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The Implementation of PC Building Simulator as a Learning Media to Enhance Vocational High School Students' Performance in the Learning Process

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ABSTRACT
The main goal of this research is to know the result of student learning outcomes by using the PC Building Simulator as a media and to know the effect of the application of PC Building Simulator media on student learning outcomes. This type of research is quantitative research that is ex post facto. The sample of this research is as many as 60 students from class X TKJ year study 2021/2022 and be divided into two classes, their experiment class and control class. Data collection technique questionnaires and test on the student. Data were analyzed statistically descriptive. The validity of the questionnaire uses context validity and continues with item analysis which is calculated with the product-moment correlation from Pearson. The reliability. Reliability is calculated by the Cronbach Alpha formula. The results of the study found that, after using the PC Building Simulator, there is an effect of increasing student learning outcomes in the class compared to the control class which only uses conventional learning media. From the results of this study, it can also be seen that the use of learning media in the classroom, especially in practical learning, the use of PC Building Simulator learning media has a significant influence on student learning outcomes.

Keywords: *PC building simulator, learning media.*

1. INTRODUCTION

A school is a form of educational institution in which teaching and learning activities take place, as well as various other activities that support the implementation of the teaching and learning process. The process is related to several elements such as students, teachers, and materials lessons that are incorporated into a school curriculum.

In teaching and learning activities, especially in Vocational institutions, the process prioritizes practical activities that allow students to interact directly with learning objects[1]. Vocational High School (SMK) is a school with learning that prioritizes direct practice in the process that aims to produce graduates who have good competence in specific majors and are ready to work in the real world. When a student can understand every material that exists in any productive subject, it is hoped that students will find it easier to practice and learn material which is the development of these subjects.

However, in most of the vocational high schools in Indonesia, the availability of tools and devices used in the laboratory can be a problem as they are still limited compared to the number of students who used them[2]. Moreover, practical equipment with the newest technology especially those that are relevant to industries are rarely seen in those schools[3]. To overcome these problems, most teachers use learning media as additional tools to teach productive subjects in the laboratory.

The implementation of good learning methods should be followed by integrating well design learning media into the learning process. Both of them must be well planned according to the characteristics of students to make sure improvement of learning achievement[4]. Therefore, learning media should include several factors such as between others: the existence of an introductory tool or instrument, the existence of channeling activities information or learning materials, the involvement of physical instruments in distributing learning materials, there are learning resources that is the origin of obtaining

learning materials, and the relationship between students, teachers, and materials with learning objectives[5].

Classifying learning media into four groups, namely[6]: (1) Graphic media, in principle, all types of media in this group are the delivery of messages through visual symbols and involve stimulation of the sense of sight. (2) Audio media, the essence of the types of media in this group is in the form of messages that are conveyed or poured into auditory symbols (verbal and/or nonverbal), which involve stimulation of the sense of hearing. (3) Silent projection media, some types of media belonging to this group require a tool (eg projector) in their presentation. There are times when this media is only presented with a visual appearance, or accompanied by audio recordings. (4) Game and simulation media, there are several other terms for this group of learning media, for example, simulation and role-playing or simulation games. Although they are different, all of them can be grouped under one term, namely games.

According to Ediyani et.al, there are 4 media, namely[7]:

1) Visual media: media that can be seen. This media relies on the sense of sight. Examples: media photos, pictures, comics, sticky pictures, posters, magazines, books, miniatures, props, and so on.

2) Audio media: media that can be heard. This media relies on the sense of the ear as a channel. Examples: sound, music and songs, musical instruments, radio broadcasts, sound cassettes, CDs, and so on.

3) Audio-visual media: media that can be heard and seen simultaneously. This medium moves the senses of hearing and sight simultaneously. For example, drama media, performances, films, television, and media are now mushrooming, namely VCD.

4) Multimedia: all types of media are summarized into one. Example: internet means applying all available media, including distance learning.

Based on some of the explanations above, it can be concluded that the kinds of learning media that will be used in this study are visual media and multimedia, because visual media can display images, and multimedia media includes visual, audio, and audio-visual, to assist in this research. Building Simulator is an application in the form of a

Media is one of the determining factors for the success of learning. Through the media, the learning process can be more interesting and fun. Learning Media are the various types of components in the student environment that stimulate him to learn[8]. Learning media always consists of two important elements, namely elements of equipment or hardware and elements of the message it carries (message/software). Learning media requires equipment to present messages, but the most important thing is not the equipment, but the messages or learning information brought by the media[9]. The definition above confirms that the learning media is actually a variety of interacting components directly with students, which in turn can foster interest in learning. With the emergence of interest in learning, learning achievement can increase.

