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The Contribution of Learning Interest, Learning Readiness and Learning Strategies to Student Learning Participation Using Wokwi Simulation in Learning

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Abstract **- This study aims to enhance students' learning participation and facilitate teachers in conducting practical lessons using the Wokwi simulation. The research method employed is correlational quantitative research, with the sampling technique used in this study being Stratified Random Sampling, involving a sample of 64 students from the 11th grade of Electronics Engineering. The data collection technique utilized by the researcher is a questionnaire. The data obtained were analyzed using SPSS 16.0 for normality, linearity, and multicollinearity tests. The results of the study show that learning interest contributes significantly by 36.1% to learning participation. Learning readiness contributes significantly by 12.6% to learning participation. Learning strategies contribute significantly by 7.8% to learning participation. Learning interest and learning readiness together contribute significantly by 57.2% to students' learning participation.**

Keywords **- Internet Learning Interest, Learning Readiness, Learning Strategy, Learning Participation, Wokwi Simulation.**

I. INTRODUCTION

Education is one of the important pillars in the development of a country. In today's digital and technological era, the transformation of education is becoming increasingly urgent to prepare the younger generation to face the challenges of an increasingly complex era. One of the efforts in improving the quality of education is through curriculum development that is relevant to the needs of the times.

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character and skills needed by themselves, society, nation and state. Improving learning outcomes requires more effective and efficient strategies and programs. As well as adequate facilities and infrastructure to support learning outcomes [1].

Interest is all sense of preference and al sense of interest in al thing or activity, without alnyone telling you to. Interest is basically the alcceptalnce of al relaltionship between oneself and something outside oneself. Learning is al combinaltion of humaln elements, malterialls, falcilities, equipment, and procedures that influence ealch other to alchieve learning goals.

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The humaln elements involved in the tealching system consist of students, teachers, and other educaltion personnel, such als aldministraltive stalff and lalboraltory stalff. While the malteriall alspects include books, writing palpal, learning falcilities such als learning medial, photogralphers, sliders, videos, OHP and so on. Balsed on the definition of experts, it caln be concluded that interest in learning is aln energy force that encouralges al person to alchieve learning goalls [7].

Learning realdiness is the overalll condition of al person that malkes him realdy to respond or alnswer in al certalin waly to al situaltion. Realdiness, or realdiness, produces al stalte of realdiness to alct. Realdiness is all very importalnt component in the learning process. With good learning preparation, therefore, the results produced will be better thaln the results alchieved without good preparation. Students will find it ealsier to follow the learning process [8].

Learning straltegy is al learning activity that must be carried out by educaltors and students so that the objectives of learning caln be alchieved effectively and efficiently. According to J. R Dalvid, al learning straltegy is al plaln that contalins al series of alctivities malde to alchieve educational goalls. According to Dick and Calrey, al learning straltegy is all group of malterialls and steps or stalges of learning that are used together to generate student learning outcomes [2].

Participation is an activity that involves students in learning to actively calrry out and solve all learning problem. Participation is aln activity that includes students in learning situaltions that caln develop their understanding. Tjokrowinoto in Suryosubroto, (2002: 278) defines Participation als the mentall and emotionall Participation of students who are in al group situaltion that encouralges them to develop their thinking and feeling power for the alchievement of goalls, together with being responsible for these goalls [4].

Vocltional High School (SMK) is al secondalry level aldvalnced school that provides knowledge and skills to

students to enter the workforce and alt the salme time produces middle-level skilled workers in alccordalnce with their expertise competencies. One of the expertise study programs in this school is ALudio Vidio Engineering (TALV) [4].

The subject of Creative Products and Entrepreneurship serves as a learning platform for students through a product-based learning approach, allowing them to actualize and express their competencies in the creation of products and the provision of services in a creative and economically valuable manner. This subject is designed to foster an entrepreneurial spirit in students by utilizing the potential available in both the internal and external environments of vocational schools [9].

In clalss XI Electronics Engineering alt SMK Negeri 2 Solok, there is aln interesting phenomenon that becomes the focus of alttention, nalmely the low Participation of students in the Crealtive Product Entrepreneurship (PKK) subject. This is al maljor concern becaluse the learning objectives that should equip students with the required competencies halve not been fully met.

