

THE IMPLEMENTATION OF VIRTUAL MACHINE SIMULATION METHODS ON LEARNING THE OPERATION SYSTEM INSTALLATION IN STATE VOCATIONAL HIGH SCHOOL 5 MAKASSAR

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ABSTRACT

The purposes of this research are to investigate: (1) the process of using virtual machine simulation method in operation system installation learning, (2) the differences of students' learning outcomes between the ones using Virtual Machine simulation method and the ones using conventional method, and (3) the effectiveness of using Virtual Machine simulation method in operation system installation learning. This research is a Quasi Experiment research. The research design employed Pretest-Posttest Control Design with 60 subjects as the samples of the research. Data was collected by employing of students' learning outcomes. Data was analyzed by using descriptive and parametric inferential statistic with independent sample t-test analysis. The results of the research show that: (1) the Process of using Virtual Machine simulation method in operating system installation learning are the material preparation phase and implementation phase which consisted of several activities, namely installing Virtual Machine and operational system, (2) There are differences of students' learning outcomes where the experimental class is higher than the control class, and (3) the Virtual Machine simulation method in operation system installation learning is more effective than the direct method.

Keywords: Virtual Machine Simulation, operation system installation, learning outcomes.

INTRODUCTION

The development of science and technology has produced a series of electronic devices that can be used in the teaching and learning process, and it is increasingly encouraged by the existence of *ICT*. The use of computers and other supporting electronic devices is expected to provide convenience for teachers both in the preparation or manufacture of teaching materials and in the use and presentation of the subject matter. Rapid development of technology and information in various aspects of life including in the field of education is an effort to bridge the present and the future by introducing reforms that tend to pursue efficiency and effectiveness.

The development of technology that is increasingly advanced, it takes expertise and also someone's skills in using computers. This is because computers or laptops are a means or capital to open eyes to keep up with technological developments. The development of technology, allows a computer to have two machines as a place of operation of the Operating System

(*Windows, Linux*) at the same time. This can happen if someone wants to have 2 operating systems on one computer. The process is called *dual boot*. To install the operating system requires a virtual machine.

The Operating System is a special program that bridges the computer and *software* application. The Operating System makes it easy for other *software* or applications to run in the Operating System, in this case the Operating System is called a Service Provider (*Virtual Machine*). Operating system learning is one of the material of the Computer Networking Expertise Package (TKJ) at Vocational High Schools (SMK). Operating System learns based operating system installation *GUI (Graphical User Interface) and CLI (Command Line Interface)*. The use of media in learning the operating system is still not optimal, this is more felt especially if it is associated with developments in the field of information and communication technology.

Based on observations and interviews with subject teachers of the Operating System at SMKN 5 Makassar, information was obtained that the system installation practicum activities were very difficult to do without using the media, because of the lack of practical facilities. The number of practicum facilities is inadequate to carry out the operating system installation practicum. Considering the average number of classifications is 30 students with an allocation of three times 45 minutes. Another consideration if the implementation of the practice regarding the installation of the basic operating system is done, each computer will lose several applications that have been pre-installed. Besides installing an operating system on a computer requires a long time between 40 to 60 minutes so that it is considered less effective and efficient.

Acquisition of student learning outcomes of SMK Negeri 5 Makassar is inseparable from the learning process carried out, including learning methods. The use of media in teaching and learning activities is very important in supporting the success of learning, because media that is good and appropriate can cause student interest in the subject matter and ultimately improve the response, interest and motivation to learn. The high response, interest, motivation, attention and interest of students towards a teaching material will ultimately affect student learning outcomes. Many factors influence student learning outcomes. One of them is the learning method used.

Basic Competency of Operating System Installation, contained in 2013 Curriculum Vocational High School 5 Makassar on Network Computer Engineering Expertise Package (TKJ). In this competency, the minimum completeness criteria (KKM) is 2.67. But in fact, not all students are able to achieve the KKM value. Based on the repeat score of the last 2 years, only about 55% of students were declared to have passed the basic competencies. This condition is caused by students' learning responses that are still lacking, learning methods that are not optimal, inadequate computer facilities and infrastructure. For this reasoning, the development of teaching strategies must be directed to the effectiveness of student learning. Thus, a teacher is not only required to be able to master the subject matter, but is required to be able to manage the teaching well. Therefore, a teacher must be able to choose and use the right method in the learning material of the Operating System, in order to achieve optimal learning goals.

