The Effectiveness of Robomind Software in Basic Programming Learning.

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Abstract:

This research aim to find out: (1) the differences of cognitive abilities of students who learn using media software RoboMind and students who learn without using media software RoboMind in learning basic programming, (2) the used of media software RoboMind in learning basic programming is more effective than without used media software RoboMind to improve cognitive ability of first grade students. This research used quasi experimental approach with Pretest Posttest Control Group Design. This research was conducted at SMK Negeri 7 Surakarta. The population of this research were all students of first grade students in Multimedia Study Program at SMK N 7 Surakarta. Based on the result of this research can be concluded that: (1) there was difference of cognitive abilities of students who learn using media software RoboMind and students who learn without used media software in learning basic programming (tcount: 2,085 > ttable: 1,99962). (2) the use of media software RoboMind in learning basic programming is more effective than without used media software RoboMind to improve cognitive ability of first grade students at SMK Negeri 7 Surakarta (tcount: 3,517 > ttable: 1,99962).

Keywords: Effectiveness, Learning Media, Robomind, Basic Programming, Cognitive Ability, Normalized Gain

Introduction

SMK Negeri 7 Surakarta is one that has a vocational skill package Multimedia (MM). One of the subjects on the package that supports multimedia expertise to produce graduates who meet the competencies required by the world of work is a Basic Programming. problems faced by teachers in the basic programming learning is the poor ability on the cognitive aspects (cognitive ability) students. This is because students have difficulties in understanding the programming concepts that have not been able to master the material well. Tenth grade students who are beginners or just learning programming, still new and unfamiliar in terms of coding. Additionally, programming is abstract also appears to be one of the causes of programming is considered difficult for them. In order to facilitate the achievement of the purposes of conducting education in schools, especially in the learning process required an intermediary media that can be used to deliver the message, stimulating thoughts, feelings, and the willingness of students. Media intermediary is none other than the medium of learning. Creative use of the media will allow students to learn better and can improve their performance in accordance with the objectives to be achieved (Suyanto & Jihad, 2013: 107).

In Yuana research and Maryono (2016) explained that robomind software is one of the PAT (Programming Assistance Tool) which is used as a tool to learn programming and improve understanding of programming concepts, as well as improving the ability of logical thinking and problem solving. The advantage of robomind compared to other PAT is simple and attractive graphical display. Robomind can be used for students from elementary schools, secondary schools and further education. In addition to the design and features, robomind also have to meet the concept of learning theory Robert Gagne.

The goal in this study were (1) to determine differences in cognitive abilities of students who take the learning to use the software media robomind compared with the following study without using software media robomind on subjects Multimedia Programming Basic membership package at SMK Negeri 7 Surakarta. (2) the use of media software robomind on learning the Basic programming more effective than without using software media robomind to improve cognitive skills class X package Multimedia expertise at SMK Negeri 7 Surakarta.

Subjects of basic programming is one of the subjects that loss is among the group of basic subjects areas of expertise or C1.

Cognitive abilities with regard to the learning outcomes of intellectual or behavioral changes that occur in the realm of cognition (Purwanto, 2014). Sudjana (2009) suggested that the national education system formulation of educational goals, objectives both curricular and instructional purposes, using the classification of the learning outcomes of Benjamin Bloom, later known as Bloom's taxonomy. Learning at SMK Negeri 7 Surakarta using curriculum 2013, which refers to the application revision of Bloom's taxonomy. Classification of cognitive abilities according to Bloom's Taxonomy of cognitive revised Anderson and Krathwohl namely: remember (remember), comprehend / understand (understand), implement (apply), analysis (analyze), evaluated (Evaluate), and create (create).

Sadiman Arief S., et al (1993), said that "the media is anything that can be used to deliver a message from the sender to the receiver so that it can stimulate the mind, feelings, concerns, and interests as well as the student's attention such that the learning process occurs".

Learning media is very diverse; the media can be in the form of electronic tools, pictures, books, and so forth.

