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The effectiveness of iot-based learning media for supporting renewable energy engineering expertise program in SMK

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ABSTRACT

The objectives of this study are: (1) to know the performance of renewable energy learning media based on IoT (Internet of Things) in the renewable energy engineering expertise program in the subject of solar hydro-wind energy (Tesha) engineering at Vocational Schools, (2) to examine the feasibility level of renewable energy learning media based on IoT in the subject Tesha's learning at Vocational Schools, (3) to examine the effectiveness level of renewable energy learning media based on IoT in the subject Tesha's learning at Vocational Schools. This research used ADDIE approach (Analyze, Design, Develop, Implement, Evaluate) with an experimental approach. Quasi-Experimental Design with form Non-equivalent Control Group Design was used in this research. Results from this study show: (1) the feasibility of learning media is in the "feasible " category. Analysis from users' responses gets the "Very feasible " category while Cronbach's Alpha gets the "Very Strong" category. Thus, it can be concluded that this media fit to be used as a learning media, (2) different and difficulty test on the questions pre-test with medium category of 96.875%, difficult 3.125% and post-test with moderate category of 93.75%, easy 3.125%, and difficult 3,125%, (3) Learning media using IoT based is more effective than without using IoT because score statistic < 0.05 that is 0.044 with the post-test average value is greater than the specified KKM value (85.42 > 75), while without using IoT, the post-test average value almost same KKM value (75.96 > 75).

Keywords: learning media, renewable energy, Internet of Things (IoT)

Article history

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INTRODUCTION

Preparing the young generation with optimal education is essential in the global era. It required the enhancement of quality in education to obtain education quality and experienced teachers. Based on the Program for International Student Assessment (PISA) in 2018 which was published in March 2019 states that the education rate in Indonesia ranks 74th out of 79 countries in the world (Hewi & Shaleh, 2020).

Vocational School (SMK) is a work-oriented educational institution where students can learn about their chosen career from counseling. Well-equipped workshops and laboratories with practical facilities for supporting high school graduates to be able to compete in the industrial world (Inges, 2003). It could be said that SMK is an institution that can produce many graduates from the workforce and ready to work without further training.

Plan Parent National Research (RIRN) 2017-2045 and Priorities Research Technology (PRN) in 2020-2024 were formed to increase the national capacity of research which includes quantity and quality of resources in science and technology, relevance and productivity research as well as role holder interest in research activity, as well as contributed research to national economic growth. RIRN's focus includes foods; energy; health and medicine; transportation; manipulation engineering; defense and security; maritime; social humanities, arts and education; disaster; biodiversity; stunting nutrition; climate change; and environmental water (Balakrishnan, 2021). The theme of this study is customized with RIRN, focus on; energy and innovation technology with the theme: Testing the Effectiveness of Development Internet of Things (IoT)-Based Renewable Energy Learning Media to Support the Renewable Energy Engineering Expertise Program in Solar Hydro Wind (Tesha) Energy Engineering Subjects at Vocational Schools

The graduates from vocational school have a high level of unemployment. Based on the Central Statistics Agency (BPS) May 2020 shows that big unemployment came from elementary school grade (SD) by 2.64%, junior high school (SMP) by 5.02%, senior high school (SMA) at 6.77%, vocational school by 8.63% (Phalevi, 2021). The statistics show that the reception of employees from school graduates is low. This happens because the graduates do not have enough skills or competencies that are needed in the work world needs.

SMK Negeri 1 Lingsar is one of the Vocational High Schools in Lombok which has 4 majors, one of which is a major in renewable energy technique (TET). Specifically, the TET expertise program has a lesson about electricity generators that are hydro technique energy, solar, wind, and hybrid (Tesha). The TET expertise program has achieved core and basic competencies in learning renewable energy techniques. Those are core competence in analyzing concepts and calculations conversion energy photovoltaic to electricity, and competence base count conversion energy photovoltaic to electricity. SMK 1 Lingsar operates the learning process by giving theory and practice, where the theory is given to give students early knowledge about miscellaneous generator power electrical and engineering conversion power generation systems. A practical process was conducted to prove the generation process of power electricity to support the learning process by theory. Besides that, in the learning process, the teacher puts more emphasis on practice so that students understand the generation process of electricity, specifically renewable energy.