To be able to overcome these problems, there is a need for relevant, easy and efficient media. The media used in the learning process can vary in the form of hardware computer such as a computer and can be in the form of software . Development of technology and communications, is now available software (*software*) *Virtual Machine*.software *Virtual*

Machine Free license that can be installed in various types of operating systems, both in operating systems *Windows, Linux* and *Mac*.

software *Virtual Machine* is a multimedia-based media to support learning that can simulate operating system installation in a major operating system. The Process of Installing an Operating System by using software *Virtual Machine* requires an applicative activity, so this software can be used as a medium for students in practicum regarding the installation of the operating system.

Relevant research on *Virtual Machine* has been carried out by several other researchers. Makmur (2012) in his research looked at the relationship between the use of software media *virtual box* and student learning outcomes in the Basic Operating System Subject, concluding that there was a significant relationship between the use of software media *VirtualBox* and learning outcomes regarding-based operating system installation *GUI* on operating system subjects. basic.

Suheriyanto (2014) examined how the quality and effectiveness of a computer-based media learning device *Virtual Machine*. Conclusion The results of this research are the learning tools produced are very effective in terms of learning achievement and achievement of student competencies.

Based on the research stated above, this study encourages the use of simulation methods *Virtual Machine* in the learning system of the Operating System. This method is used in class X TKJ at SMK 5 Makassar. Will be tested in the class chosen as the experimental class, while the control class is given lessons as usual using the direct method. After learning ends, a test is conducted to see the learning outcomes of students who are taught using the simulation method *Virtual Machine* compared to the learning outcomes of students taught by the direct method.

THIS RESEARCH METHODS

Type of research is a research *Quasi Experiment* which is a method that has a control group, but cannot fully function to control external variables that influence the execution of experiments (Sugiyono, 2014: 114). Examine the two classes of students, namely the experimental class which is given treatment using the method *Virtual Machine* and the control class which is not given the treatment of the method *Virtual Machine* but uses direct learning. This research is located in Makassar Vocational High School 5 which addresses Jalan Sunu No. 162, Especially for Computer Network Engineering Skills Competencies. The study was conducted in April to May 2015.

The research design used was *Pretest-Posttest Control Design* The design of the study was one form of experimental design used in educational research. The data collection instrument of this study is a learning test. The compiled test is a series of questions on operating system subjects. The number of items developed by the operating system technical test is 30 items, all of which are multiple choice questions with four answer options. Four answer options using a scale *Likert*. There are two reasons these instruments are arranged in multiple choice forms, namely: (1) it is expected that the score of multiple choice answers will be more objective than the description answers, and (2) multiple choice test items with four answer options means that students are likely to answer correctly by guessing .

This research is divided into three stages, namely the preparation stage, the implementation phase and the reporting phase. Data collection methods or techniques are techniques or methods

that can be used by researchers to collect data. The data needed in this study is the learning outcomes before and after the treatment, namely learning using the simulation method *Virtual Machine*. Data collection techniques used are objective tests (multiple choice). Before the instrument is used as a data collection tool, it is tested first to determine the validity and reliability.

Data analysis techniques in this study used two analyzes, namely descriptive statistical analysis techniques and parametric inferential analysis techniques. Descriptive statistical analysis is used to analyze data by describing learning outcomes that have been collected from research results.

RESULTS AND DISCUSSION

The results of the study were in the form of *pretest* scores *posttest*., and scores *gain*. The score *gain* is obtained from the difference between the score *pretest* and the score, *posttest* both students who learn using the simulation method *Virtual Machine* and students who learn to use direct learning media.

Learning Device Validity Analysis Results

One of the main criteria for determining whether a learning device is feasible to use or not is the result of expert validation. Validation of experts is done to see the validity of learning devices that cover all aspects and criteria of the device developed. The validation results of the experts are used as a basis for revising and refining the learning tools. DAPT validator assessment results seen in the following table

Table 1. Assessment Validator

Validator	of Learning Device			
	RPP	LKS	THB	Handbook
Validator 1	3.93	3.81	3.69	3.58
Validator 2	3.55	3.83	3.39	3, 83
Average	3.74	3.82	3.54	3.70

Remarks:

RPP = Learning Implementation Plan

LKS = Student Worksheet

THB = Student Result Test Results

Instrument Test Data Analysis

Determining whether the item is valid or not is comparing the results of r_{hitung} with r_{table} *Product Moment*. With the number of respondents 30 according to r_{table} and significance level = 5% then $r_{table} = 0.361$. Based on the results of $soal_r$ for each item when compared to r_{hit} , the invalid item $r_{hitung} < r_{tabel}$, that is, items 3, 6, 8, 14 and 25.

