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Development of Open Education Resources (OER) Learning in Vocational Education

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***Abstract*— The learning process has an important role in improving student character. The process of character building can result from a fun learning process. Open learning has an important role in the formation of student character. Open learning leads students to learn more creatively, by giving students the freedom to search for modules and references using the Open Education Resources (OER) learning technology. Learning that directs students to discuss and learn using NET. The method used in this study is experimental research. Research conducted on vocational education students as a sample in the study. The student learning process is carried out in two groups which divided into experimental group students and control group students. OER learning is carried out on students in the experimental group, while the student group as a comparison of the control group students. The results of this study obtained the results of the Leven Test that the assumption of two variants is not the same, with the value of t = 5.822 and p-value (2-tailed) 0.000. While the p-value is smaller than the value of α = 0.05, then H0 is rejected. So it can be concluded that there are differences in learning outcomes of students who use OER learning in the experimental class and control class.**

Keywords: Open Education Resources, Vocational Education

I. INTRODUCTION

The learning process has important characteristics in achieving student competence. In learning technology tools have important properties to support student development, adaptation and distribution in the implementation of learning are another components needed to produce effective educational resources [2]. Education in the 4.0 era of technology is indispensable in the learning process. Open learning (OER) becomes open learning with the use of technology.

Open learning (OER) defined as teaching, learning and research that uses technology, such as an open license, to enable continuous use, continuous learning improvement and assessment by others for educational purposes [3]. Another explanation of a teaching and learning module that is available online for free to use, whether teacher, student, or independent study [4]. Digital teaching materials include modules, software for developing, using and distributing knowledge, and implementing resources [1].

Open learning has a learning process where each student has independent learning activities. Meanwhile, students also can develop the ability to search for information through books that are available online. The purpose of this learning is to look at metacognitive and proxiological developments in students. Metacognitive characters can help develop good thinking management skills. Metacognitive as the awareness and management of cognitive processes and products that a person has, or simply referred to as "thinking about thinking" [8].

II. METHODS

The research method used is Quasi-Experimental. The sample in this study consisted of a control class and experimental class. To reduce errors in this study, division groups were carried out: (1) the vocational high school research class (2) conducted tests that were different from the mean (mean) posttest scores to see the ability in the experimental class and the control class (3) the basic test for student's initial knowledge. The population in this study is Vocational Education students. How to take samples from two classes, namely the experimental class and the control class. Each class of 100 control class students and 100 experimental class students. The design of this study can be described as follows :

Independent Variable / Moderator Variable		Open Education Resources	
		Experimental Class (X1.1)	Control Class (X1.2)
Locus of Control (X2)	Internal (X2.1)	Y	Y
	External (X2.2)	Y	Y

Table 1. Variables in the Research

The main variables in this study were learning with OER, while the moderator variable in this study was Control Focus. The open system learning process as a whole described in the following phase:

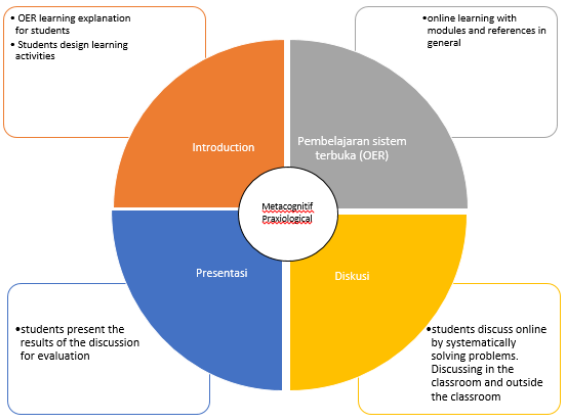

Fig 1. Phase Diagram in Research

First Phase

The teacher gives direction to students the learning objectives to achieve. Explanation of open learning and designing learning to be carried out.

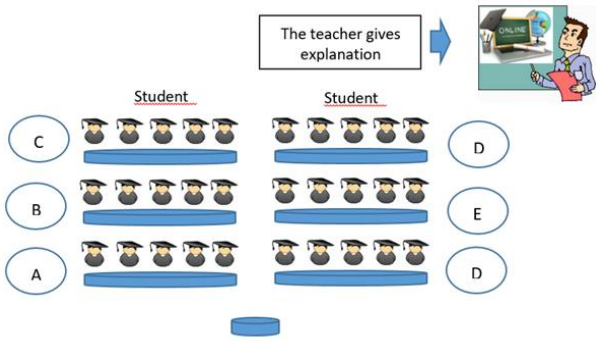

Fig 2. Classroom Learning

Second Phase

Open learning, with the development of OER learning. Students learn interactively in groups. Active learning of students with online learning using applications designed according to the needs of students. This activity is carried out in the classroom and outside the classroom with the use of technology in the learning process.