Teacher uses lecturing method and discussions with whiteboard media and PowerPoint which make the learning process ineffective in increasing the ability of student, and this year Indonesia has been hit with pandemic cases which makes the learning process conducted virtually where the learning process is not effective and maximal enough (Darojat & Sutikno, 2018), because of media limitations, limitations of time in the practical process which only take 30 minutes and non optimal utilization of application cause uninteresting learning process. Besides that, when students are bored in the learning process, many students open smartphones to play games and social media in the learning process. This thing is conducted by students by utilizing the teacher's carelessness, and the teacher lacks firm in upholding learning process rules. Because of that, the teacher should teach with interesting methods of learning to make the learning process run smoothly.

Strong connections are indicated by context awareness, energy independence, and improved energy processing in networks connecting devices connected to the Internet (Satria et al., 2015). The use of IoT (Internet of Things) is used to support the virtual learning process (Megawati, 2021). Thamaraimanalan et al., (2018) state a horticultural agriculture computerization framework utilizing Web of Things (IoT) is proposed. The Internet of Things is gradually maturing and continues to be the newest and hottest concept in the IT world. Over the past decade, the term Internet of Things (IoT) has gained traction by representing a vision of a global infrastructure of networked physical objects, enabling the connection of everything, everywhere, and everything just for anyone (Madakam et al., 2015). IoT consists of a collection of different, purpose-built networks. for example, having multiple networks to control machine performance, safety features, communication systems, and so on (Cisco, 2011). The Internet of Things has been verified to work satisfactorily by connecting various soil parameters to the cloud and being successfully controlled remotely via a mobile app (Kumar et al., 2021). Internet of Things (IoT) in general has the concept of bringing together many interconnected objects, services, people, and devices that can communicate and share data and information to achieve common goals in different fields and applications (Andriani et al., 2019). IoT refers to the infrastructure of interconnected objects, people, systems, and information resources based on smart services that process information from the visual and virtual worlds to give proper reactions (Evans, 2011). The IoT architecture according to Vashi et al., (2017) is divided into five main layers: Perception layer; (2) Network layer; (3) middleware layer; (4) Application layer; (5) Bussines layer (Burange &; Misalkar, 2015). IoT systems are categorized by the implementation of Intelligence, Connectivity, Sensing, Safety, and Energy. The basic concept of IoT is illustrated in Figure 1. The "things" can be interconnected with "people" and other "things" through internet networks. The data communication between "things" can happen anywhere, anytime, and under any conditions. IoT is a framework that applies high-level object identification which allows quick data transfer over the web without two-way interaction between humans and computers. IoT is a scientific advancement that makes life easier with smart sensors and smart devices that are integrated into networks (Keoh et al., 2014).

The practice of generating electricity, especially renewable energy in the process of measuring and determining the output/parameter values produced is still manual, with the existence of IoT media making it easier for teachers and students to determine the measurement and determination of parameters on the power plant learning media such as current, voltage, and energy produced to increase efficiency, time and the level of validity of parameter data. In addition, by using this media device, the process can be controlled and monitored anytime and anywhere and in the practical process, it will be more applicable to support the power plant learning process. In addition, the use of IoT is developed to evaluate the applicability of Core Competencies and basic competencies. Utilization of IoT can be used as a generator learning media device for vocational schools because IoT-based media is still minimal. Therefore, it is necessary to develop learning media for IoT-based renewable energy power plants for the SMK level. The objectives of this study are knowing as: (1) the level the feasibility of learning media generator electricity use energy renewable IoT based, (2) the Response vocational school students and teachers regarding learning media generator electricity use energy renewable IoT-based, (3) The level of effectiveness of learning media generator electricity use energy renewable IoT based on the eye energy engineering lessons renew at SMK.