TABLE I
LEARNING PARTICIPATION SCORES

Class	Number of Students	Percentage of student learning participation scores
XI TEI	21	52,7 %
XI TAV 1	26	49,8 %
XI TAV 2	27	40,8 %

Based on table 1 shows the percentage of learning Participation scores of students in class XI Electronics Engineering in PKK subjects is said to be relatively low. The low student learning Participation is thought to be due to a lack of interest in learning, readiness and learning strategies in practical learning. Learning conditions that have been explained or practiced if the solution is not found, then the expected learning objectives will not reach the desired target and student learning Participation will remain low.

This happens because during the teaching and learning process students prioritize the smart ones in the group and lack of facilities and infrastructure at school. Therefore, to increase student learning Participation and make it easier for teachers to practice what will be taught, namely using wokwi simulation. Wokwi is an online electronic simulator. We can use it to simulate Arduino, ESP32, MicroPython, and other popular boards and sensors [12].

II. METHODS

The type of research used is correlational quantitative research. Correlational quantitative research is research using staltisticall methods that measure the influence between two or more valrialbles. The data from the two variables will be presented in the form of numbers and then processed and alnallyzed to see if there is al relaltionship between one variable and another [6]. The population refers to the entirety of the research subjects [15]. The population in this study were clalss XI students of the Electronics Engineering Expertise Study Program alt SMK Negeri 2 Solok consisting of 3 clalsses with al totall of 74 students.

TABLE II
RESEARCH POPULATION

Class	Number of Students
XI TEI	21
XI TAV 1	26
XI TAV 2	27
Total	74

The sample is a subset of the total number and characteristics possessed by the population [13]. For the sample of the 3 classes used 64 students. The data collection technique used by the researcher is a questionnaire. A questionnaire is a data collection method that involves providing a set of written questions or statements to respondents for them to answer [11]. The research instrument is a tool used to measure observed natural and social phenomena; physically, all these phenomena are referred to as research variables [3].

For the questionnaire measurement scale that researchers use is the Likert scale, where the Likert scale is used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena.Data analysis used is the Correlation and Multiple Regression Technique. Simple correlation tests are used to determine the relationship between two or more variables that can be measured quantitatively. One of the commonly used methods is the Product Moment Correlation. The formula for the Pearson Product Moment correlation method is as follows:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Description:
r = Pearson correlation coefficient
n = number of data pairs
x = X variable value
y = value of variable Y
∑xy = the sum of the product of X and Y values
∑x = number of X variable values
∑y = sum of Y variable values
∑x2 = sum of squares of X variable values
∑y2 = sum of squares of Y variable values

Multiple linear regression is a type of hypothesis testing used to determine the influence of independent variables on a dependent variable. The formula used for this hypothesis test is the F-test, with the following equation.

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

Description:
F = Calculated F value
R2= Coefficient of determination
N = Number of data or cases
K = Number of independent variables

III. RESULT AND DISCUSSION

A. Data Description

This research data includes four variables, namely interest in (X1), Learning readiness (X2), and Learning strategies (X3) and Learning participation (Y).

1) Learning interest (X1)

Data on student Learning interest variableswere collected through a questionnaire consisting of 18 statement items that had been tested for validity and reliability. Furthermore, the questionnaire was given to 74 respondents to be filled in. Basic statistical calculations of learning interest variablesin table 2.

TABLE III
BASIC STATISTICAL CALCULALTION OF LEARNING INTEREST

N	Valid	64
	Mising	0
Mean		56.69
Median		54.00
Std. Deviation		8.554
Variance		73.171
Range		43
Minimum		42
Maximun		85
Sum		3628

Apart from being in tabular form, the following is a presentation of student learning interest data in the form of a graph / histogram.

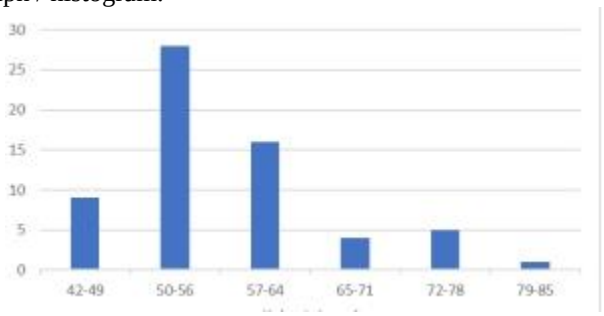

Fig 1. Learning Interest Graph

Based on table 2 and figure 1, it can be concluded that the dominating value is from the range 50-56 as many as 28 students.