After the validity of the instrument is tested, step next is to examine its reliability. Instrument reliability test was performed using Alpha Cronbach reliability test. Based on the results of the trial, a value of $\alpha = 0.920$ was obtained. This figure shows that the instrument used in this study has a very high level of reliability. The calculation was obtained through computer assistance SPSS version 20.

Analysis of Student Learning Results

Data on student learning outcomes on learning in the experimental class and control class obtained from student learning outcomes tests. can be seen in the following.

Table 2. Descriptive Statistics Analysis of Student Learning Outcomes

STATISTICS	VALUE			
	pretest	Experiment Class	Pre-test	GRADE CONTROL
Subject	30	30	30	30
Average	58.73	87.10	58.17	65.40
Median	60	85	60	60
Mode	67	80	67	80
Standard Deviation	7,900	7,053	8,607	14,041
Variance	62,409	49,748	74,075	197,145
Range	30	20	30	40
Lowest Value	40	80	40	40
Highest Value	70	100	70	80

Based on the table above shows that the average student learning outcomes in learning Operating System Installation differs between experimental classes using simulation methods *Virtual machines* and control classes without simulation methods *Virtual Machine*, namely 87.10 and 65.40. The median for the experimental class is 85 and for the control class is 60. The mode for the experimental class is 80 and for the control class 80. While the variance for the experimental class is 49.748 and for the control class is 197.145. The lowest value for the experimental class is 80 and the highest score is 100 with a range of 20. While the control class, student learning outcomes with the lowest value of 40 and the highest score of 80 with a range of 40. The distribution of student learning outcomes is shown in the following table

Table 3. Distribution of Learning Outcomes students, learning Operating System Installation methods *Virtual Machine* and Direct method

VALUE	CATEGORY	EXPERIMENT		CONTROL	
		FREQUENCY%		FREQUENCY%	
81-100	Very High	21	70	0	0
61-80	High	9	30	14	46.67
41-60	Adequate	0	0	12	40
21-40	Low	0	0	4	13.33
0 -20	Very Low	0	0	0	0
Total		30	100	30	100

Based on the above it can be seen that student learning outcomes in the experimental class the percentage is in the very high category is 70% and the high category is 30%. In the experimental class there were no students who had enough value. Whereas in the control class the percentage of students in the high category was 46.67% and the sufficient category was 40%, the low category category was 13.33%.

Normality Test Normality

Test is used to determine whether the data comes from a population that is normally distributed or not between the experimental class and the control class. Normality testing was carried out with the Kolmogorof-Smirnov test statistic with the help of SPSS 20. The results of the normality test are given in the table below:

Table 4. Results of normality tests with the *Kolmogorof-Smirnov test*

Class	Kolmogorof- Smirnov		
	Statistics	N	Sig (P)
Experiment	0.120	30	0.200
Control	0.095	30	0.200

Test criteria:

If $P > \alpha(0.05)$, then normal distribution

If $P < \alpha(0.05)$, then it is not normally distributed

Based on the calculation of normality test then experimental class obtained $P = 0.200$ and in the control class obtained $P = 0.200$. By comparing the value of $\alpha = 0.05$, for the experimental class $P = 0.200 > \alpha(0.05)$ and the control class $P = 0.200 > \alpha(0.05)$. So it can be concluded that for both data are normally distributed.

Homogeneity Test Homogeneity

test aims to find out whether the two classes come from a homogeneous population.

Table 5. Homogeneity Test Results of

Levene Statistic	df1	df2	Sig (P)
1,425	7	13	0.276

Testing Criteria:

If the significance value $(P) > \alpha(0.05)$, then homogeneous

If the significance value $(P) < \alpha(0.05)$, it is not homogeneous

Based on the table above, the value between the experimental class and the control class obtained $P = 0.276$. By comparing with the value of $\alpha = 0.05$, because the value for $P (0.276) > \alpha(0.05)$, it can be concluded that the data comes from a population with the same (homogeneous) variance.

Results of Data Analysis The Gain

value *is* obtained from the difference between the *posttest* value and the value *pretest*. Because learning outcomes are the results obtained by students after learning, the intended learning outcomes are an increase experienced by students. To determine the effectiveness of using the simulation method *Virtual Machine* in the experimental class and the use of direct learning media in the control class, the calculation of used *gain is*. The results of the calculation of *gain* normalized (*g*) in the experimental and control classes can be seen in the following table.