METHOD

The study on the renewable energy learning media based on IoT for supporting the competent of generator electricity in the lesson " Sun hydro wind energy engineering" or "*Teknik Energi Matahari Hidro Angin"* (Tesha) at SMK used Research and Development. The development model used the ADDIE approach. In the ADDIE approach, the implementation stage used an experimental approach to test the level of effectiveness of the learning media. According to Branch, (2009), The ADDIE approach consists of analysis which includes validation of gap performance, formulation of instructional destination, identification of students' characteristics, identification of the resources needed, determination of the right learning strategy, drawing up a plan for management projects/programs; design which include compiling to-do lists, compiling destination performance, strategize tests, calculate costs incurred; development which includes generate content, select or develop supporting media, develop guidance for students, develop guidance for teachers, conduct formative revisions, conduct a pilot test; Implementation (apply) which includes preparing teachers, preparing the student to use knowing response user to media use, and for knowing the effectiveness of media used. In the lesson, a Quasi-Experimental Design with the Form Non-equivalent Control Group Design approach was used (Sugiyono, 2010). In this design, there was an experimental group and a control group, but the experimental group and control group were not chosen randomly (Sugiyono, 2010). In the Non-equivalent Control Group Design, the second group was given a pretest to know the pre-score or knowledge and examine if there was a difference between the experimental group and the control group. Good pre-test results when the experimental group score and control group score show no big difference. The following table is the design of the Nonequivalent Control Group (Sugiyono, 2010);

Table 1. Design of Experimental methode

Group	Pre-test	Treatment	Post-test
Experiment	X_1	X	X_2
Control	X_3	-	Y_4

Description:

X1: test at the beginning class experiment.

Y3: test at the beginning of class control.

X2: test at the end class experiment.

Y4: test at the end of class control.

This study produces a product in the form of software and hardware about renewable energy leaning media based on IoT for supporting on an expertise program of renewable energy engineering in the generator class (Sun hydro wind energy engineering) in SMK. This experimental approach has 2 variables namely: independent variable and dependent variable. The independent variable in this study is the learning method with and without the utilization of the Internet of Things. On the other hand, a dependent variable in this study is the performance of students' learning which was reviewed from ability; and evaluation (evaluating) where its part contains the determination of evaluation criteria, and choosing a tool or media for evaluation. Conducting this evaluation must be started from the first step to the last step linearly. This process will stop if the developed product is already fullfil the analysis requirements and needs assessment :

1) Development Procedure

The procedure of this study uses the ADDIE development model and experiment. The steps of the ADDIE development model are as follows:

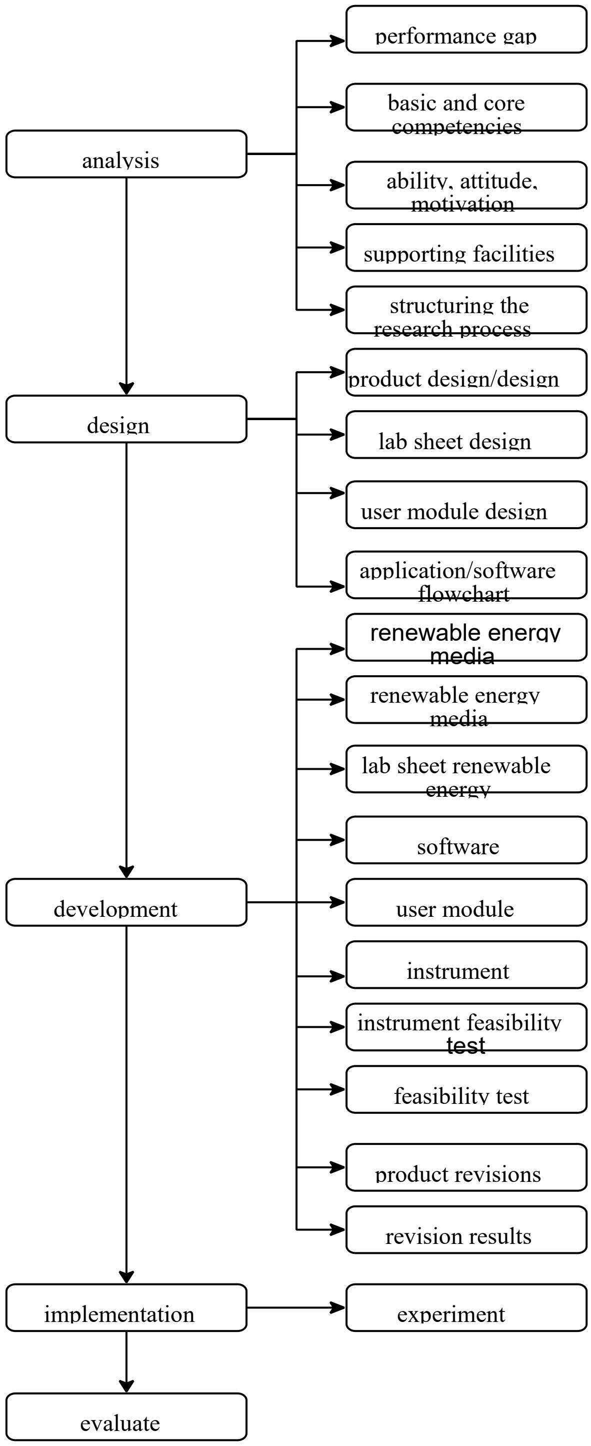

Figure 1. Research Flowchart

2) Analysis

Need Analysis is a step to gather information for knowing the gap between reality and an ideal situation.

3) Design (Design)

According to Robert Maribe's branch, at second stage i.e. the process design focuses on design development based on IoT in competence generator electricity. There are 3 designs namely product design, job sheet design, and design of users' module.

4) Development (Development)

The development process in this study consists of 7 steps of applied research namely: 1) Making renewable energy media based on IoT, 2) Creating worksheets media for renewable energy based, 3) Development of Instrument, 4) Eligibility Test Instrument, 5) Test Try Eligibility, 6) Revision Product, 7) Result Revision Product.

5) Implementation (Apply)

Application of media testing in generator competition was conducted after media-based renewable energy was confirmed and declared as "feasible" by expert material and expert media. After that, further implementation is done on teachers and students, and for response users test on media-based renewable energy devices IoT on process learning.

6) Evaluation (Evaluation)

To know the advantages and disadvantages of the device, revision steps from suggestions and experts' comments are required. The weakness will be used as ingredient analysis for carrying out the development process return/appropriate refinement with needs as well as fixing deficiencies from developed devices.

7) Validity and Reliability Instrument

The level of validation and reliability have already been fulfilled. Thus, this instrument could be used to know the appropriateness of a product. Validity is measured by material experts, media experts, and user's responses. Reliability by using the Alpha formula Method is chosen because multi-answer questionnaires are used as tools that are given to students.

8) Data analysis techniques

Data analysis techniques in this research were descriptive quantitative techniques to describe feasibility, functionality, and effectiveness as a learning medium for the TET expertise program. Data analysis techniques obtained with the method as follows:

a. eligibility data consists of categorization of appropriateness

b. hypothesis test consists of effectiveness data, difference effectiveness learning use and not using IoT (T-test/ inferential)

c. assumption test consists of normality and homogeneity.

RESULTS AND DISCUSSION

1. Validation of test materials and media/test appropriateness

a. Results Test of Validation Contents (Content validity)

Table 2. validation results from the expert contents

No	Respondent	Aspect			Total
		Theory	Learning	Functionality	
1	Material Expert 1	54	21	26	102
2	Material Expert 2	49	22	30	101

The percentage appropriateness from expert Theory could be depicted in a bar chart and can be reviewed from three aspects that cover quality material aspect, learning aspect, and functionality aspects that can be seen in Figure 2 as follows.

