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The Use of Robomind Application in Problem Based Learning Model to Enhance Student's Understanding in the Conceptual Programming Algorithm

Anggun Nofitasari

Informatics Education Department, Faculty of Teacher Training and Education, Sebelas Maret University

anggunnofitasari@gmail.com

Rosihan Ari Yuana

Informatics Education Department,Faculty of Teacher Training and Education,Sebelas Maret University

Dwi Maryono

Informatics Education Department, Faculty of Teacher Training and Education,Sebelas Maret University

Abstract:

The purpose of this research was to improve understanding of basic programming algorithms concept of class X TKJ 1 SMK N 1 Banyudono on Basic Programming lesson using robomind application through Problem Based Learning model. This research was a Classroom Action Research, with research subjects were 33 students of class X TKJ 1 SMK N 1 Banyudono. This research was started by identifying the problems occured in the classroom. Then, we designed actions to solve the problem in a cycle of actions. In this research, the actions were done in two cycles. Each cycle consists of planning, implementation, observation and reflection. Data was collected by observation of the learning activities in the classroom and comprehension tests after each cycle. Analysis of the data was performed using quantitative and qualitative analysis interactive technique. The results showed that the implementation of the Problem Based Learning model using media assistance robomind applications could enhance students' understanding of the program algorithm. It is shown by the completeness of comprehension tests on pre-cycle 37.5%, 44.8% in the first cycle, and 93.3% in the second cycle.

Keywords: classroom action research, understanding of basic programming algorithms concept,problem based learning, robomind.

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Introduction

According to the observation conducted during the learning process in the classroom of the Basic Programming X TKJ 1 teacher teached the demonstration model. Teachers demonstrating how the work of a program, then the teacher asks the students to try to write a program that is in the guide books, into the framework Free Pascal. Furthermore Teachers guide the students in an error due to a typing error. After all the students had finished working, then the teacher explained the flow course of the program. From the students' learning process is merely directed typing program code and less stressed understand the algorithm completion of the program, so that most students do not understand about the flow or measures of completion of a program or programs known as algorithms. Meanwhile, according to Susanta (2014) designed a program algorithm is one of the early stages that must be taken in order to define the detailed steps and is structured to facilitate the completion of a program. In other words, the program algorithm is the basic understanding that needs to be built first before the students start typing or create program code. When students do not understand about the program algorithm then students will find it hard to make the program different from the one exemplified teachers.

The results of the evaluation of learning the basic concepts of algorithm Pascal programs in the Middle Deuteronomy Semester (UTS) showed that, of the 33 students who work on the problems a number of 16 students passed and who have not passed as many as 17 students, if dipersentase the number of students who graduated reached 51.5% and who have not passed 48.5%. From these results, it is known that the students' understanding of the material previously taught still low.

Based on these problems, the authors analyze that required specific actions that could be a solution to enhance students' understanding of the basic concepts of programming algorithms. Efforts are being made is to wrap the learning model that can train and develop students' ability to solve the problem of problem-oriented authentic, which in this study a problem that the intent is to develop programming algorithm to create a computer program and learning model that can facilitate it is problem Based Learning. As a supporter of the media used robomind as interesting applications and can visualize the problems encountered in the program and to facilitate the teacher explains the basic concepts of programming. In this study the basic concepts of programming is limited to the control structure branching 1 conditions, 2 conditions and more than two conditions.

The goal in this classroom action research is the growing understanding of the basic concepts of programming algorithms class X TKJ SMK Negeri 1 Basic Programming Banyudono on learning through learning model Problem Based Learning to use the Robomind media applications.

Literature Review

Robomind Application as a Media in Education

Criticos, 1996 in Daryanto (2012) mentions that the media is a communication component that acts as a messenger from the communicator to the communicant.

Robomind application is a simple programming that is usually used in an educational environment with its own scripting language that allows beginners to learn the basics of computer science by programming the robot simulation. Environment simulation on robomind constructed as robots are in a world which is then called a folder. The folder is two-dimensional shape and become a robot to move, these folders conditions encountered visualize a program, for example the condition that there is a barrier in front of the robot and so on. Robomind uses a basic scripting language that consists of a concise set of rules. The advantages of robomind is using its own scripting language that is easily understood even by a novice programmer, does not interfere with the computer system, is freeware, can be run on the operating system Windows, Linux, and Mac OSX, and simulated robot is very interactive (robomind Learning Programming, 2011).