Based on the above problems, learning media is needed as additional tools for students in the learning process. This application may become a bridge so that students and teachers can carry out practical activities anytime and anywhere. From these problems, we took the initiative to investigate whether a learning media in the form of simulation may be able to maximize the learning process. One of the interactive learning media that can be used is Personal Computer (PC) Building Simulator application. This application is a simulation application for assembling a PC with a virtual one. The application is used in computer assembly subjects that include practical experiments in the process.

By using this application, students can do various things as is done in actual practice, from disassembling the computer. the assembly process to handling computer problems in the form of simulations. This can provide additional learning for students at school to deepen their understanding and skills in computer assembly subjects without the risk to break any equipment. Through this risk-free application, students can do computer assembly directly. It is expected that it can give a better understanding to students about how to do assembling according to standard operations in computer assembly without worrying about damage or assembly error.

2. METHOD

The research was conducted in the Computer Assembly subject taught in class X in the competence of Engineering skills Computers and Networks at SMK Negeri 1 Enrekang. In this research, these subjects are chosen as it is one of very important for vocational students, especially in the Engineering expertise program Computer Network. This subject is the basis for Subsequent courses that will have more complex material.

Based on the results of initial observations in this class, it is obtained an overview that the teaching and learning process in the classroom already uses learning media, but is only limited to displaying text and images so that the students in the learning process still take more notes. The teacher only explains learning materials without being accompanied by providing directions regarding computer assembly, at least in the form of simulation to get a visual experience of the assembly computer.

This type of research is quantitative research that is ex post facto. This research is field study research used

to examine certain populations or samples, and data collection using research instruments.

The design of this research can be seen in Figure 3.1. Namely one independent variable, in the form of the use of the PC Building Simulator application (X) and one dependent variable in the form of student learning outcomes (Y):

Figure 1 Research design.

2.1. PC Building Simulator

PC Building Simulator is an application in the form of a semi-game that is intended for people who want to be able to assemble their own PC or just want to try new hardware configurations without risking major damage to computer hardware components. Through this application, the developer hopes that anyone can try to build a PC at random without having to be afraid of damaging the original hardware or even removing the contents of the wallet[10].

The developer of this application is The Irregular Corporation. They develop their game plan as educational material. That's why, they try to present the simulation experience of assembling a PC as authentic as possible, for example, the installation of components, we must do it correctly and sequentially as it should. We are even faced with a number of problems such as BSOD (Black Screen of The Dead) or other component errors, then find out for ourselves what causes and how to solve them.

2.2. Learning Outcomes

Learning outcomes are the attainment of a form of behavioral change that tends to persist from the cognitive, affective, and psychomotor domains of the learning process carried out within a certain time [11]. Learning outcomes are the abilities that students have after they receive their learning experiences[12]. Three kinds of learning outcomes, namely [13]: (a) skills and habits, (b) knowledge and understanding, and (c) attitudes and ideals. Choe et.al (2019) mentioned five categories of learning outcomes, namely (a) verbal information, (b) intellectual skills, (c) cognitive strategies, (d) attitudes, and (e) motor skills. In the national education system, the formulation of educational goals, both curricular and instructional goals, uses the classification of learning outcomes from Benjamin Bloom which broadly divides them into three domains, namely cognitive, affective, and psychomotor domains[14].

Based on the opinion of experts, it can be concluded that a person's learning outcomes can be influenced by his learning experience so it can cause changes in behavior in a person.

3. RESULT AND DISCUSSION

3.1. Descriptive statistics

3.1.1. Use of PC Building Simulator Experiment Group and Control Group

Table 1 PC Building Simulator Usage Data Experiment and Control Group.

	Experiment Class	Control Class
Average	88.4	86.0
Min	81.1	81.1
Max	93.3	92.2
Standard Deviation	2.6326	2.4168
Variance	6.9306	5.8408

The use of the PC Building Simulator in the Experimental Group was 88.4 while in the control class, it was 86.0 from these results, it can be seen that there was an increase in the acquisition of students' scores by using the PC Building Simulator software learning media. In addition, the Minimum Value in the experimental class and in the control class are both equal to 81.1, these results illustrate that there is no increase in the minimum value in the two different classes. Meanwhile, the maximum value in the experimental class is 93.3 while in the control class, it is 92.2, this illustrates that the maximum value or the highest score of students increases in the experimental class compared to the control class. In the standard deviation category, the standard deviation in the experimental class is 2.6326 and in the control class is 2.4168 and in the variance category, experimental class, the variance value is 6.9306 and in the control class the variance value is 5.8408, from these results illustrates that the scores of students in the experimental class are more varied than the scores in the control class.

