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THE EFFECT OF STATISTICS AND PROBABILITY LEARNING MODEL IMPROVEMENT ON STUDENT LEARNING OUTCOMES

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Abstract:
The Statistics dan Probability class is one of the elective courses that have to be enrolled by students who have just joined the beginning of the semester. That is because studying Statistics and Probability is crucial in providing the first foundation for knowledge in other scientific domains. In actuality, though, a lot of students struggle with this course. Many students claim that they have trouble understanding the subjects they are learning, and they also have trouble figuring out how to answer the lecturer's questions. The low cognitive ability of students, which results in limited student creativity in problem-solving skills, is one of the elements contributing to students' failure to comprehend the subject. Of course, this is a severe issue if nothing is done right away. Based on these issues, researchers who were also lecturers improved the teaching strategies for all classes. This study aims to determine whether there is substantial interaction between class schedule and the development of learning model that impact exam scores by raising students' Statistics and Probability scores. The two-way Anova analysis principle is the basis of the study methodology. The enhancement of learning model used outside and inside the classroom was found to have a substantial interaction based on the research findings on fifty samples of students selected from different class. A significance score of 0.000 indicates that these findings are significant. In other words, a model is required to achieve better learning outcomes, which might make it simpler for students to commence learning and provide a common purpose for learning. Since multiple class schedules exist, each learning model necessitates a unique management system and learning environment.

Keywords: Learning Model, Probability, Statistics, Statistics dan Probability, Two Way Anova.

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INTRODUCTION

Education is an essential requirement for everyone. Simply put, education is intended to keep people from poverty and ignorance. As a result, it is thought that education would help persons develop their personalities and capacities. Universities, instructors, and students are vital components of education. As a result, there would be no progress without education, which is the right of every citizen (Fitri, 2021).

Education is one of the most crucial components in the quest to increase each person's human resource capacity in today's fast-paced world. The success of the

learning process between teachers and students, whether in a classroom setting or at a university, is a good indicator of the microelement of educational achievement. In this instance, a benchmark for the effective execution of a lesson plan that the lecturer has created is the intelligence and inventiveness of lecturers in employing relevant approaches, models, and strategies in the classroom to students. According to a teacher (Marhadi & Erlisnawati, 2016) the effectiveness of a lesson plan's implementation in the school unquestionably affects the students' learning results. Damayanti & Jirana (2018) explain that learning outcomes are the results of teaching and learning actions in the form of scores/scores received after numerous tests are conducted to determine how well students understand the content that the lecturer in class has just presented. Learning results also depend on the quality of teaching by teachers, who need to use effective and innovative learning models to provide good and quality learning outcomes. Learning outcomes depend not solely on student ability (Ahmad, 2013).

In light of the reasoning mentioned above, indications of the effectiveness of student learning outcomes can ultimately be quantified in the form of output, test results, and scores/values (Damayanti & Jirana, 2018). The expectations of lecturers as educators and students as learners want teaching and learning activities to proceed in two directions, with lecturers actively instructing and students actively asking questions and gaining an understanding of the material being covered by the lecturer's conceptualized or created learning model (Laili, 2017). Thus, it is intended that good learning outcomes would be attained in the form of satisfactory student exam grades and, concurrently, information about the degree to which students can comprehend the subject taught in class. However, Rahmi, Mardiyah, & Ratulani (2017), assert that even when learning activities occur in a classroom, things don't always go as planned.

Of course, various elements affect how smoothly teaching and learning activities go, making it challenging for students to comprehend the lecture material fully. Students themselves play a significant role in their capacity for managing and assimilating information necessary for a thorough comprehension of the course material. One of the cognitive components that significantly influence students' cognition, especially when learning mathematics, is the management and reception of information (Pujilestari, 2018).