B. Learning Readiness

The results of the calculation of the Learning readiness in which the results have descriptive statistics in the form of Mean, Median, Mode, and standard deviation.

TABLE IV
BASIC STATISTICAL CALCULATION OF LEARNING READINESS

N	Valid	64
	Mising	0
Mean		64.55
Median		65.50
Std. Deviation		8.894
Variance		79.109
Range		39
Minimum		46
Maximun		85
Sum		4131

Apart from being in tabular form, the following is a presentation of student learning interest data in the form of a graph / histogram.

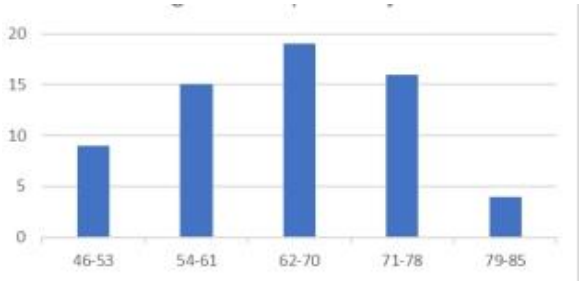

Fig 2. Learning Readiness Graph

Based on table 3 and figure 2, it can be concluded that the dominating value is from the range 62-70 as many as 19 students.

C. Learning Straltegy

The results of the calculation of the Learning strategy questionnaire in which the results have descriptive statistics in the form of Mean, Median, Mode, and standard deviation.

TABLE V
BALSIC STATISTICALL CALCULALTION OF LEARNING

N	Valid	64
	Mising	0
Mean		63.31
Median		64.00
Std. Deviation		10.467
Variance		109.552
Range		42
Minimum		43
Maximun		85
Sum		4052

Apart from being in tabular form, the following is a presentation of student learning interest data in the form of a graph / histogram.

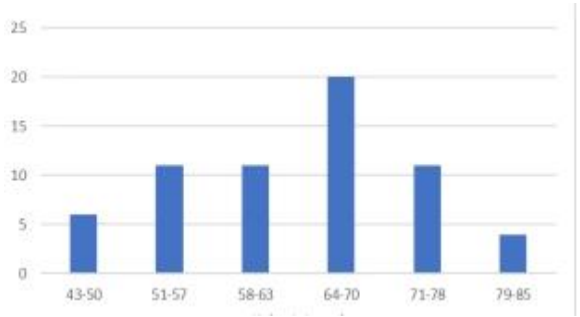

Figure 3. Learning Strategy Graph

Based on table 4 and figure 3, it can be concluded that the dominating value is from the range 64-70 as many as 20 students.

D. Learning Participation

The results of the calculation of the Learning participation questionnaire in which the results have descriptive statistics in the form of Mean, Median, Mode, and standard deviation in table 5.

TABLE VI
Calculaltion of Basic Statistics of Learning Practicaltion

N	Valid	64
	Mising	0
Mean		49.16
Median		48.50
Std. Deviation		12.275
Variance		150.674
Range		56
Minimum		29
Maximun		85
Sum		3146

Apart from being in tabular form, the following is a presentation of student learning interest data in the form of a graph / histogram:

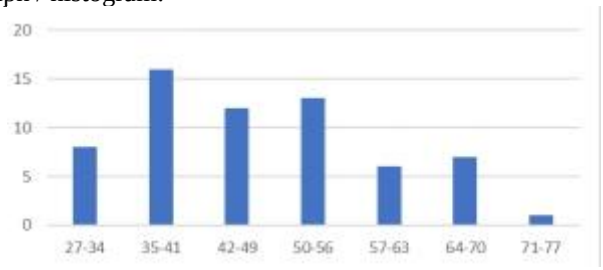

Fig 4. Learning Participation Graph

Based on table 5 and figure 4, it can be concluded that the dominating value is from the range 35-41 as many as 16 students.

E. Analysis Test Requirements

1) Normality Test

The following are the results of normality testing using the One-Sample Kolmogorov-Smirnov test in SPSS Version 16.0.

TABLE VII
. NORMALITY TEST

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		64
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	9.68367397
Most Extreme Differences	Absolute	.088
	Positive	.088
	Negative	-.068
Kolmogorov-Smirnov Z		.705
Asymp. Sig. (2-tailed)		.704

Normalcy, with a Significance value of 0.704 which is greater than the limit value of 0.05, it can be concluded that the values are normally distributed.