Fig 3. Open Learning Design

Third Phase

In this activity, students discuss according to the task of the teacher. Students discuss in groups by mentoring teachers as facilitators. The teacher becomes a mentor in discussions with each group. This activity is carried out inside and outside the classroom. This learning activity is not limited in time for the implementation of learning.

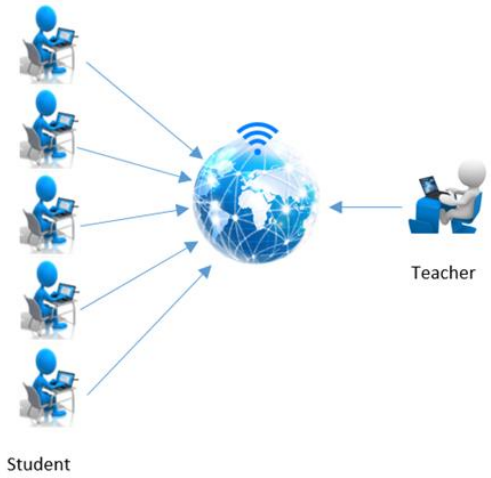

Fig 4. Interactive Learning Design

Fourth Phase

The next learning process each group presents the results of the discussion to delivery in the classroom. From this learning, students are expected to be more creative and active in learning. This learning aims to see student learning outcomes. The development of student characteristics which includes students' and proxiological metacognitive abilities of learning outcomes.

III. RESULT

The results of the study can obtain from the posttest, pretest and control locus values of OER learning. The results of the study will be analysed to determine the improvement of student learning outcomes using OER.

A. Pretest test results for experimental class and control class

1. The initial ability of the experimental class

Description of the results of the analysis of the experimental class test results show that 27% of students have less category value, 46% of students have enough categories, and 27% of students have good category scores. Most of the students' most prat scores range from 7-11 with a frequency of 46 (or 46%) and enough categories.

No	Interval	Category	Frequensi	(%)
1	2 - 6	Deficient	27	27
2	7 - 11	Passable	46	46
3	12 - 16	Desent	27	27
Sum			100	100

Table 2. Pratest Value Frequency Distribution

The data collected and the results of descriptive analysis obtained a minimum value of 2; maximum of 15; mean (mean) of 8.99, and deviation standard 3,495 while the frequency distribution of the pre-test value of the experimental group students present in Fig 5.

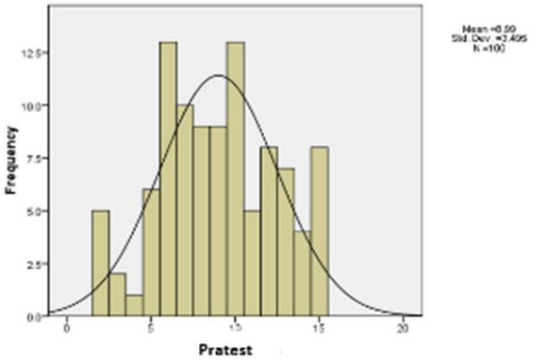

Fig 5. Pre-test Frequency Diagram

It can conclude from the data above; it can interpret before being given treatment. The initial ability of students' learning outcomes in the experimental class is sufficient.

2. Initial control class ability

The results of the test can analyse that 33% of students have less category value, 47% of students have enough category scores, and 20% of students have good category scores. Most of the students' most prat scores range from 7-11 with a frequency of 47 (or 47%) and category sufficiently.

No	Interval	Category	Frequensi	(%)
1	2 - 6	Deficient	33	33
2	7 - 11	Passable	47	47
3	12 - 16	Desent	20	20
Sum			100	100

Table 3. Pratest Value Frequency Distribution

The data collected and the results of the descriptive analysis obtained that the minimum value is 2, maximum 15, average (mean) 16.70, and deviation standard 14,528. The description of the frequency distribution of the pre-test value of the control group can be qualified according to figure 6 to be able to see more clearly.

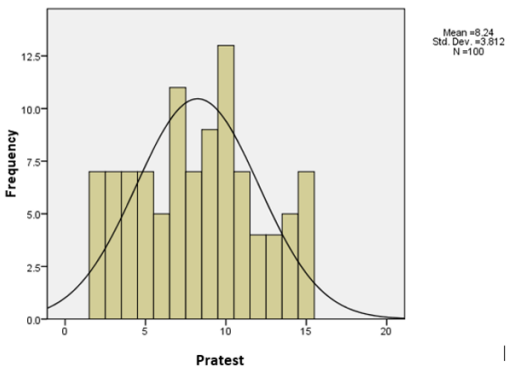

Fig 6. Pre-test Frequency Diagram

It can conclude from the data above; it can interpret before being given treatment. The initial ability of the control class learning process is sufficient.