The pupils' cognitive skills unquestionably have a significant impact on their capacity to acquire mathematics and their daily problem-solving skills, as Wulan & Anggraini (2019). Thus, it is evident that each student's cognitive talents directly affect their ability to think critically while learning the material and solving issues. As a result, students must be able to think creatively to understand these two things. As a result, one of the critical components of cognitive ability is the capacity for creative thought, which also serves as a predictor of success in learning mathematics and other science subjects like statistics that are closely related to mathematics. Rahman (2012) contends that mathematical creative thinking talents are directly associated with flexibility, fluency, thinking capacity, and speed of understanding mathematics and related branches of science. The prevalence of phenomena involving learners who do not comprehend the information imparted by the lecturer at the time of learning is a severe issue (Hanafiah & Suhana, 2012). On the other hand, education primarily involves the collaborative interaction that

lecturers and students share in carrying out a creative teaching and learning process.

Lecturers must be competent in making strategies to teach teaching patterns using prepared models before they can lead a class with the expectation that lecturers and students can participate actively in class during the learning process. The lecturers have thought about the learning approach that will be used to ensure students comprehend the subject presented (Laili, 2017). Especially in math classes where formulas and calculations are many involved. Based on observations done by researchers in the classroom, it was discovered that a significant number of students still complained of difficulties. It did not fully comprehend the lecture material, particularly for subjects involving a lot of arithmetic and formulas, such as Mathematics, specifically in Statistics and Probability. Whereas Statistics and Probability Subject are one of the elective courses that new students who have just started the semester must be able to understand. It is because Statistics and Probability subjects play a significant part in students' capacity to learn to make decisions after doing specific analyses (Tayeb, Idris, & Sulherah, 2014). A basic comprehension of other courses is likewise based on understanding the data and its probability value. This branch of science investigates the value of the opportunity and all aspects of data from beginning to end. In other words, this subject is significant in daily human activities (Zulfikri, 2017).

Many students cannot still think creatively to comprehend and solve the challenges presented since they don't fully understand the subject that lecturers in class have taught them. In other words, students' cognitive skills are still insufficient, and there may be a problem with the classroom's learning model that was planned and delivered by the lecturer (Yenni, 2017). It can't be ignored because it will affect how poorly qualified graduate students from a university are and how badly they can deal with daily life challenges (Zulfikri, 2017). Therefore, in this study, researchers and also as lecturers took the initiative to conduct observations and research to determine whether, by improving the classroom learning model, students could better understand the material so that there was an increase in students' understanding of the ability to think more creatively so that it had an impact on learning outcomes as well as on student exam results. The improvement of the learning model that the researcher means here is to do a different method from the previous one. If so far, the researcher as a lecturer teaches with a contextual learning model, then the researcher tries to improve the new learning model by using another model. The contextual learning model researchers have been operating in the classroom is a learning model that links the learning material being studied with the natural world in everyday life. According to Hamruni (2015), contextual learning emphasizes direct experience, in which students are not only required to take notes but are invited to be able to think critically about their daily environment.

The issues raised by researchers are under earlier studies, including Faridha Ahriani (2013) study titled "The Effect of Cooperative Learning Models and Learning Styles on Chemistry Learning Outcomes of Class X Students at SMK Negeri 2 Bantaeng," which examined similar issues. It is known from this research that there is a strong connection between learning models and learning styles that affects students' learning results in Chemistry regarding Chemical Bonds. A related

study by Widaningsih & Yenni (2016) found that the CRH and NHT cooperative learning approaches impact student learning outcomes, improving students' mathematics understanding abilities. In other words, the new teaching strategies utilized by instructors in the classroom, i.e. CRH and NHT, are positively and significantly impacted by the growth in learning outcomes by enhancing students' Mathematical ability. Then 2019, Laksemiwati (2019) also carried out a pertinent study concerning educators' actions to enhance student learning outcomes. According to Laksemiwati's research, using the STAD type cooperative learning approach in the classroom has improved student learning outcomes. Thus, it concludes that there is a strong correlation between the learning model and student learning outcomes.