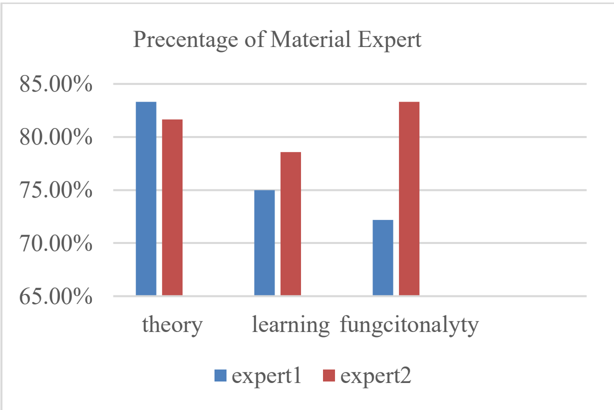

Figure 2. Chart percentage from Material Expert

b. Results Test Validation Construct (Construct validity)

Table 3. validation result from the expert contruct

No	Aspect Evaluation	Score Max	Score Expert 1	Score Expert 2	Average Score
1.	Appearance	44	37	37	37
2.	Functionality	88	70	77	73.5
	Amount	132	107	114	110.5
	Percentage (%)	100%	81.06%	86.36%	83.71%

Based on the data in Table 3, the appropriateness percentages from media experts can be depicted in bar chart form, it also could be reviewed from two aspects: cover appearance aspect, and functionality aspect that can be seen in Figure 3 as follows.

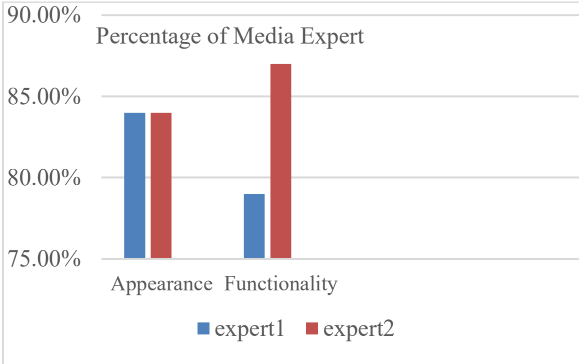

Figure 3. Chart percentage from Media Expert

c. Post-test and pre-test validation tests (Aiken pre-test)

Table 4. the result of coefficient aiken pre-test

Item	Expert 1	Expert 2	S1	S2	Total	n(c-1)	V
A1-A32	127	138	95	106	201	256	0.7851563

d. Reliability and validity

Interpretation after getting coefficient reliability. Coefficient interpretation alpha that was used according to (Budi, 2006), where rehabilitation results that were obtained from alpha calculation was 0.707 so that could be said to be "reliable". Thus it can be concluded that indicator devices Fulfill requirements to be used in research.

Table 5. Reliability results instrument

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.707	.651	35

Instrument tests that are used in the classroom by teachers should have minimum coefficient reliability (0.7). The results estimation reliability instrument test in this study can be seen in Table 5. For estimation results of reliability instrument pre-test and post-test are presented in Appendix 6.

Table 6. Estimated Result Reliability Instrument

Reliability Statistics

Cronbach's Alpha	N of Items
.870	32

Reliability Statistics

Cronbach's Alpha	N of Items
.714	32

Based on Table 6, it was obtained that the coefficient reliability instrument in this study is more from or the same with 0.70 whether it was used in the pre-test as well as the moment post-test

a. Trials Usage

1) Test user scale small

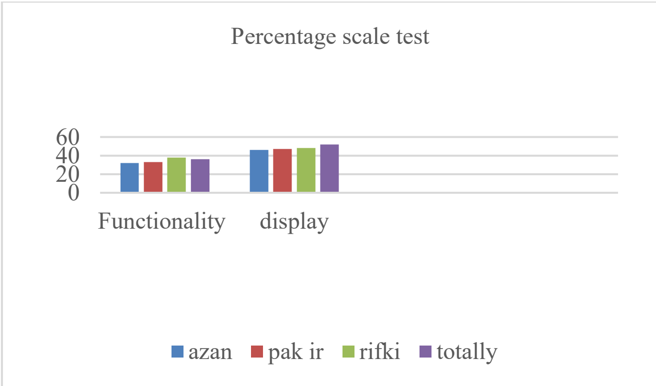

Figure 4. Chart Scale test percentage small

Based on Figure 5, the small-scale test result was as big as 90.90%. Based on those results, thus, learning media using IoT is declared to be very worthy as learning media on the lesson "technique energy Sun hydro wind in Energy Engineering expertise program renewable" in SMK.

