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Education transformation in era 4.0: The effect of learning facilities on student learning outcomes

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Abstract: This study aims to determine the effect of learning facilities on the learning outcomes of SMK Pasundan 1 Serang City class XI students. The sample of this research is class XI students of SMK Pasundan 1 Serang City, with as many as 61 people who act as respondents. To answer questions from the formulation of the problem above, the type of research used is quantitative. In contrast, the data collection technique uses questionnaires, observation, and documentation, and the data analysis technique uses SPSS IBM 26. The results of hypothesis testing research using validity test, reliability test, normality test, linearity test, T-test, and F test show that learning facilities obtained the results of t_{count} 8.257> t_{table} 2.002 (sig 0.000 <0.05), meaning that H0 is rejected and Ha is accepted. Thus, it can be concluded that there is an influence between learning facilities on the learning outcomes of class XI students of SMK Pasundan 1 Serang City.

Keywords: Influence; Interactive learning media; Articulate storyline; Self-reliance learning

1. Introduction

The changing times that have reached the 4.0 era have various influences in every field (Lukita et al., 2020; Masood & Egger, 2019; Stachová et al., 2019). The development of the industrial revolution 4.0 happening in the world today is very influential on education development, including education in Indonesia (Lukita et al., 2020). The impact on Indonesia is the rapid changes in technology and information that require the provision of optimal human resources. Therefore, education is considered to be an essential investment to be implemented. Entering the era of the Industrial Revolution 4.0, education in Indonesia has changed in all learning factors, including curriculum, learning methods or models, learning materials, learning media, teachers or educators, students and learning facilities (Maryanti et al., 2020).

Education is also a vital thing that everyone must obtain in order to adapt to the progress of the times, which requires everyone to have knowledge so as not to be left behind (Gayatri et al., 2023; Ydyrysbayev et al., 2022). The development of a country begins with the formation of a person's character, where a person's character can be determined by the education obtained. The importance of education for national development is to form and prepare human beings who are qualified, dignified and ready to provide innovations to advance the country (Afandi et al., 2019; Kumar et al., 2021).

The government has carried out various programmes to improve the quality of education in various educational institutions to improve the quality and quality of human beings who can positively influence the country (García et al., 2020). Law No 20 of 2003 on the National Education System Article 3 states

that national education functions to develop the ability and shape the character and civilisation of a dignified nation in order to educate the nation's life, as well as develop the potential of students to become human beings who are faithful and devoted to God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (Afandi et al., 2019).

In this 4.0 era, education is required to keep up with the times, including technology (Guo et al., 2020; Oke & Fernandes, 2020). Learners must be able to use and utilise technology to adapt to the rapid development of the times (Lim et al., 2022). This can be seen from the activities of teachers and students using technology, namely computers, in teaching and learning. Many activities are carried out using computers, for example, making papers, reports, exam questions and others. Not only the ability to master technology but critical thinking, problem-solving, communication, collaboration, and creativity are needed in global competition in the 4.0 era.

2. Methods

The type of research used is quantitative (Bloomfield & Fisher, 2019). Quantitative research is a method to test specific theories by examining the relationship between variables (Bloomfield & Fisher, 2019). These variables are measured (usually with research instruments) so that data consisting of numbers can be analysed based on statistical processes, while this research approach is a quantitative descriptive method. This research was conducted at SMK Pasundan 1 Serang City, located at Jl. Pakupatan, KM 3, Panancangan Cipocok Jaya Serang City, Banten in July odd semester. The instrument used in this research is a questionnaire.