Based on research conducted by Melisa Koorsse et al (2010), which discusses some of the software that can be used as tools (media) to endorse the teaching and introduce programming, one of which is a software robomind.
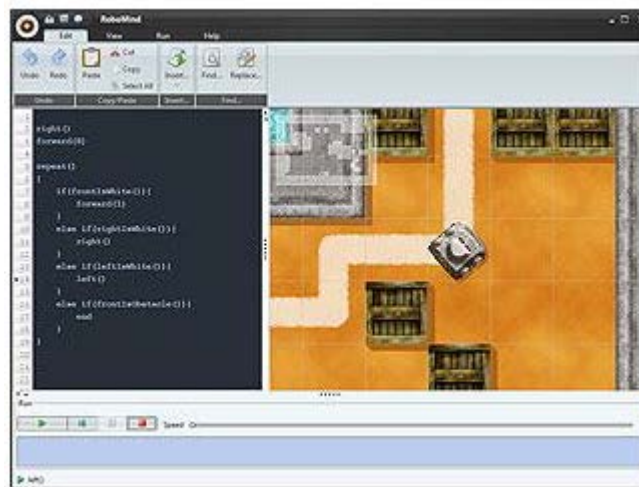
Figure 1. Robomind User Interface

The effectiveness of the use of software as a learning medium robomind means how the success rate of software as a learning medium robomind achieve the learning objectives. The learning objectives in question is the result of tests of cognitive ability are achieved by students on the subjects of basic programming. Media can be considered effective if it can improve the expected learning outcomes achieved well.

Research Methods

This type of method used in this study is a quasi-experimental or quasi-experimental design. The experimental design used in this study is a pretest posttest control group design. In this study, subjects were divided into two groups: the experimental group and the control group. Treatment or treatment will be given to the experimental group that is with the use of learning media in the form of software robomind while the control group without the use of instructional media robomind software.

The population in this study were all students of class X packages expertise Multimedia (MM) at SMK Negeri 7 Surakarta in the second semester of the 2015/2016 academic year. The total number of class X Multimedia membership packages at the school are three classes with a total population of 96 students. Based on random sampling is obtained class X MM 2 as an experimental class with the number of students 32 and class X MM 3 as the control class with the number of students 31 people.

Data collected by the test that aims to measure students' cognitive abilities through pretest and posttest given to both classes. Tests are prepared in accordance grating then before using this test tested first using validity and reliability test. After the data collected from the data collected in the study, then performed the data processing or analysis of data to prove the truth of the hypothesis. Data analysis performed in this study that is testing requirements analysis in the form of test data normality and homogeneity of data; balance test, and hypothesis testing using t-test and posttest results of t-test gain normalized.

Results And Discussion

Description Data Research

Research data is the data value of the pretest and posttest in the experimental class and control class. To determine the initial state students' cognitive abilities either the experimental class and the control class then performed a pretest. Data values student pretest results obtained before students are treated. The researcher also did calculations to determine

improved cognitive ability that occurs by formula normalized gain. The results of statistical calculations of research data are shown in the following table.

Table 1. Summary of the Statistical Data

Calculation Result	Mean	
	Experiment Class	**Control Class**
Pre-Test	58,68	58,42
Post – Test	72,05	66,85
Normalized Gain	0,34	0,21

Based on Table 1 above shows that the average value pretest experimental class and control class is almost the same, or similar, can be defined initial state students' cognitive abilities before being given the treatment in the second grade is the same. The average value posttest experimental class looks higher than the average value of the control class. When viewed from the average value of pretest and posttest both the experimental class and control class showed an increase. According to the table 1 is also known to the average value of the gain is normalized by the students in the experimental class at 0:34 the middle category while the control class is 0:21 which is at the low category. It shows that the performance improvement that occurred in the experimental class is higher than the control class.

Requirements Analysis Test Results

Normality test

Before testing the hypothesis, to know that the data will be analyzed normal distribution or not the test is conducted prior data normality. Test for normality using the Kolmogorov-Smirnov test at a significance level of 5% with SPSS 22 for Windows. If the P value of the significant value of Kolmogorov-Smirnov > α (0.05), the distribution of data is the result of normalBerikui data normality test the experimental class and control class.

Table 2. Results of Research Data Normality Test

Data	P (Sig.)	Conclusion
Experiment Class Pre – Test	0,156	Normal
Experiment Class Post-Test	0,065	Normal
Experiment Class Gain Index	0,160	Normal
Control Class Pre – Test	0,059	Normal
Control Class Post-Test	0,129	Normal
Control Class Gain Index	0,200	Normal

In Table 2 that all research data is good value pretest, posttest and the index value of the gain in each group had a P value of more than α (0.05). Thus the data is normally distributed.