With the characteristics and advantages, robomind often used as a means of research related to computer science. One is the research conducted by Kurniawati (2010), this study concentrates on the study of comparative analysis of the use of a new medium for learning courses Programming Algorithms and Data Structures using game-based learning tools that already exist. The results showed that the appropriate tools to increase programming skills competency is Scratcth, Alice and robomind. From this research it is known that the tools used to train robomind suitable programming concepts in the form of a sequence (squence), the screening conditions, repetition (looping) and procedures. In addition, research conducted by Kochakornjarupong (2010) mentions that in learning the basics of computers developed artificial intelligence to learn to make them KERMIT ER Diagram, CeeBot to learn C ++ and robomind to the basics of programming. Duenpen Kochakornjarupong mention that robomind suitable for learning the basics pemrorgaman. These applications have been tested on 111 students and showed an increase in good performance.

Problem Based Learning (PBL) Learning Model

According to Mulyatiningsih (2010), "Problem-based learning is an instructional delivery is done by presenting a problem, ask questions, facilitating the investigation and open a dialogue". Margeston in a book written Rusman (2014) suggested that the problem-based learning can help improve the development of learning skills in a mindset that is open, reflective, critical, and active learning.

The learning model Problem-Based Learning (PBL) by Ning (2014), and Rusman (2014), which take the conclusion quote from Ibrahim and Nur said steps PBL as follows.

• Orientation of students to the problem;

• Organizing learners;

• Guiding the investigation of individuals and groups;

• Develop and present the results of the work;

• Analyze and evaluate the problem-solving process;

One of the studies that utilize PBL is research by Muhson (2009), applying the learning model Problem-Based Learning has proven to improve student learning and understanding in learning Advanced Statistics.

Research Method

This type of research is the Classroom Action Research (PTK) with the subjects in this study were students of class X TKJ 1 SMK Negeri Banyudono. Sources of data obtained from informants, places, events and behaviors as well as documents. Data collected through observation, testing and analysis of documents. To prove the correctness of the data obtained, then the researchers to test the validity of the data with the test data triangulated. Researchers involved viewpoints of teachers and participants who help monitor the implementation of learning conformance with the RPP and the learning atmosphere in the classroom. In this study, the type of data to be analyzed is qualitative data include the results of observation, while quantitative data that student test results. For qualitative data were analyzed using an interactive model, while the quantitative data were analyzed descriptively. The performance indicators of this research is an increase in students' understanding of the concept of programming on the control structure of the branching condition of up to 75% of students who take the test otherwise completed. Yardstick completeness students adjusted to the minimum completeness criteria (KKM) schools established for subjects based on the Basic Programming Permendikbud 104 2014 article 9 which is 2.67 for the maximum assessment scale 0 - 4. So the students declared complete when the gain value ≥ 67.

Literature Review

Pre-Action Description

From the observations that have been made, the data showed that the learning process that takes place in the classroom less emphasis on algorithms completion of a program, the atmosphere built when

learning basic programming is student predominant type programs and less stressed to understand the algorithm the completion of the program, leading to the understanding of the concept basic program algorithm is not optimal.

Pre-Action tests done to measure student understanding before action is taken and the data obtained from the 32 students who work on the problems, completeness achieved by 37.5% (12 students), while students who did not complete a 62.5% (20 students). For more details, the percentage of completeness pratindakan presented in Figure 1 below:

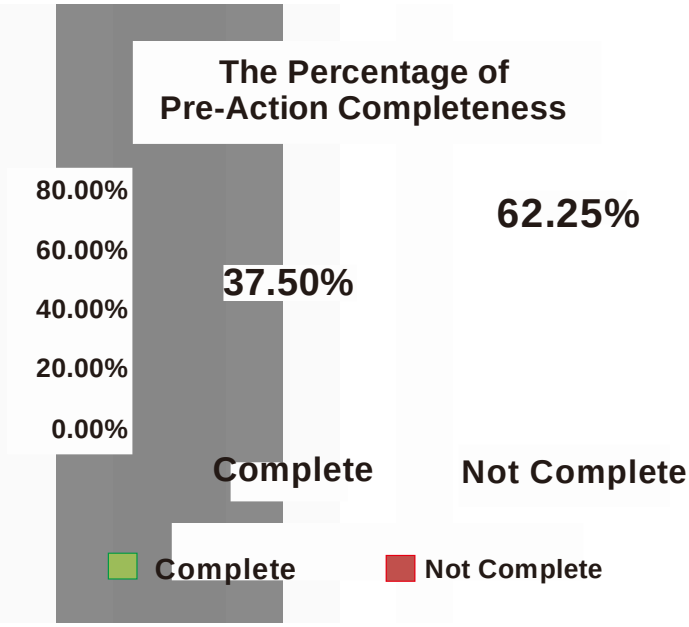

Figure 1. The Percentage of Pre-Action Completeness

Description of the Actions in the First Cycle

Research conducted in the first cycle of Basic Programming with learning materials Branching Control Structure and Condition 2 Condition 1, the first cycle of four meetings. First cycle begins with the stages of planning, things are prepared include, (1) equate the perception of the problems that need to be in the classroom that is the level of understanding of the algorithm of the program students are still low, (2) introducing the application robomind and measures model of Problem Based Learning , (3) planning research schedule and prepare research instruments include, syllabus, lesson plan (RPP), learning materials, student worksheets, evaluation questions and a record sheet specifically to monitor the suitability of the course learning with lesson plans, (4) Installation of applications robomind. The next phase of implementation of the action as planned, then the learning takes place with preliminary activity includes open learning, praying, preparing media, provide motivation, apresepsi, deliver the learning objectives and scope of learning. Continued core activities include planting understanding of the concept of branching control 1 and 2 state conditions using robomind application, orient students on issues faced the default folder in the application robomind, then Master provides worksheets to facilitate students conduct an investigation to find the steps that students can move to follow the line. The default folder is presented in Figure 2 below.

Figure 2. The Default Map

The teacher, then, asks the class representatives presented the results of their work, then teachers guide students to change the algorithms they have made into robomind script. Furthermore Teachers guide students to conclude writing branching control structures 1 and 2 state conditions. Deepening of the material is done, by creating algorithms in the computer program using Pascal language. Teachers back orient students to the issues facing the computer program completion using branching control structures 1 and 2 state conditions. The investigation process is facilitated students using student worksheets. The teacher again asked the students to present their work, then teachers guide students to convert the algorithms they have made into the Pascal language in the framework Free Pascal. Further tests to measure student understanding after the cycle action I. From the observations that have been made of the obtained test data comprehension on the first cycle shows the number of students who meet the KKM number of 13 students and who have not met KKM number of 16 students. Percentage of completeness value reached 44.8% and unresolved as much as 55.2%. The lowest value was 40 and the highest 75. Percentage of completeness of classical comprehension tests after the first cycle of the action shown in Figure 3 below:

Stages continues on reflection with the results include:

1. Robomind media applications can attract all the attention of students to listening to the teacher's explanation about the picture of the condition of a program.

2. Learning takes place in class and the number of computers is inadequate.

3. Students who do not operate the computer directly tend to be unfocused and lackluster during the learning.

4. During the training process find steps to resolve the program facilitated through student worksheets, there are obstacles that most students have not been fully able to find the pace well completion program.