B. Results of the final ability test (posttest) of the experimental class and control class

1. Final test results (posttest) Experimental class

Explanation of data analysis results obtained 22% of students have less category value, 49% of students have enough category value, and 29% of students have good category scores. Most of the students' posttest scores ranged from 16-19 with a frequency of 49 (or 49%) categorised sufficiently.

No	Interval	Category	Frequensi	(%)
1	12 - 15	Deficient	22	22
2	16 - 19	Passable	49	49
3	20 - 23	Desent	29	29
Sum			100	100

Table 4. Pre-test Value Frequency Distribution

The data collected and the results of the descriptive analysis obtained a minimum value of 13, maximum 23, mean (mean) 17.86 and deviation standard (deviation standard) 2.671. Frequency distribution for post-test values of students of the experimental group can qualify in the diagram.

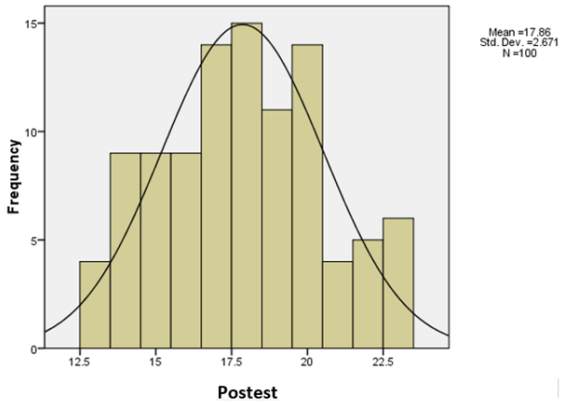

Fig 7. Post-test Frequency Diagram

Then it can be interpreted that after OER, the experimental group students classify as good.

2. Final test results (post-test) Control class

Based on table 5, it can be seen that 34% of students have fewer category scores, 53% of students have enough category scores, and 13% of students have good categories. Most of the posttest scores of students were from 16-19 with a frequency of 53 (or as much as 53%) categorised sufficiently.

No	Interval	Category	Frequensi	(%)
1	12 - 15	Deficient	34	34
2	16 - 19	Passable	53	53
3	20 - 23	Desent	13	13
Sum			100	100

Table 5. Pratest Value Frequency Distribution

The data collected and the results of the descriptive analysis obtained a minimum value of 12, maximum of 22, mean (mean) 16.7 and standard deviation (deviation standard) 2,584. From the results of the analysis, it is obtained the frequency distribution of the posttest scores of the experimental group students qualified in the diagram.

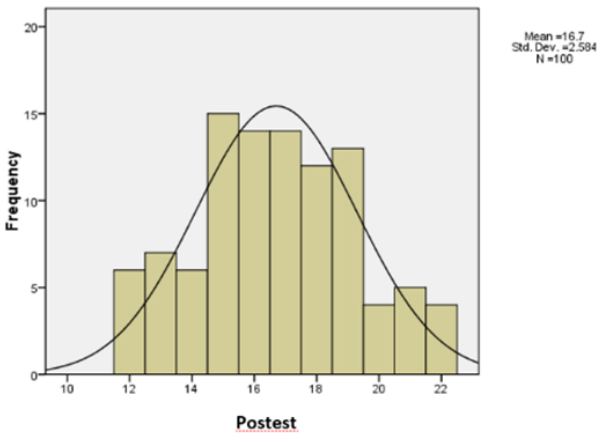

Fig 8. Postest Frequency Diagram

The results of data analysis can interpret that the control group learning outcomes are quite sufficient.

C. Locus Control class experiment and control class

Measurement of locus of control on students was carried out in both groups, including the experimental class, and the control class. While testing locus of control is done on students before students take initial test measurements using a locus of control test, which is included in this instrument as many as 29 questions with six questions that are installed to make the test objectives clearer and not to scan.

1. Test results of Experimental class locus of control

Based on the contents of table 6, it can be seen that 48% of students have an external locus of control test orientation, and 52% internal locus of control test. Most of the orientation of the locus of control test was 12-24 with a frequency of 52 (52%).