2.1 Validity test

A test is called valid if it can measure what it intends to measure. According to (Eliza et al., 2019) said that if the instrument is said to be valid, it means that it shows that the measuring instrument used to obtain the data is valid, so valid means that the instrument can be used to measure what should be measured (Sudaryono et al., 2019). The validity value is calculated using the Product-Moment correlation formula using a raw score. Eq 1.

$$r_{xy}=\frac{N\sum XY-(\sum X)(\sum Y)}{\sqrt{\{N\sum X^2-(\sum X)^2\}\{N\sum Y^2-(\sum Y)^2\}}} \quad (1)$$

Description:

r_{xy} = Colleration coefficient between variables X and Y
X = Item score
Y = Total score
N = Multiple subjects

2.2 Reliability test

Reliability is an index that shows the extent to which a measuring device is trusted or reliable (Aiken, 1985). The reliability test in this study used the Kuder Richardson-21 formula. This KR-21 formula is different from that proposed by Spearman-Brown, Flanagan and Rulon, where test reliability is determined on part of the first hemisphere and part of the second hemisphere (Almehrizi, 2021). However, Kuder Richardson was not satisfied with these methods. He suggested that determining the reliability of the test is more appropriate if it is done directly on the items concerned. Here is the KR-21 Eq. 2

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{1-Mt\,(n-Mt)}{(n)(St^2)}\right) \quad (2)$$

Description:

r_{11} = test reliability coefficient
n = Number of items
1 = constant Number
Mt = mean total
St^2 = variant total

2.3 Normality test

The normality test helps determine whether the data that has been collected is normally distributed or taken from a normal population (Yap & Sim, 2011). The normality test in this study used the Kolmogorov-Smirnov (Eq. 2).

$$k_D = \sqrt[1.36]{\frac{n_1+n_2}{n_1 n_2}} \quad (3)$$

Description:

K_D = Kolmogorov-Smirnov price sought
n_1 = Number of samples observed or obtained
n_2 = Expected sample size

2.4 Linearity test

The linearity test aims to determine whether two variables have a linear relationship or not significantly. This test is usually used as a correlation or linear regression analysis prerequisite. They were testing on SPSS using the Test for Linearity with a significance level of 0.05. Two variables are said to have a linear relationship if the significance (Linearity) is less than 0.05.

2.5 Hyposthesis test

Hypothesis testing is a temporary answer, which is still being tested through facts. Hypothesis testing using the basis of facts requires a tool, and statistical analysis is often used (Keysers et al., 2020). If the researcher has explored the research problem carefully and established basic assumptions, then make a temporary theory, the truth of which still needs to be tested (under the truth). This is the hypothesis the researcher must think that his hypothesis can be tested. Furthermore, the researcher will work based on this hypothesis.

2.5.1 Simple regression analysis

To find out how variable Y can be predicted through variable X. individually and how much influence the independent variable has on the dependent variable, after the data is converted from ordinal data to interval data, it is entered into the Eq.

$$\hat{Y} = a + b\,X \quad (4)$$

Description:

$\hat{Y}$ = Subjects in the predicted dependent variable
A = Y price when X = 0 (cash price)
b = Direction number or regression coefficient, which shows the Number of increases or decreases in the dependent variable based on the independent variable. If b (+), it increases; if b (-), it decreases.
X = Subject on the predicted independent variable

2.5.2 Coefficient of determination

Furthermore, the Amount of contribution given by the independent variable to the dependent variable is determined by the Coefficient of determination formula Eq 5.

$$K = r^2 \, x \, 100\ \% \quad (5)$$

Description:

KP = The coefficient of determination
r = Correlation coefficient value

2.5.3 T test

The t-test is used to show whether there is an influence of one independent variable individually on the dependent variable.

Hypothesis formulation:

H_0 : There is no significant influence between learning facilities and the learning outcomes of class XI SMK Pasundan 1 Serang City.
Ha : There is a significant influence between learning facilities and the learning outcomes of SMK Pasundan 1 Serang City class XI students.

To test the correctness of the hypothesis, the t statistic is used, which is calculated in the following bg Eq. 6.

$$t = \frac{b_i}{Sb_i} \quad (6)$$

Description:

bi = Regression coefficient (i = 1,2,3..)
Sbi = Standard deviation of the coefficient

2.5.4 F test

The F test is simultaneous regression testing. This test determines the effect of all independent variables contained in the model together (simultaneously) on the dependent variable.

$$F = \frac{R^2/k}{(1 - R^2/(n - k - 1))} \quad (7)$$

Description:

R^2 = Coefficient of determination
K = Number of independent variables
N = Amount of data

The calculated F is compared with Ftable obtained using a 5% significance level or with df =k (n-k-1).