Figure 5. Use scale small

2) Test Usage (user test scale big)

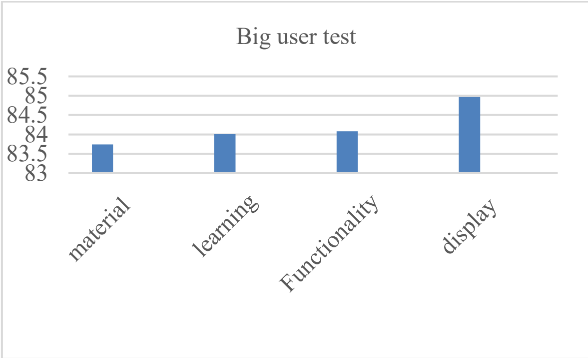

Figure 6. Chart percentage from User

Based on Figure 6, some data can be obtained. From theory quality, the percentage of data is 83.73%, from the learning aspect the data shows 84%. If it is reviewed from the functionality aspect, the data shows 84.08%. From the quality appearance aspect, the data indicates 84.96%. The average percentage from those four aspects is 84.19%. Based on the results, the learning media using IoT is declared to be very worthy as learning media in the renewable energy engineering expertise program in the subject of solar hydro-wind energy engineering at Vocational Schools

Figure 7. Large-Scale Usage Process

1. Experiment Test Results

The learning process has been implemented at SMK Negeri 1 Lingsar, starting on class X tesha1 and XI tesha2. Class X tesha1 is an experimental class that was taught without using learning media that utilizes IoT while in class XI tesha2 was a control class that was taught by applying lots of learning media applied in the school that takes advantage of IoT. In the implementation of learning, the researchers followed a timetable at school that is every Wednesday for X $tesha_1$ and every Thursday for XI $tesha_2$. The learning process of this study was conducted in 2 meetings in each class. The first meeting was used for pre-test data to see learning performance by students in the lesson Sun hydro wind energy engineering in class experiment and control class. Giving the pre-tests aimed to know the early ability of students in both classes before giving treatment.

Next, at the second meeting, different treatments were given in each class. In the experimental class, the treatment was in the form of learning without taking advantage of IoT. On the other hand, the control class was given treatment in the form of learning by utilizing IoT as a supporting medium. At the end of the meeting from both classes, it was used for post-test test data collection performance study. This post-test test data was used to measure the ability of students after students getting treatment learning without taking advantage of IoT in the experimental class and conventional learning with taking advantage of IoT in the control class.

Figure 8. Approach Experiment

Analysis item was conducted based on the theory test classic for knowing the level of difficulty and power of different item matter. Analysis item by a theory tests classic use of Microsoft Excel help. Data used in the form of answer participant tests in forms A, B, C, D, and E are accompanied by key Answers. Level difficulty item questions in the study are shared into 3 categories, namely easy, medium, and hard categories. As for the percentage based on criteria level difficulty presented in Figure 33