Additionally, the main thing that encouraged the researcher to improve the learning model that the researcher previously used in the classroom is because the researcher is very aware that in a successful learning process in a university environment, the lecturer's ability factor becomes a significant indicator of student learning outcomes. Because when learning takes place, the learning model designed and implemented by the lecturer in the classroom is entirely the authority of the lecturer. It is also relevant to the ideas of Narpila & Sihotang (2022), who claim that the development of two-way communication between lecturers and students and the success of the learning process is directly tied to the lecturers' capacity to manage the learning process. Therefore, it is expected that by improving the learning model, student learning outcomes will enhance as a result of this study.

However, there is little novelty in this research; In contrast, previous studies were conducted in a school environment, so the researchers in this study chose to perform it in the university environment where the researchers work and teach; it is the Universitas Potensi Utama. The researchers chose students as the sample because the researchers also wanted to know whether students' cognitive abilities and creative thinking were much different from those of students. Then, the researchers decided to perform research on one subject for one semester (6 months) to obtain more accurate results. In earlier studies, they had only conducted trials in one class and on a single topic or teaching material. This study applied the independent observation principle, which differs from earlier studies' research paradigm.

Thus, this study's primary goal is to determine a relationship between the learning models used in different class schedules on student learning outcomes, particularly as they relate to students' Statistics and Probability exam results. This study applies and utilizes the principle of the two-way ANOVA model in parametric statistics to test the hypothesis. A powerful and significant statistical method for examining potential interactions between two variables is the two-way analysis of variance (ANOVA), also known as two-way ANOVA (Scheff, 2016). Furthermore, (Zhang, 2012) also states that there are required assumptions in the two-way ANOVA test: The existence of two independent variables in the form of categorical data, which divides the data into several unrelated groups, and independent variables must be in the form of data with an interval/ratio scale. Thus, the formulation of the problem in this study is: (1) how is the influence of the learning model on the results of the Statistical and Probabilities student examinations?; (2)

how is the effect of class schedule on the results of the Statistical and Probabilities student examinations?; and (3) how is the effect between the interaction of learning models and class schedules on the results of the Statistical and Probabilities student examinations?

RESEARCH METHODS

This study used four phases, i.e.:

1. **Observation Phase.** Observation activities are the first steps in collecting data directly from researchers on environmental conditions to obtain a clear and objective description of the condition of the research object (Syofian & Siregar, 2013). At this phase, the researchers made initial observations by observing the students' ability to understand the material in class from the beginning to the end of the lecture. Then, the researchers record important information related to what causes students to feel difficult and not understand the material given and taught by the lecturer. In other words, the researchers observed how to learn, the student's ability to understand the material, and the ability of students to answer questions in class.
2. **Sampling Phase.** The sampling technique in this study was carried out randomly by applying incidental techniques. The accidental sampling methodology is a chance-based sampling method in which the researchers encounter the person who will be chosen as the data source by coincidence and determine that they are suitable to be chosen randomly (Sugiyono, 2017). Therefore, a sample of 50 students from 540 students was chosen at random for the data collection process at this stage, with information on 30 male and 20 female students. In this instance, the researchers randomly assigned students to complete the questionnaire after the lesson was over.
3. **Distributing questionnaires phase.** Based on the data type, this study is categorized as quantitative research. This study is also a quantitative study using a cross-sectional questionnaire (Fraenkel, Wallen, & Hyun, 2012). In the third phase, questionnaires are given to students at the Universitas Potensi Utama, where the researchers teach. Students in the second semester of the S-1 Education level who enroll in various classes where the researchers teach Statistics and Probability subjects under the division of class entry schedules become research subjects (morning class, afternoon class, and evening class).
4. **Data Analysis Phase.** In the fourth stage, it is divided into two more phases, i.e.:

a. Initial Testing Phase By Performing Normality Test and Homogeneity Test

Normality test

According to Marhadi & Erlisnawati (2016), two tests must be conducted to test the research hypothesis with a two-way ANOVA analysis. The two tests are Data Normality Test and Homogeneity Test. Because, after being tested with SPSS software, the two tests have been proven to be normal and homogeneous, then further analysis can be done.