5. Although seen an increase, but these results have not reached the target that 75% of students declared complete

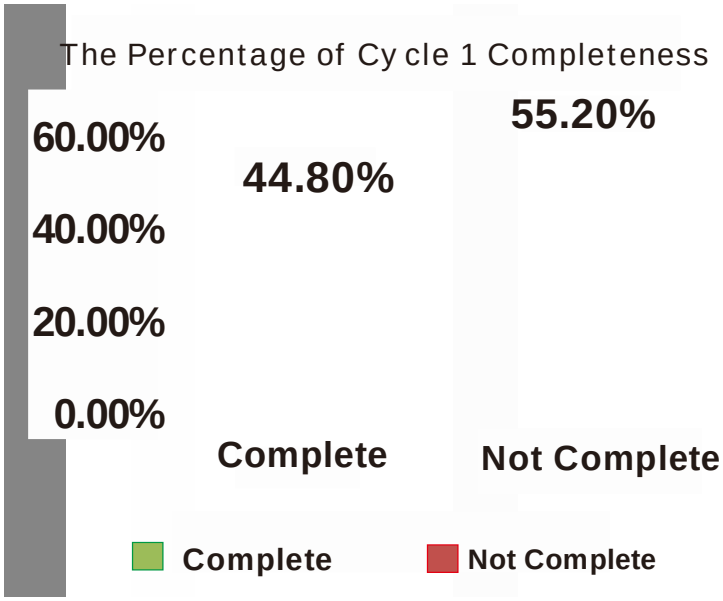

Figure 3. The Percentage of Cycle 1 Completeness.

The Improvement Efforts

1. Getting the next meeting could take place in the computer lab so that each student can operate a computer.
2. Perform repairs on a worksheet. The process of training the students are divided into two phases, the first in a worksheet made steps to resolve the program in detail, but is not yet complete. Students are required to complete these steps. In the second stage, students asked to find their own steps to resolve a program.

Description of the Actions in the Second Cycle

Based on the results of action taken in the first cycle, it is necessary to repair the second cycle. Action planning and improvement efforts in the second cycle is done based on the advice presented in part reflecting the results of learning materials I. cycle action is a continuation of the material in the first cycle of the control structure of branching of more than 2 conditions. Cycle II held three meetings. Cycle II begins with the planning stage, things are prepared include, (1) to strive so that every student can operate the computer so that each student acquire the same learning experience. The solution found is learning to be done in the computer laboratory, (2) prepare a lesson plan (RPP), (3) improve student worksheets, making it more detailed and detail. The next phase of implementation of the action as planned, then the learning computer lab, with preliminary activity includes open learning, praying, preparing media, provide motivation, apresepsi, deliver the learning objectives and scope of learning. Continued core activities starting with discussion of the test after the first cycle of action, this is done to establish a more mature understanding of the structure of the branching control 1 and 2 state conditions. After the activity continued with the planting of understanding of the concept of control branching more than two conditions using the application robomind, if the first cycle is used default folder then in the second cycle Master orient students on the problems faced in the follow-line folder in the application robomind, then Master provides worksheets for facilitating students conduct an investigation to find the steps that students can move to follow the line. Follow online map presented in Figure 4 below:

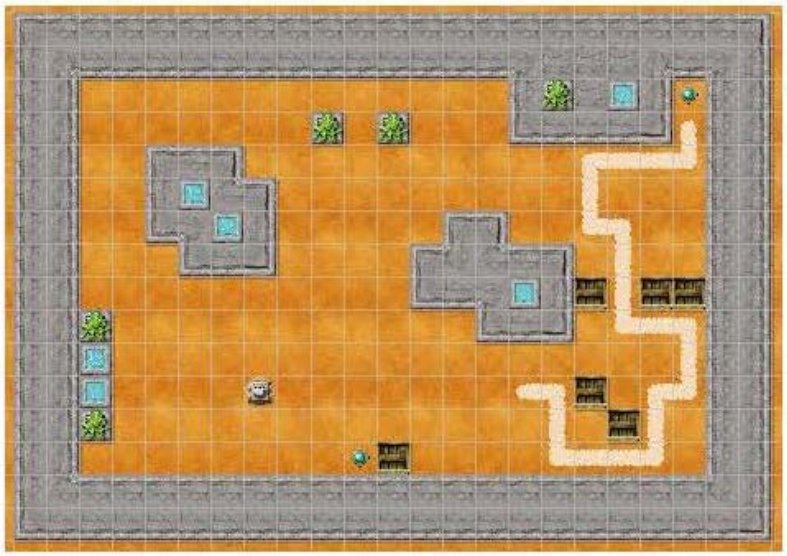

Figure 4. Follow Line Maps

In the discovery process steps to resolve the hiatus created folder worksheet, students contribute to complete these steps. After the teacher asks the students deliver the their work through the process of debriefing, teacher appreciation to students who dare to raise their hands and deliver work. Furthermore Teachers guide students to conclude the writing of a control structure over the 2 conditions. Deepening of the material is done, by creating algorithms in the computer program using Pascal language. Teachers back orient students to the issues facing the computer program which resolutions using the control structure over the 2 conditions. The investigation process is facilitated students using student worksheets through two stages. The first stage presented steps to resolve the programs are still gaps, and then ask the student completes the algorithm. In the second phase the students look for the full completion of the program measures. Furthermore deliver the teacher asks the students they work through the process of debriefing. After that, teachers guide students to make the program using the Pascal language in the framework Free Pascal. Further tests to measure student understanding after the second cycle. From the observations that have been made of the obtained test data comprehension on the second cycle showed a very significant increase, from 30 students following the evaluation of the number of students who meet the KKM as many as 28 students and who have not met KKM number of 2 students. So if in the percentage of the value of completeness reached 93.3% and unresolved as much as 6.7%. The lowest value was 50 and the highest 90. Percentage ketuntasa classical comprehension tests after the second cycle shown in Figure 5 below:

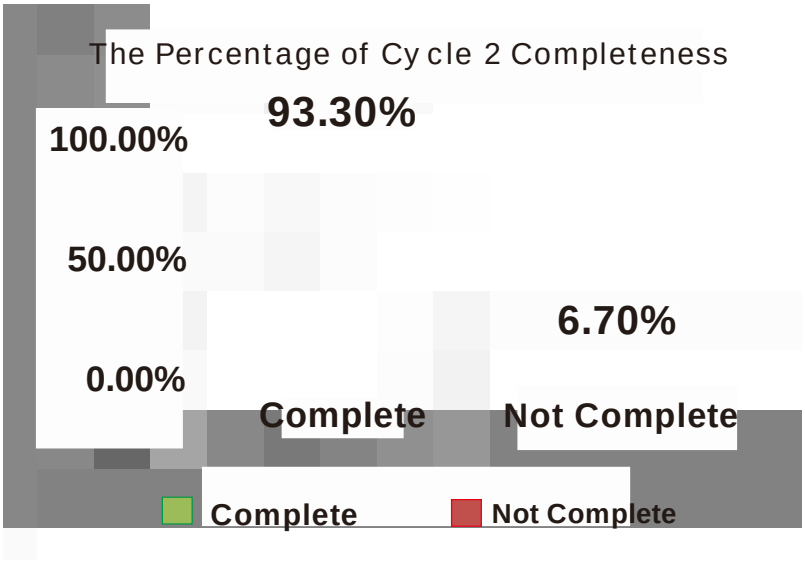

Figure 5. The Second Cycle Completeness

Stages continues on reflection with the following results:

1. All the students operate the computer itself, so that each student's learning experience has particularly made a program on Free Pascal, learn to find errors in programs (debugging) and learn to cope with program error. In the more conducive athmosphere, students focus more and more excited about accomplishing program.
2. Improvements in student worksheets positive impact on the smooth learning, most students can complete the steps to resolve the program properly.
3. The classroom athmosphere came alive for students more actively discuss and help each other trouble completing the program.
4. Increase the understanding reached the target of 75% of the total number of students declared complete. The action was terminated.
5. Application of Problem Based Learning model of learning using media assistance robomind application in the second cycle can enhance students' understanding of the program algorithm.

Comparison of Outcome Measured between Cycles

The comparison of the results of the action on the pre-cycle, the first cycle and the second cycle in Table 1 and Figure 6.

Table 1. The Cross Cycle Comparison of Student's Comprehension

Description	Pre-Cycle	First Cycle	Second Cycle
Score ≥ 67	12	13	28
Score < 67	20	16	2
Class Completeness (%)	37,5	44,8	93,3
In-Completeness	62,5	55,2	6,7