3.1.2. Experimental Group Student Learning Outcomes

Table 2 Experimental Group Student Learning Outcomes.

	Pre Test	Post Test
Average	77.5	90.5
Min	60	80
Max	90	100

Based on Table 2 above, it is known that the average value of student learning outcomes in the pre-test

experimental group is 77.5 and increased in the post-test session by 90.5. Meanwhile, the minimum score in the pre-test class was 60 and increased in the post-test session 80. In addition, the maximum pre-test score was 90 and increased in the post-test session by 100.

3.1.3. Control Group Student Learning Outcomes

Table 3 Control Group Student Learning Outcomes.

	Pre-Test	**Post Test**
Average	74.8	83.5
Min	65	75
Max	85	90

Based on Table 4.3 above, it is known that the average value of student learning outcomes in the pre-test control group is 74.8 and increased in the post-test session by 83.5. Meanwhile, the minimum score in the pre-test class was 65 and increased in the post-test session 75. In addition, the maximum pre-test score was 85 and increased in the post-test session by 90.

3.2. Validity and Reliability Test

3.2.1. Validity test

Table 4 Result Validity Test.

Pertanyaan	**R Tabel**	**R Hitung**	**Keterangan**
Item 1	0.355	0.586	Valid
Item 2	0.355	0.476	Valid
Item 3	0.355	0.753	Valid
Item 4	0.355	0.486	Valid
Item 5	0.355	0.553	Valid
Item 6	0.355	0.486	Valid
Item 7	0.355	0.387	Valid
Item 8	0.355	0.453	Valid
Item 9	0.355	0.486	Valid
Item 10	0.355	0.532	Valid
Item 11	0.355	0.422	Valid
Item 12	0.355	0.586	Valid
Item 13	0.355	0.513	Valid
Item 14	0.355	0.576	Valid
Item 15	0.355	0.364	Valid
Item 16	0.355	0.886	Valid
Item 17	0.355	0.486	Valid
Item 18	0.355	0.541	Valid

Based on Table 4 above, it is known that from a total of 18 question items in the questionnaire to measure the variable X (Using PC Building Simulator, all question items are valid, this is because the calculated R-value> R table.

3.2.2. Reliability Test

Based on the results of the reliability test, the Cronbach Alpha value is 0.149. This implies that the questionnaire is said to be reliable.

3.3. Prerequisite Test

3.3.1. Normality test

The normality test was conducted to determine whether the data obtained were normally distributed or not. This normality test was carried out using the One Sample Kolmogrof-Smirnov Test. The data can be said to be normally distributed if it has a result greater than the Asimpp Sig (2-tailed) value of 0.05 (5%), the results of the normality test can be seen in Table 5.

Table 5 Normality Test Results.

		Use of PC Building Simulator	**Learning outcomes**
N		30	30
Normal Parametersa,b	Mean	77.80	90.50
	Std. Deviation	2.369	5.144
Most Extreme Differences	Absolute	.143	.209
	Positive	.143	.191
	Negative	-.123	-.209
Kolmogorov-Smirnov Z		.785	1.145
Asymp. Sig. (2-tailed)		.570	.145

Based on Table 5 above, it can be seen that the value of sig. (2-tailed) the variable using PC Building Simulator is 0.570 > 0.05, sig. (2-tailed) Variable Learning Outcomes 0.145 > 0.05. From these results, it can be concluded that the data from all variables are normally distributed so that it can be carried out for further tests, in this case, the Simple Linear Regression test.

3.3.2. Linearity Test

The linearity test aims to determine whether two variables have a linear relationship or not significantly. Testing the linearity of the data using the Deviation from Linearity Test on the Anova table in the SPSS program. The results of the linearity test can be seen in Table 6 below.

Based on Table 6, it is known that the value of Sig. deviation from linearity is 0.957 > 0.05, it can be concluded that there is a linear relationship between the use of PC Building Simulator and Learning Outcomes in other cases H1 is accepted.

Table 6 Result Linearity Test.