3. Results and discussion

3.1 Validity test

They are testing the validity of the questionnaire using the product moment formula to test the validity of the questionnaire using Cronbach's alpha formula at the $\alpha = 0.05$ level. The calculation was carried out using IBM SPSS version 26. The results of the validity test calculation are as follows.

Table 1. Variable X (Learning facilities)

No item	r_{count}	r_{table}	Category
1	0,487	0,248	Valid
2	0,487	0,248	Valid
3	0,568	0,248	Valid
4	0,455	0,248	Valid
5	0,686	0,248	Valid
6	0,401	0,248	Valid
7	0,677	0,248	Valid
8	0,457	0,248	Valid
9	0,343	0,248	Valid
10	0,461	0,248	Valid
11	0,576	0,248	Valid
12	0,683	0,248	Valid
13	0,558	0,248	Valid
14	0,344	0,248	Valid
15	0,623	0,248	Valid
16	0,734	0,248	Valid

Testing the item's validity, each statement item must be compared with r_{table} at the $\alpha = 0.05$ level with n = 61, so it can be seen that $r_{table} = 0.248$. Based on the table above, it can be seen that the statement item is declared valid.

Table 2. Variable Y (learning facilities)

No item	r_{count}	r_{table}	Category
1	0,574	0,248	Valid
2	0,376	0,248	Valid
3	0,397	0,248	Valid
4	0,353	0,248	Valid
5	0,612	0,248	Valid
6	0,425	0,248	Valid
7	0,576	0,248	Valid

8	0,489	0,248	Valid
9	0,512	0,248	Valid
10	0,638	0,248	Valid
11	0,453	0,248	Valid
12	0,558	0,248	Valid

3.2 Reliability test

Once valid items have been obtained, reliability is tested using the Cronbach alpha formula, which aims to determine whether the test given is appropriate for the sample determined. The reliability results are shown in table 3.

Table 3. Reliability of learning facilities

Variable X		Variable Y	
Cronbach's alpha	N of items	Cronbach's alpha	N of items
.791	16	.719	12

3.3 Normality test

The normality test uses the Kolmogorav-Smirov test analysis technique with the SPSS program at a probability of $\alpha = 0.05$. The results of the normality test calculation of the two variables are presented in the following table 4.

Table 4. Reliability of learning facilities

		Unstandardised residual
N		61
Normal Parameters[b]	Mean	.0000000
	Std. Deviation	2.05306814
Most Extreme Differences	Absolute	.083
	Positive	.083
	Negative	-.043
Test statistic		.083
Asymp. Sig. (2-tailed)		.200[c,d]

Based on the data above, it can be seen that the probability value (sign) is 0.200, whose value is> from the significant level of 0.05; it can be said that Ha is accepted, and based on the results of this analysis, it can be stated that the variable data is normally distributed.

3.4 Linearity test

The results of the linearity test calculation of the learning facility variable (X) on learning outcomes (Y) are presented in the following table:

Table 5. Linearity test

	Sum of squares	Df	Mean square	F	Sig.
X * Y	633.362	11	57.578	8.211	.000
	523.723	1	523.723	74.689	.000
	109.639	10	10.964	1.564	.000
	343.589	49	7.012		
	976.951	60			

3.5 Hypothesis test

3.5.1 Determination coefficient test

Before testing the hypothesis, a correlation analysis was first carried out from the regression output, the results of which are shown in Table 6.

Table 6. Determination coefficient test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732[a]	.536	.528	2.070

Based on the output obtained, the R number is 0.732. It can be concluded that 73.2% there is a relationship between learning facilities and student learning outcomes, while variables outside the study influence 26.8%.

3.5.2 T-test

Hypothesis formulation is:

H_0 : There is no significant influence between learning facilities and the learning outcomes of grade XI students at SMK Pasundan 1 Serang City.
Ha : There is a significant influence between learning facilities and the learning outcomes of grade XI students at SMK Pasundan 1 Serang City.

If the significance value > α (0.05), then H0 is accepted, and Ha is rejected ($t_{count} > t_{table}$), while if the significance value < α (0.05), then H0 is rejected, and Ha is accepted.