No	Interval	Category	Frequensi	(%)
1	1 - 11	External	48	48
2	12 - 24	Internal	52	52
Sum			100	100

Table 6. The frequency of control locus

The data collected and the results of the descriptive analysis obtained a minimum value of 2, maximum 23, mean 11.43 and deviation standard 6.211. Whereas the frequency distribution of the test scores of students' control locus quickly experiments is presented in fig. 9.

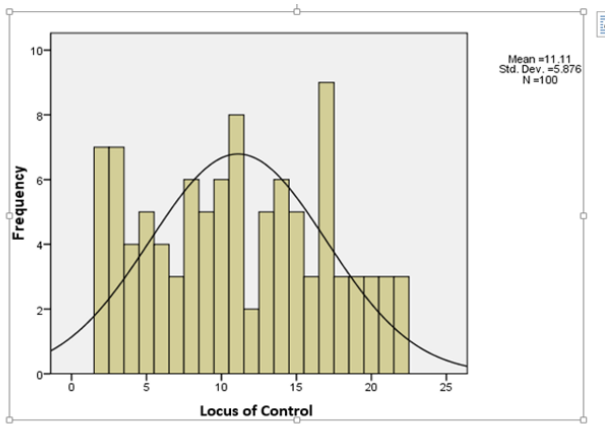

Fig 9. Frequency chart of locus of control

Test results can be interpreted that the experimental class has an internal control locus orientation.

2. Test results of Control class locus control

Based on table 7, it can be seen that 55% of students have an orientation of external control loci, and 45% of an internal control locus. Most orientations of the control locus stretched from 1-11 with a frequency of 55 (by 55%).

No	Interval	Category	Frequensi	(%)
1	1 - 11	External	55	55
2	12 - 24	Internal	45	45
Sum			100	100

Table 7. The frequency of control locus

The data collected and the results of the descriptive analysis obtained a minimum value of 2, maximum of 22, mean (mean) 11.11 and deviation standard 5.879.

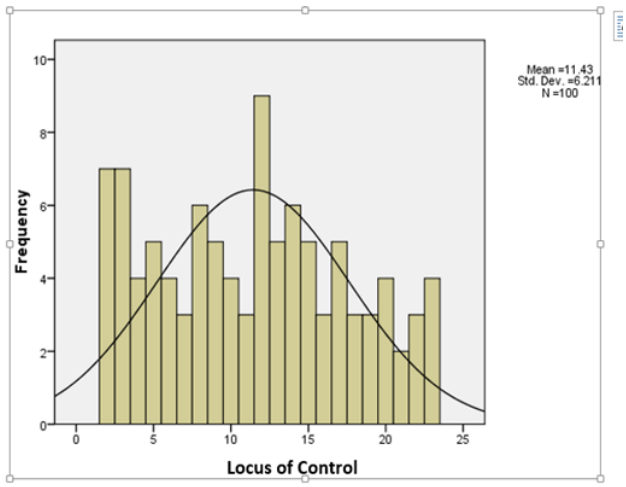

Fig 10. Frequency chart of locus of control

The results of the analysis can be interpreted that the control group has an external control locus orientation.

D. Hypothesis test results

The research hypothesis testing was carried out using two-way / path analysis (ANOVA). In testing this hypothesis, the significance level (α) of 0.05 or 5% was used. Two-way / path analysis (ANOVA) analysis is calculated with the help of the SPSS 20 for Windows computer program.

Analysis of research results on the acceptance or rejection of the null hypothesis (H0), is done by comparing the probability value (sig) with the value of the significance level of the study (α = 0.05). If the significance value is <0.05, then H0 is rejected, and H1 is accepted, and vice versa if the sig value is> 0.05, then H0 is accepted.

1. Difference Test Results of Initial Ability Test (Pre-test) Experimental class and Control class.

Tests of Between-Subjects Effects

Dependent Variable:Nilai_Pra_test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2192.776[a]	3	730.925	4.140	.007
Intercept	248041.085	1	248041.085	1.405E3	.000
Student	164.310	1	164.310	.931	.336
Locus of Control	1195.478	1	1195.478	6.771	.010
Student*Locus	864.038	1	864.038	4.894	.028
Error	34603.304	196	176.547		
Total	283760.000	200			
Corrected Total	36796.080	199			

a. R Squared = .060 (Adjusted R Squared = .045)

Table 8. two-way variant analysis (ANOVA)

The description of table 8 results of two-way analysis of variance statistics on the initial ability test can be shown that:

- Student factors: For student variables, the F-test value = 0.931 with a P-value = 0.336. Because the P-value is greater than α = 0.05, H1 is rejected. So the conclusion is that there is no difference in the initial ability test in the two group classes.
- Factor of locus of control: For the control locus variable, the F-test value = 6.771 P-value = 0.010. Because the P-value is smaller than α = 0.05, then H0 is rejected. So the conclusion is that the student control locus has a different level of difficulty.
- Interaction Factor: F-test value = 6.771 and P-value = 0.028. Because the P-value is smaller than α = 0.05, then H0 is rejected. So the conclusion is that there is an interaction between students' initial testability and control locus.