Table 6. Results Index *Gain* Experiment Class and Control

Class	pretest	posttest	Gain	g	Criteria
Experiment s	58.67	87.11	28.44	0.7	High
Control	58.11	65.33	7.22	0.3	Low

Based on the data value of *pretest* and *posttest* in the experimental class, the value of *gain* normalized the experimental class is 0.7 and the control class is 0.3. This value is interpreted into the value criterion (*g*), the effectiveness of using the method *Virtual Machine* in the experimental class is high.

Research Hypothesis Test The research

hypothesis uses analysis *Independent Sample t-Test*. The t test presented in Appendix 20 page 204, obtained t_{count} of 5.855. By looking at the t distribution table, it is obtained t table with $df (n-2)$ or $60-2 = 58$ by testing 2 sides (significance = 0.025) the results obtained for t_{table} are 2.002. Then it can be concluded that $t_{\text{count}} > t_{\text{table}}$ and $\mu_1 \neq \mu_2$ means that H_1 is accepted, meaning that the simulation method is *Virtual Machine* effective compared to the direct method of learning Operating System installation.

The process of using simulation methods *Virtual Machine*

The steps of using the method *Virtual Machine* in learning the operating system installation are the Preparation Stage and Implementation Phase.

After the learning process is carried out by giving treatment with the simulation method *Virtual Machine* in the experimental class and the treatment with the learning media directly on the control class, shows that the final learning outcomes of the two classes experience differences. The value of the post-test from the experimental class with the control class turned out to show that the learning effectiveness criteria can be achieved which is above 75% achieving completeness (70) even though the experimental class is greater than in the control class. So that the method *Virtual Machine* can be said to be effectively used in learning Operating system installation considering the requirement of learning effectiveness if at least 75% of students can achieve KKM values (70) Differences in learning outcomes are shown by the average value of the experimental class is higher than the control class.

In decision making with advanced analysis with t-test the price of t test from the calculation is greater or equal to t table, it means that there is a significant mean difference between the two variables, where the value of $t_{\text{counts}} > t_{\text{table}}$ then the Hypothesis is accepted.

Then the T-done for the results of *test ispost test* both research classes obtained by t_{count} / t test of 5.855 while t table is 2.002 or t_{count} / t test > t table (5.855 > 2.003) 95% significance level or there is a difference Significantly significant between the experimental class and control class learning outcomes. Based on research Makmur (2012) and analytical results from testing the hypothesis advanced above it can be said that H_0 is rejected and H_1 accepted or "There are differences in effectiveness between the simulation method *Virtual Machine* with the direct method on learning operating system installation"

The results of this study are expected to provide contribution in overcoming low student achievement, especially in productive learning and can be applied in overcoming educational problems in general. Learning at vocational schools is usually constrained due to lack of facilities, computer facilities infrastructure. Schools that have Computer Network Engineering (TKJ) majors must be supported by computer and device facilities, but if that is still lacking. The task of educators is to find the right method by using existing facilities without reducing the essence of learning the operating system installation

The method *Virtual Machine* is the right solution to overcome the constraints of limited facilities. The results of this study prove that the *Virtual Machine* method is a practical, easy and interesting method shown from the high learning outcomes in using the *Virtual Machine* method compared to the direct method when learning the operating system installation.

CONCLUSIONS AND SUGGESTIONS

Based on the results of research on the class X Computer Network Engineering at Makassar on the Effectiveness of the Use of Simulation Methods *Virtual Machine* Vocational High School 5 in Learning Installation of Operating Systems in VOCATIONAL SCHOOL 5 Makassar then concluded as follows: The process of using simulation methods *Virtual Machine* in operating system installation namely: (1) Phase of material preparation, and (2) The implementation phase consists of several activities, namely: installing *Virtual Machines* and Operating Systems. Second, there are differences in student learning outcomes of the experimental class is higher than the control class learning outcomes. Third, the use of simulation methods *Virtual Machine* in learning Operating System Installation is more effective than the use of direct learning methods. The

Use of methods *Virtual Machine* should also be used for learning Computer Skills and Information Management (KKPI) and Communication Information Technology (ICT) in the School Operating System Secondary General (high school) and college level. Limitations of this study researchers only examined the operating system installation only. For further research it is recommended to expand the operating system material to the server area using the method *Virtual Machine*. Learning outcomes that researchers do only on aspects of student response. For further research can examine aspects of student activity when using simulation methods *Virtual Machine*

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