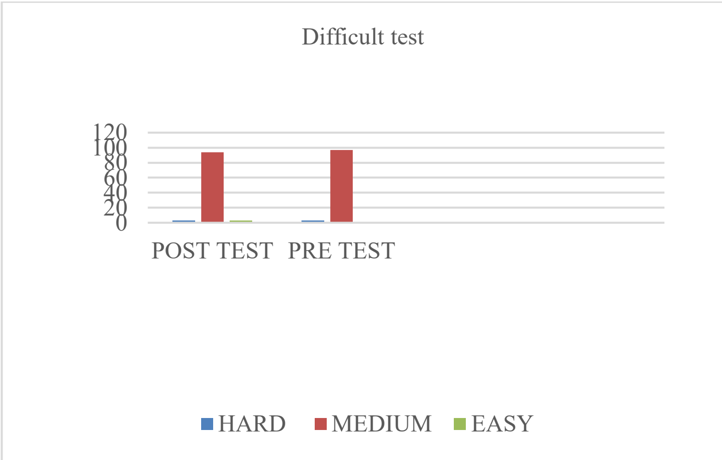

Figure 9. Difficulty Level Item Question Instrument Pre-Test and Post-Test

Based on Figure 9 it is obtained that the percentage of item instrument pre-test which has a medium level of difficulty was 96.875%, the difficult category was shown by 3.125%, and there is no item in the easy category. The temporary percentage item instrument post-test which has a level of difficulty with category medium is 93.75%, the easy category is 3.125%, and 3.125% which entered the difficult category.

Figure 10. differentiating power for each question item

Based on Figure 10 shows that all question items in the pre-test instrument and post-test instrument have good differentiating power. This could be interpreted that the instruments were used in this study having a good ability to distinguish which participants are capable learners and those who aren't. Participants who can teach are participants who can answer the test item correctly because they have mastered the material.

a. Descriptive Data Analysis

To review the effectiveness of students' learning performance using learning media based on the IoT at Sun hydro wind energy engineering class, pre-test and post-test were used. The learning method can be said to be effective if the overall average score of students is at least 75. The achievement data from students in the technique energy Sun hydro wind lesson can be seen in Appendix 7 and pre-test data and post-test data in Appendix 8.

Table 7. Descriptive test questions pre-test and post-test

Statistics					
		Preeks	Precontrol	Posttext	control post
N	Valid	30	30	30	30
	Missing	2	2	2	2
Mean		55.7955	58.1307	75.9632	85.4208
Std. Deviation		6.00083	6.28498	9.29433	10.19622
Variance		36.010	39,501	86,385	103,963
Minimum		46.88	43.75	56.25	59.38
Maximum		71.88	75.00	93.75	100.00

From Table 7 above, there is an enhancement of about 23% from 58.55 to 78.96 in the post-test in-class experiment. Meanwhile, the mean score of the pre-test students' performance in the control class i.e. 59.0625 experienced enhancement by 33% to 85.42 in the post-test. Besides that, the cut score in the expertise program is 75. Based on students' performance in learning completeness, it was obtained that students' performance in learning completeness by 43.33% (13 students) who reached the KKM in the pre-test increased to 66.6% (20 students) who achieved the KKM in the post-test. Meanwhile, in-class study control obtained performance completeness of 53.33333% (16 students) who reached the KKM on the pre-test increased to 86.66667% (26 students) who reached the KKM on the post-test. This result shows that student's achievement in the control class is higher than students in the experiment class.

a. Inferential Data Analysis

1) Assumption Test

a) Normality Test

Normality tests were carried out on the pre-test and post-test data of students' achievement in the TESHA lessons. In this research, the normality test that was used is the Kolmogorov-Smirnov. test with correct Dallal - Wilkinson - Lilliefor. Normality test results using the Kolmogorov-Smirnov. test with correct Dallal -Wilkinson- Lillie for presented in Table 8.

Table 8. Normality test

Tests of Normality						
	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
Class	Statistics	df	Sig.	Statistics	df	Sig.

learning outcomes	Class pre-experiment	.142	30	.126	.934	30	.065
	Class post experiment	.133	30	.183	.955	30	.229
	Class pre-control	.149	30	.087	.960	30	.305
	Class post control	.143	30	.122	.923	30	.032

a. Lilliefors Significance Correction

Based on Table 8, the data shows that the pre-test and post-test data normality test performance study in TESHA lessons in the control class have a more significant score compared to the alpha value 0.05 (p-value>0.05). The same information was also obtained on the pre-test and post-test data study performance TESHA lessons in experiment class where the score shows a more significant score compared to the score alpha 0.05 (p-value>0.05). Thus, it can be concluded that the null hypothesis is accepted and there is no reason to accept alternative hypotheses. That means, there is no difference among distribution scores pre-test and post-test in the experiment class and control class with the expected normal distribution.

b) Homogeneity Test

Homogeneity test carried out on pre-test and post-test data on students' study performance in TESHA lessons. In this research, the homogeneity test used is Levene's test. Homogeneity test results that use the Levene test are presented in Table 9.