			Sum of Squares	df	Mean Square	F	Sig.
Hasil Belajar * Penggunaan PC Builiding Simulator	Between Groups	(Combined)	277.500	7	39.643	.578	.767
		Linearity	177.518	1	177.518	2.586	.122
		Deviation from Linearity	99.982	6	16.664	.243	.957
	Within Groups		1510.000	22	68.636		
	Total		1787.500	29			

3.4. Simple Linear Regression Test

3.4.1. T-test

Table 7 Result in T-Test.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.741	46.257		-.081	.936
	Use of PC Building Simulator	1.044	.594	.315	1.757	.000

Based on the test results in the table above, it is known that the significance value for the effect of the variable (X) on the variable (Y) is 0.000 <0.05 and t count 1.757 > t table 1.697, so it can be concluded that the use of PC Building Simulator has a positive and significant effect. on Learning Outcomes. Based on the results obtained, it can be concluded that H1 and H2 are accepted, which means that there is a positive and significant effect of the use of the PC Building Simulator application on the learning outcomes of class X at SMK Negeri 1 Enrekang and there is a positive and significant effect of the use of the PC Building Simulator application on learning outcomes in subjects Class X computer assembly at SMK Negeri 1 Enrekang.

3.4.2. F-Test

Table 8 Result F-Test.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	177.518	1	177.518	3.087	.000
	Residual	1609.982	28	57.499		
	Total	1787.500	29			

Based on the output above, it is known that the significance value for the simultaneous effect of the variable (X) on the variable (Y) is 0.000 <0.05 and the calculated F value is 3.087> F table 1.84. so it can be concluded that there is an effect of using the PC Building Simulator simultaneously on student learning outcomes (Y) in the subject of Computer Assembly class X at SMK Negeri 1 Enrekang.

3.4.3. Coefficient of Determination

The coefficient of determination serves to find out what percentage of the influence given by the variable (X) simultaneously on the variable (Y) whose test results can be seen as follows:

Table 9 Result Coefficient of Determination.

Model	R	R Square	Adjusted R Square	Std. An error of the Estimate
1	.315a	.699	.067	7.583

Based on the output of the coefficient of determination above, the value of the coefficient of determination (R Square) is 0.699, this means that the effect of the variable using PC Building Simulator (X) on learning outcomes (Y) is 69.9% and the remaining 30.1% is influenced by variables other.

3.5. Discussion

Based on the research results that have been obtained and have been described previously. It is known that the average value of the pre-test student learning outcomes in the experimental group was 77.5 and increased in the post-test session by 90.5. Meanwhile, the minimum score in the pre-test class was 60 and increased in the post-test session by 80. In addition, the maximum pre-test score was 90 and increased in the post-test session by 100. In addition, the comparison of the average student learning outcomes between classes In the experiment with the control class, it was found that the average learning outcome in the experimental class was 77.5 in the pre-test and post-test 90, 5 the value was higher than the student learning outcomes in the control class, which in the pre-test was 74.8 and post-test was 83,5. From these results, it can be concluded that in general student learning outcomes after using the PC Building Simulator are higher than student learning outcomes in conventional classes on the subject of Computer Assembly class X at SMK Negeri 1 Enrekang.

In this regard, students in the experimental class in simulating virtual computer assembly procedures without fear of damage to computer components. During the learning process, students can observe the compatibility between theory and facts that occur when assembling a computer. This can strengthen students'

knowledge and understanding of the material being studied.

Furthermore, based on the results of the Simple Linear Regression test, it is known that the significance value for the effect of the variable (X) on the variable (Y) is 0.000 <0.05 and t count 1.757 > t table 1.697, so it can be concluded that the use of PC Building Simulator has a positive and significant effect. on Learning Outcomes. Based on the results obtained, it can be concluded that H1 and H2 are accepted, which means that there is a positive and significant effect of the use of the PC Building Simulator application on the learning outcomes of class X at SMK Negeri 1 Enrekang and there is a positive and significant effect of the use of the PC Building Simulator application on learning outcomes in subjects Class X computer assembly at SMK Negeri 1 Enrekang.

The results obtained are in line with the results of research conducted by Fahrurozi et al [15] the research state that the effect of application of simulation learning method using PC Building Simulator in learning. Based on the results of descriptive statistical tests, the average value of the experimental class student learning outcomes is much higher than the average value of the comparison class learning outcomes; that is equal to 83.4 for the experimental class and 57.3 for the comparison class. Then there is a difference in the average value of 26.1.

4. CONCLUSION

The average student learning outcomes between the experimental class and the control class are known to have average learning outcomes in the experimental class 77.5 in the pre-test and post-test 90, 5 the value is higher than the student learning outcomes in the control class which in the pre-test is 74.8 and post-test of 83.5. From these results, it can be concluded that in general student learning outcomes after using the PC Building Simulator are higher than student learning outcomes in conventional classes in the subject of Computer Assembly class X at SMK Negeri 1 Enrekang.

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