Homogeneity test

Homogeneity test is performed to determine whether the data from each sample group have the same or different variance using Levene test with SPSS 22 for Windows. If the significance of the test results of more than α (0.05) then the data can be said to be homogeneous. Results of homogeneity test data can be seen in the table below.

Table 3. Data Homogeneity Test Results

Data	Lavene Statistic	P (Sig.)	Conclusion
Pre – Test	0,167	0,068	Homogeneous
Post-Test	1,340	0,252	Homogeneous
Gain Index	1,882	0,175	Homogeneous

Based on Table 3 above it can be seen that the results of good research data homogeneity test of the pretest, posttest and the results have nlai index gain more significance than 0.05. It shows that the research data meet the assumption of homogeneity is derived from populations having the same variance (homogeneous).

Balance Test Results

The test is intended to determine the state of early cognitive abilities of students in the two groups before treatment is given. Previous data has met the assumptions of normal distribution and homogeneous then the data were analyzed using t-test with SPSS 22 for Windows, with a significance level of 5%. Data t-test results pretest control class and experimental class can be seen in below.

Table 4. Results of t-test Pretest Data

t_{hitung}	t table	Conclusion
-0,105	1,99962	H_o accepted

According to the table above 4 t value obtained is -0.105 while the value t table for df by 61 is 1.99962. Because the t value is smaller than t table so it can be said that there are no differences in results between the pretest students significant control class with a class experiment. That means the initial state of the experimental class and control student before being treated have the same cognitive abilities.

Hypothesis Test Results

T-test results posttest

The tests are conducted to determine whether there are significant differences between the value posttest experimental class and control class that shows the differences in students' cognitive abilities after being given a different treatment in each class. The results of the t-test posttest data is shown in the table below.

Table 5. Results of t-Test posttest data

t_{hitung}	t table	Conclusion
2,085	1,99962	H_o rejected

Based on the above table 5 it can be seen that the t value obtained was 2.085 while t table for df by 61 is 1.99962. Because the value of t is greater than t table so it can be said that there are differences in student posttest results significantly between control and experimental class class. That means there are differences in cognitive abilities of students who take learning by using media software and the following study robomind without using software media robomind on the subjects of class X Basic Programming Multimedia packages expertise in SMK Negeri 7 Surakarta.

Test-t Index Gain

Testing gain index data was conducted to determine the effectiveness of learning by using media software robomind the experimental class and learning without media software robomind the control class. Gain index data obtained from the formula shows the normalized gain improved understanding or mastery of concepts students after learning process. Further testing using t-test to find out if there really is a difference in students' cognitive abilities increase significantly in the experimental class and class. The results of the t-test data is normalized to determine the gain increase students' cognitive abilities may be seen in the table below.

Table 6. Results of t-Test Data Index Gain

t_{hitung}	t table	Conclusion
3,517	1,99962	H_o rejected

Based on Table 6 above it can be seen that the t value obtained was 3.517 while t table for df by 61 is 1.99962. Because the value of t is greater than t table, so it can be concluded that the average gain index data for the experimental class is greater than the control class significantly. It means learning by using

media software robomind more effective than learning without using software media robomind in improving the cognitive abilities of students.

Discussion

Based on the results of students' cognitive ability differences shown by the average value obtained from the experimental class posttest that is equal to 72.05, while the average acquisition value posttest in control class is 66.85. Based on the average value of the posttest shows that the cognitive abilities of students in the experimental class is higher than the control class. Differences in cognitive abilities students' final results after receiving treatment is also confirmed by the results of the posttest data analysis using t-test with SPSS 22 for Windows. T value obtained was 2.085 while t table for df by 61 is 1.99962. Based on the calculation shows that the value t is greater than t table so it can be concluded that there are differences in student posttest results significantly between control class with a class experiment. That means there are differences in cognitive abilities of students who take learning by using media software and the following study robomind without using software media robomind on the subjects of class X Basic Programming Multimedia packages expertise in SMK Negeri 7 Surakarta. It is relevant to research conducted Arik Kurniati (2010) with respect to the use of learning-based game with a tool (media) in college programming algorithm, Arik Kurniati melakaukan study comparative analysis of the three tools (media) that robomind, Scratch, and Alice tested against a number of students to assist in understanding the course material programming algorithms. From these results it can be seen that robomind can be used to understand the concept of programming in the form of a sequence (squence), the screening conditions, repetition (looping) and procedures.