To test the effect of learning facilities on student learning outcomes in this study using the comparison of t_{count} and t_{table} with a significance level of 5% and N = 61, the t_{table} value at 5% is dk = N-k-1 or dk = 61-3-1 = 57, t_{table} 2.002.

Table 7. T-Test results

Model		Unstandardised coefficients		Standardised coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.400	3.529		2.947	.000
	X	.547	.066	.732	8.257	.017

Based on the results of Table 7, it is known that t_{count} = 8.257. Meanwhile, the t table at the 5% significance level obtained the t table value = 2.002. A comparison of the two resulted in $t_{count} > t_{table}$ (8.257> 2.002). The significance value for the learning facilities variable is 0.017, smaller than the probability value of 0.05 (0.017 <0.05). This test shows that Ha is accepted and H0 is rejected, meaning that there is a significant influence between learning facilities and the learning outcomes of class XI students at SMK Pasundan 1 Serang City.

3.5.3 F-test

The F test was conducted to determine the effect of variable X on variable Y. In this case, the effect of learning facilities on the learning outcomes of class XI students at SMK Pasundan 1 Kota Serang can be seen by using the comparison of Fcount and Ftable using a confidence level of 95% and α = 5%, df1

(Number of variables -1) or 2-1 = 1, and df2 (n-k-1) or 61-2-1 = 58. The results obtained with Ftabel =. Based on calculations using SPSS can be seen in the following table 8.

Table 8. F-Test results

Model		Df	Mean Square	F	Sig.
1	Regression	1	292.242	68.177	.000[b]
	Residual	59	4.287		
	Total	60			

Based on the table above, the value of F_{count} = 68.177 is obtained. This shows that $F_{count} > F_{table}$, and the significance level is 0.000 <0.05. The test results show that the significance value obtained is smaller than the probability. So Ha is accepted, and H0 is rejected, meaning that there is a significant influence between learning facilities on the learning outcomes of class XI students of SMK Pasundan 1 Serang City.

4. Conclusion

Learning facilities are all kinds of objects that facilitate and support the process of teaching and learning activities that are created deliberately to improve student learning outcomes while learning outcomes are the abilities obtained by students through learning activities. In another sense, learning outcomes are patterns of action, values, notions, attitudes, appreciation, and skills. Based on the results of the research analysis on learning facilities on student learning outcomes at SMK Pasundan 1 Serang City using a questionnaire instrument that was tested using a validity test containing 16 statement items for variable X and 12 items for variable Y, the results of variable X 16 items were valid with rcount 0.248. Then, the reliability test for variable X obtained results of 0.791 and variable Y 0.719, where both variables obtained high interpretation results. Then, the reliability test for variable X obtained the results of 0.791 and variable Y 0.719, where both variables got high interpretation results. After that, a data description was carried out, and the results were for variable X mean of 53.13, median of 54, mode of 54, std. Deviation of 4.035, variance of 16.283, range of 19, minimum of 42, maximum of 61 and sum of 3241.

As for variable Y, the mean value is 39.46, the median is 39, the mode is 37, the Standard Deviation is 3.014, the variance is 9.086, the range is 12, the minimum is 47, and the sum is 2407. Then the normality test is carried out, and the sig value is 0.200 where the probability value> 0.05, Ha is accepted and the data is normally distributed. In contrast, the linearity test obtains a sig value of 0.000 where the probability value ≤ 0.05, Ha is accepted, meaning that the data distribution of the independent variables forms a linear line to the dependent variable. Based on this research, it can be concluded that there is an influence between learning facilities (X) and learning outcomes (Y). This is evidenced by the hypothesis test by obtaining the $t_{count} > t_{table}$ value, namely 8.257> 2.002 and a significance of 0.000 <0.005 so that the hypothesis in this study is accepted.

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Declarations

Author contribution

Desi Handrayani as research implementer, designing media and collecting data. Kurniati Rahmadani as

research and article concept designer. Fuad Abdul Baqi as research and article concept designer. Gulzhaina Kuralbayevna Kassymova as proof-reader.

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Competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Clearance

The involvement of human subjects in this research complies with the Declaration of Helsinki.

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