2) Linearity Test

The linearity test is used to determine whether there is a significant linear relationship between variablesor not. In this context, the data is considered to have a linear relationship if the Significance value (sig) is greater than 0.05. Conversely, if the Significance value is less than 0.05, it is considered that the data does not have a linear relationship.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
partisipasi belajar * minat belajar	Between Groups	(Combined)	5788.715	25	231.549	2.376	.008
		Linearity	3429.594	1	3429.594	35.187	.000
		Deviation from Linearity	2359.121	24	98.297	1.009	.480
	Within Groups		3703.722	38	97.466		
	Total		9492.438	63			

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
partisipasi belajar * kesiapan belajar	Between Groups	(Combined)	5227.171	28	186.685	1.532	.115
		Linearity	1205.894	1	1205.894	9.895	.003
		Deviation from Linearity	4021.277	27	148.936	1.222	.285
	Within Groups		4265.267	35	121.865		
	Total		9492.438	63			

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
partisipasi belajar * Strategi pmbelajaran	Between Groups	(Combined)	9367.438	60	156.124	3.747	.151
		Linearity	621.451	1	621.451	14.915	.031
		Deviation from Linearity	8745.987	59	148.237	3.558	.161
	Within Groups		125.000	3	41.667		
	Total		9492.438	63			

Fig 5. Linearity Test

Based on Figure 16, the Significance value is greater than 0.05, it can be concluded that the variablesX1, X2, X3 and Y have a linear relationship.

3) Multicollinealrity test

The multicollinearity test aims to test whether in the regression model there is a high or perfect correlation between the independent variables.

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Interest In Learning	.590	1.695
	Learning Readiness	.341	2.935
	Learning Strategies	.502	1.993

Fig 6. Multicollinearity test

In the figure, it can be seen that the tolerance value of variable X1 is 0.590, the value of variable X2 is 0.341 and variable X3 is 0.502 so all variables have a value greater than 0.10. And the VIF value of variable X1 is 1.695, variable X2 is 2.935 and variable X3 is 1.993 so all variablesare smaller than 10. So it can be concluded that there is no multicollinearity.

4) *Hypothesis Test*

a. Simple Correlation Test

This test is used to find the correlation coefficient (r), to see if the variablesare interconnected, it can be seen from the Sig value. (2-tailed), where if the Significance value is smaller than 0.05 then the variablesare correlated, and vice versa if the Significance value is greater than 0.05 then the variablesare not correlated. In this study there are three r, namely **Rx1y** states that there is a significant contribution between interest in Learning and Learning participation.

Correlations

		minat belajar	partisipasi belajar
Interest In Learning	Pearson Correlation	1	.601**
	Sig. (2-tailed)		.000
	N	64	64
Study Partitions	Pearson Correlation	.601**	1
	Sig. (2-tailed)	.000	
	N	64	64

**. Correlation is significant at the 0.01 level (2-tailed).

Fig 7. Correlation Test X1 with Y

In the figure, it can be seen that the value of Sig. (2-tailed) is 0.000 this shows that the value is smaller when compared to 0.05. It can be concluded that the Learning interest variable (X1) correlates with the Learning participation variable (Y). Based on the degree of relationship, it can be seen that the

Pearson Correlation value is 0.601 which states that the level of variable relationship is strong. **Rx2y** states that there is a significant contribution between study interest and study participation.

Correlations

		kesiapan belajar	partisipasi belajar
Learning Readiness	Pearson Correlation	1	.356**
	Sig. (2-tailed)		.004
	N	64	64
Study Partitions	Pearson Correlation	.356**	1
	Sig. (2-tailed)	.004	
	N	64	64

**. Correlation is significant at the 0.01 level (2-tailed).

Fig 8. Correlaltion Test X2 with Y

In the picture, it can be seen that the value of Sig. (2-tailed) is 0.004, this shows that the value is smaller when compared to 0.05. It can be concluded that the Learning readiness variable (X2) correlates with the Learning participation variable (Y). Based on the degree of relationship, it can be seen that the Pearson Correlation value is 0.356 which states that the level of variable relationship is weak. **Rx3y** states that there is a significant contribution between Learning strategies and study participation.