Based on the average value of pretest and posttest there is an increase in students' cognitive abilities were seen in kotrol class and experimental class. Results pretest experimental class has an average of 57.99 and posttest results with an average of 72.05. This shows that the experimental class increased average value of 20%. In the control group, the average value of 58.24 pretest and posttest average value of 66.85. This shows that the experimental class increased average value of 13%. Based on the percentage increase in the average value obtained, it can be said that the improvement of cognitive abilities of students in the experimental class is higher than the control class. It is also strengthened by the results of data analysis obtained the index gain. The gain is the difference between the posttest and pretest to determine the effectiveness of the increase which indicates improved understanding or mastery of concepts students after learning process. In this study, an increase in control class with a class experiment. That means there are differences in cognitive abilities of students who take learning by using media software and the following study robomind without using software media robomind on the subjects of class X Basic Programming Multimedia packages expertise in SMK Negeri 7 Surakarta. It is relevant to research conducted Arik Kurniati (2010) with respect to the use of learning-based game with a tool (media) in college programming algorithm, Arik Kurniati melakaukan study comparative analysis of the three tools (media) that robomind, Scratch, and Alice tested against a number of students to assist in understanding the course material programming algorithms. From these results it can be seen that robomind can be used to understand the concept of programming in the form of a sequence (squence), the screening conditions, repetition (looping) and procedures.

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of t is greater than t table, so it can be concluded that the average -rata gain index data on experimental class is higher than the control group significantly. This means that the use of media software robomind on learning the Basic programming more effective than without using software media robomind to improve cognitive skills class X package Multimedia expertise at SMK Negeri 7 Surakarta.

The results generally in line with the opinion of Suyanto and Jihad (2013: 107) states that the use of creative media will allow students to learn better and can improve their performance in accordance with the objectives to be achieved. The use of media in learning Programming software robomind Basic materials development application algorithm was able to increase students' cognitive abilities.

Conclusions and Suggestions

Conclusion

Based on the research that has been done, it can be concluded that (1) There are differences in cognitive abilities of students who take learning by using media software Robomind and who follow learning without using software media robomind on the subjects of class X Basic Programming Multimedia packages expertise in SMK Negeri 7 Surakarta. This is evident by comparing the average value of students and the t test results performed on the data posttest students in the experimental class and control class. The average value obtained from the experimental class posttest that is equal to 72.05, while the average acquisition value posttest in control class is 66.85. T-tests were performed to produce the t value of 2.085 while t table value is 1.99962. Because the value of t is greater than t table, so it can be concluded that there are differences in student posttest results significantly between the control class with a class experiment. (2) Use of media software robomind on learning the Basic programming more effective than without using software media robomind to improve cognitive skills class X package Multimedia expertise at SMK Negeri 7 Surakarta. This can be seen by comparison increase students' cognitive abilities of the average value of pretest and posttest and comparison of the average gain ternormalisai and t-test gain is normalized in the experimental class and control class. In the experimental group increased an average value of 20%, while the control group increased an average value of 13%. The average value of normalized gain obtained by the students in the experimental class at 0:34 the middle category. In the control group the average acquisition value gain normalized by 0:21 that are in the low category. In addition, as evidenced also by the t-test is performed to produce normalized gain t value of 3.517 while t table value is 1.99962. Because the value of t is greater than t table, so it can be concluded that the average gain index data for the experimental class is higher than the control group significantly.

Suggestion

Based on the conclusions that have been described, it can be the first proposed some suggestions to teachers, media robomind software can be used as an alternative medium that can be used effectively in learning Basic Programming in improving the cognitive abilities of students. Later in the use of media software robomind learning teachers should pay attention to the use of the method, the subject matter and timing of implementation so that students can better understand the concept and the material so that the learning objectives achieved optimally. Second, to the school should motivate teachers and provide the facilities and infrastructure needed by teachers to implement the media or learning methods are varied so as to improve the quality of learning. Third, namely advice to other researchers in this study only included the results of student learning outcomes on cognitive competencies. Should be included also affective, and psychomotor. In addition, researchers are interested in further research problems like this should conduct similar studies with the subject matter coverage broader and involve more research variables.

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