
Reporting status Assessment



Student assessment menu



Student review assessment



Rearrange student assessment

V. IMPLEMENTATION AND TESTING

No	Test	Expected Result	Result
1	Add Assessment Question	Question added to question bank	Passed
2	Preview Question	Lecturer can view their question	Passed
3	View the student's report	View the student reporting	Passed
4	Answering the question	Student can answer the question	Passed
5	Review of question	Show the question, right answer and student answer	Passed
6	Scoring	Show score of student	Passed

VI. CONCLUSION

The conclusion for this research is :

1. This platform will help the lecturer to measure the ability of their student by seeing the reporting result of the assessment. Lecturer will know what their student answers are and what the right answers are so the lecturer know what their student can do and what they can't do.
2. For student this platform helps their learning process by providing continuous learning and improvement because this platform has review function to help them get through that.

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