The results of the initial ability test analysis can be concluded. Experimental classes and control classes have no differences and have the same abilities.

2. Different Tests of Final Test Results (Post-test) Experimental class and Control class.

Tests of Between-Subjects Effects

Dependent Variable:Nilai_Pos_test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3734.992[a]	3	1244.997	17.949	.000
Intercept	854105.084	1	854105.084	1.231E4	.000
Student	539.792	1	539.792	7.782	.006
Locus of Control	2146.770	1	2146.770	30.949	.000
Student*Locus	1115.759	1	1115.759	16.085	.000
Error	13595.488	196	69.365		
Total	869104.000	200			
Corrected Total	17330.480	199			

a. R Squared = .216 (Adjusted R Squared = .204)

Table 9. two-way variant analysis (ANOVA)

The results of the analysis in table 9 can be shown that:

- Student variables (experimental and control groups) have a calculated F value = 7.782 while the sig value is large. = 0.006, while the value (sig) is smaller than the level of significance of the study, namely α = 0.05. So it can be concluded that H1 is rejected and H0 is accepted. This means that the alternative hypothesis that reads "There are differences in learning outcomes of experimental group students and control classes with a significance level of 5%.
- Variable locus control (experimental and control groups) has a calculated F value = 30.949 while the sig value is large. = 0,000, while the value (sig) is smaller than the level of significance of the study, namely α = 0.05. So it can be concluded that H0 is rejected and H1 is accepted. This means that the alternative hypothesis which reads "There are differences in learning outcomes of experimental class and control class between groups of students who have an internal control locus and who have an external control locus" with a significance level of 5%.
- Interaction variables (OER learning and student control locus) have F count = 16.085 while the sig value is large. = 0,000, while the value (sig) is smaller than the level of significance of the study, namely α = 0.05. So it can be concluded that H0 is rejected and H1 is accepted. This means that the alternative hypothesis which reads "There is an interaction between OER learning and locus of control of learning outcomes" with a significance level of 5%.

3. Different test Results of the Cloud Capability Test (Priest) and Final Capability Test (Post-test) Experimental class and Control class.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai	Equal variances assumed	6.753	.002	5.822	198	.000	7.760	1.333	5.131	10.389
	Equal variances not assumed			5.822	183.163	.000	7.760	1.333	5.130	10.390

Table 10. T-test competency of students in experimental class and control class

The description of table 10 above, can be shown by the results of the Leven's Test that the assumption of the two variants is not equal, with a value of t = 5.822 and a p-value (2-tailed) 0,000. While the p-value is smaller than the value of α = 0.05, then H0 is rejected. So it can be concluded that there are differences in learning outcomes of students who use OER learning in the experimental class and control class.

IV. DISCUSSION

Online learning has different goals and processes with other learning. Online learning can increase motivation found in students. Learning motivation and motivation to know about technology for students can be applied to OER learning. More online learners are more intrinsically motivated than other school students [10]. Intrinsic motivation in the online learning process has a positive impact on student learning. Students who are not motivated in online learning will have difficulty using cognitive and metacognitive strategies such as mastery and self-understanding in the learning process [9].

Motivation in the learning process tends to find relevant academic learning processes and also for the learning desired by students [7], although learning motivation approaches negate the fact that a learning process depends on time and context in learning [5]. Open learning is a medium for increasing student learning motivation. OER is a communication tool in the learning process in the World of Education. Since the development of internet technology to date, various activities have been obtained regarding technology and knowledge that can be obtained for free such as free software [6].

OER learning students and teachers can interact through online media. Teacher and student communication are not limited to classes but can be done anywhere with the help of NET. OER learning is a digital material that is used freely and openly in its use by teachers, students, and others so that it can be reused in the process of teaching, learning, and research[12]. On the other hand, OER is an open learning resource providing usage rights for academic purposes [11].

V. CONCLUSION

The results of the study can be taken some conclusions about OER learning, including:

1. OER learning provides students with extensive learning so that students can get more information about the topic of learning.
2. OER learning can interact online with NET. Students have high motivation in using NET technology, with this students learn more happy and motivated.
3. Information obtained by students will be more so that the learning process when students present the results of the discussion has a lot of information from Online learning.

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