Table 9. Homogeneity test

Test of Homogeneity of Variance

		Levene Statistics	df1	df2	Sig.
learning outcomes	Based on Mean	.168	1	58	.683
	Based on Median	.091	1	58	.764
	Based on the Median and with adjusted df	.091	1	57,391	.764
	Based on trimmed mean	.129	1	58	.720

Based on Table 9 obtained information that the homogeneity test of the pre-test and post-test data of study performance in TESHA lessons in experiment class have more significant scores compared with score alpha 0.05 (p-value>0.05). The same information was also obtained on the pre-test and post-test data study performance eye in TESHA lessons in the control class where the results of the score show a more significant score compared to alpha value 0.05 (p-value > 0.05). Thus, it can be concluded that the null hypothesis is accepted and there is reason for accepting the alternative hypothesis. That is, pre-test and post-test scores in-class experiments and control class have the same variance (homogeneous).

2) Hypothesis Test

a) Effectiveness learning by taking advantage of IoT

In testing the effectiveness of online learning methods with the application of IoT reviewed from students' study performance in TESHA lesson, then One-Sample T-Test was used. students' study performance was used in testing is post-test data compared with the KKM value that has been set, which is 75. The results of the One-Sample T-Test in the control class are presented in Table 10.

Table 10. test one sample test

One-Sample Test						
	Test Value = 75					
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Posttest	5.598	29	.000	10.42083	6.6135	14.2282

Based on Table 10, the data shows that the significant score is smaller or not enough from score alpha 0.05 (p-value < 0.05) and value t> table. This shows that the null hypothesis (0) is rejected. Thus, it can be concluded that online learning with IoT is reviewed from students' study performance in TESHA lessons.

b) The difference in effectiveness among learners that apply IoT and not IoT.

In determining the difference of effectiveness in online learning methods that apply IoT which was reviewed from students' performance in technique energy Sun hydro wind independent-sample lesson, thus T-test was used. Difference test results effectiveness among experiment class no leveraging IoT and class (conventional) controls utilizing IoT are presented in Table 11.

Table 11. Independent sample test

One-Sample Test							
	Levene's testing equity of Variances						
						95% Confidence Interval of the Difference	
	F	df	Sig. (2-tailed)	Mean Difference	Std error difference	Lower	Upper
Equal variance assumption	4.250	58	.044	- 2016767	2016767	-24.21085	-16,12449
Equal variance not assumption		49.599	.000	2016767	2016767	-24,22548	-16.10985

Based on Table 11, the data shows that Pre-test data effectiveness test results in students study performance energy engineering lessons Sun hydro wind Among eye energy engineering lessons Sun hydro wind has a more significant score from alpha value 0.05 (p-value > 0.05). This indicates that there is no difference in effectiveness among technique energy Sun hydro wind lesson reviewed from students' study performance in technique energy Sun hydro wind before given treatment. Different results were found in the post-test data effectiveness test where the result shows a smaller score or not enough from score alpha 0.05 (p-value < 0.05). This shows that the null hypothesis (0) is rejected. Thus, it can be concluded that there were different averages found among learning with and without using IoT reviewed from students' study performance generator electricity (Tesha) lesson.

CONCLUSION

Based on the results of data analysis about the effectiveness of learning media by taking advantage of IoT in increase understanding of the lesson Sun hydro windenergy engineering, it can be concluded as follows: Learning media IoT based on the lesson generator power electricity (Tesha) in SMK 1 Lingsar have level appropriateness with "Decent" category with amount percentage by expert material 79.83% and by media experts 83.71%, Students' responses have appropriateness with "Very Eligible" category with an amount of percentage by 84.19%, especially energy renewable in Skills Program technique energy there is different effectiveness from learning by IoT and without IoT reviewed from students' performance in generator power electricity (Tesha) lessons. Learning by utilizing IoT is more effective compared to learning without utilizing IoT reviewed from students' performance in generator power electricity (Tesha) lesson.

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