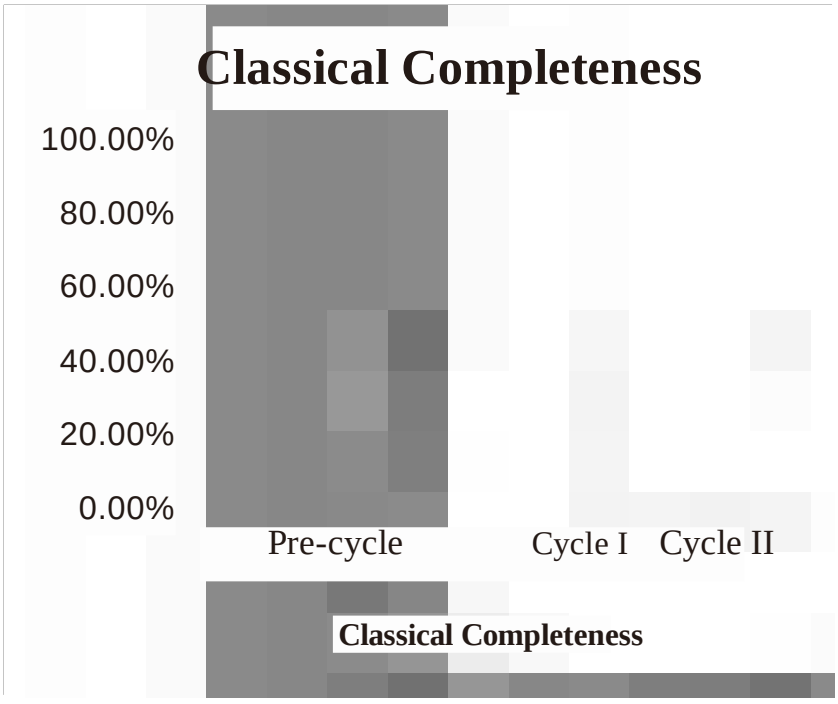

Figure 6. The Completeness of Individual Cycle

Discussion

Results of the evaluation showed completeness klasikan prasiklus achieved by 37.5%, then after the action on the first cycle classical completeness increased by 7.3% and reached 44.8% classical completeness. The results of the reflections made in the first cycle be used as a basis for consideration to make improvements in the second cycle, and the result is increased very significantly, by 48.5% and reached 93.3% klasikan completeness. Because classical completeness achievements already reached the target that 75% of the number of students then the action will be terminated.

Findings

One function of the media in the learning process according to Daryanto (2012) was able to obtain a clear picture of objects or things that are difficult to see directly. This is also reflected in this study. Media applications robomind used at the first meeting and the second in each cycle, teachers use the media robomind application to help illustrate the condition in a program of events.

At the time of granting cycle I, when I started practicing solve the problem in a program with the Pascal language, most students have not been able to find work steps solving problems in the program. Based on the results of the reflection this has happened because of worksheets sisiwa used to lure students to find steps to resolve the problem created is global. Yet according Susanta (2014) to complete a program after analyzing the issue stage to do is find the idea of dispute resolution procedures and declare completion program is structured and detailed steps. When the process is the search algorithms are not going well then it makes it difficult to establish their understanding of problem solving in the program, causing the purpose of the study in the first cycle can not be achieved optimally. as a solution then do repairs on a survey of individuals through improved coaching worksheet.

In the second cycle students in the investigation process of finding algorithm designed program in two sessions complement steps to resolve the matter and seek an overall settlement program steps. As described Nana Sujdana (1995) that the capability of understanding in learning include: (1) students can explain back on what they read or heard about the construction of a sentence itself, (2) the students can give other examples besides the mentioned teachers, and (3) students can use the manual application in other cases. Action is given on the second cycle this is one way shape formation Nana Sujdana understanding submitted on the application using the instructions for completing the different cases.

Concluding Remark

Conclusion

The use of Problem Based Learning model of learning by using media robomind applications to enhance understanding the basic concepts of programming algorithm to increase the percentage of students demonstrated mastery of students from 37.5% to 44.8% in the first cycle, and completeness reached 93.3% in the second cycle.

Suggestion

1. In carrying out the study using Problem Based Learning method Teachers are expected to be familiar with the capabilities and characteristics of students. This is necessary so that the teacher can menyesuaiakan difficulty level of the problems given to students by their ability to solve the problem.
2. Teachers are expected to be more observant in making observations during a student trying to solve the problems given. When there are signs that students are completely unable to solve the problem then, teachers need to enhance the role of guidance on the investigation of students. Teachers continue to motivate and engage students find problem-solvingItem 1

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