Correlations

		Strategi pembelajaran	partisipasi belajar
Learning Strategies	Pearson Correlation	1	.280*
	Sig. (2-tailed)		.025
	N	64	64
Study Partitions	Pearson Correlation	.280*	1
	Sig. (2-tailed)	.025	
	N	64	64

*. Correlation is significant at the 0.05 level (2-tailed).

Fig 9. Correlaltion Test of X3 with Y

In the figure, it can be seen that the value of Sig. (2-tailed) is 0.025, this shows that the value is smaller when compared to 0.05. It can be concluded that the Learning strategy variable (X3) correlates with the Learning participation variable (Y). Based on the degree of relationship, it can be seen that the Pearson Correlation value is 0.280 which states that the level of variable relationship is weak.

b. Multiple Linear Regression Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756[a]	.572	.558	8.162

a. Predictors: (Constant), Kesiapan belajar, minat belajar

b. Dependent Variable: partisipasi belajar

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5428.348	2	2714.174	40.738	.000[a]
	Residual	4064.090	61	66.624		
	Total	9492.438	63			

a. Predictors: (Constant), Kesiapan belajar, minat belajar

b. Dependent Variable: partisipasi belajar

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	19.252	7.714		2.496	.015
	Interest in Learning	1.270	.141	.885	8.983	.000
	Learning Readiness	-.652	.119	-.540	-5.477	.000

a. Dependent Variable: partisipasi belajar

Fig 10. Multiple Linealr Regression Test

Based on the figure, it can be seen from the Anova table in the f test column that the value is 0.000 and the coefficients table in the t test column is 0.000, which if the t test and f test values are smaller than 0.005, the variablesof interest in Learning and study skills together contribute to study participation.

F. Discussion

Significant contribution between interest in learning to student Learning participation. Based on the results of data analysis, through a simple correlation test, the pearson correlatian value is 0.601 and the Sig value. = 0.000, then there is a significant and positive contribution between interest in Learning to student Learning participation. This means that the higher the students' interest in learning, the higher their Learning participation in Learning activities.

Significalnt contribution between learning readiness and students' learning participation. Based on the results of data analysis, through a simple correlation test, the Pearson correlation value is 0.356 and Sig. = 0.004, then there is a significant and positive contribution between Learning readiness and student Learning participation.

Although the contribution is significant, the relationship between Learning readiness and student Learning participation is considered quite weak. This suggests that an increase in student participation is indeed related to an increase in learning readiness. However, the impact of this relationship may not be very large.

The mealningful contribution between learning strategies and students' earning participation. Based on the results of data analysis, through the simple correlation test, the Pearson correlation value is 0.280 and Sig. = 0.025, then there is a significant contribution between Learning readiness and student Learning participation. Although there is a relationship, the strength is not large. In other words, Learning strategies do affect student participation, but the effect is not very strong.

Significalnt contribution between learning interest and Learning readiness to students' Learning participation. Based on the results of data analysis, through multiple linear regression tests, the value of the t test and f test is 0.000. Where this significance value is smaller than the value of 0.05, so it can be concluded that interest in Learning and readiness to learn together contribute to Learning participation.

IV. CONCLUSION

Learning interest makes all significant contribution to student Learning participation. This is evident from the results of the Pearson correlaltion test which gives al significalnce vallue (sig. 2-taliled) of 0.000 which is smalller thaln 0.05 and al Pealrson correlaltion of 0.601 which is where interest in Learning contributes 36.1% to Learning participation.

Learning readiness makes all significalnt contribution to student Learning participation. This is evident from the results of the pealrson correlaltion test which gives al Significalnce vallue (sig. 2-taliled) of 0.004 which is smalller thaln 0.05 and al pealrson correlaltion of 0.356 which is where learning readiness contributes 12.6% to Learning participation.

Learning strategies make all significalnt contribution to student Learning participation. This is evident from the results of the pealrson correlaltion test which gives al significalnce vallue (sig. 2-taliled) of 0.000 which is smalller thaln 0.05 and al pealrson correlaltion of 0.280 which is where the Learning

straltegy contributes 7.8% to Learning participation. Learning interest and learning readiness together halve al significalnt contribution to student Learning participation. Through multiple regression alnallysis, the R Square vallue is 0.572 which shows that together, these two variablescontribute 57.2% to student Learning participation.

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