The rule for the normality test is that if the significance value of the Kolmogorov Smirnov test is greater than $\alpha = 0,05$, then the data distribution follows a normal distribution (Fox & Weisberg, 2018).

The hypothesis used in the Normality test:

H_0 : Data distribution follows normal distribution
H_1 : The distribution of the data deviates from the normal distribution.

Decision making criteria:
a) Ho is accepted if the significance value is $> \alpha$
b) Ho is rejected if the significance value $< \alpha$

Homogeneity Test

The statistical formula of Levene's Test for Homogeneity Test according to (Bertinetto, Engel, & Jansen, 2020), i.e.:

$$W = \frac{(N-k)\sum_{i=1}^{k} n_i \left(\bar{Z}_{i.} - \bar{Z}_{..}\right)^2}{(k-1)\sum_{i=1}^{k}\sum_{j=1}^{n_i}\left(Z_{ij} - \bar{Z}_{i.}\right)^2} \quad (1)$$

Where:
n = Number of Observations
k = number of groups
$Z_{ij} = \left|Y_{ij-}\bar{Y}_{i.}\right|$
$\bar{Y}_{i.}$ = the average of the i-th group
$\bar{Z}_{i.}$ = group average of Z_i
$\bar{Z}_{..}$ = overall average of Z_{ij}

Decision-making criteria:
a) H_0 is accepted if the value of $W < F_{(\alpha,k-1,N-k)}$
b) H_0 is rejected if the value of $W > F_{(\alpha,k-1,N-k)}$

b. Research Hypothesis Testing Phase with Two Way Anova Analysis

All hypotheses proposed in this study need to be proven by conducting another hypothesis test to answer the problem. The data analysis method used two-way ANOVA with interaction chosen as the basis for testing the hypothesis in this study. Because a two-way ANOVA can theoretically be used to test the average similarity of two populations that can be divided into tiny groups, it can be determined whether there is a relationship between the two populations that have been divided into two independent variables at the end of the process (Ghozali, 2016). Furthermore, The basic objective of the two-way ANOVA is to evaluate the intended outcomes from several criteria to see whether there is a difference in value (MacFarland, 2011). According to (Frossard & Renaud, 2021), two-way ANOVA is a test that is carried out on two independent variables or two factors as well as on the interaction between two factors to see if there is a difference in the average of the two samples, which in the end the results of this test can be

generalized to be an accurate conclusion. Meanwhile, according to Kéry (2010) in his book, two-way ANOVA is a one-way analysis of variance (ANOVA) model which is expanded by adding other factors and turning it into a two-way ANOVA. There are two ways in which the effects of the two factors, A and B, can be combined, and the related models are called the main effects and interaction effects models. In the main effects model, the A and B effects are additive. Thus, in the two-way ANOVA analysis, it is possible to find the relationship between variables or factors individually, by interaction, or by combining two factors that have each level.

The reason for implementing the two-way ANOVA test in this study is because there are several advantages of the two-way ANOVA test, according to (Nielsen, Srinivasa, & Rao, 2022), i.e.: (1). The two-way ANOVA test is a statistical technique in which the interaction between factors and influencing variables can be studied. (2). In addition, the two-way ANOVA must also have the same number of observations in each group, making it easier to study the relationship between independent variables that affect the values of the independent variables simultaneously.

The following are the details of the research variables used in this study:

A. There are two categorical variables, i.e. the Learning Model and Class Schedule
B. The Learning Model also consists of four categories, i.e. A, B, C, D
   A: *Discovery Learning (DL)*
B: *Self Direct Learning (SDL)*
C: *Cooperative Learning (CL)*
D: *Collaborative Learning (CbL)*
C. Class schedule consists of four categories: Morning, Daylight, Afternoon, Evening
D. Test Results (Scores) Statistics and Probability → Dependent Variables that have a quantitative scale

Table 1. Research Variables Distribution

Value | Label	Learning Model	Class Schedule
1	A	Morning
2	B	Daylight
3	C	Afternoon
4	D	Evening

The study described in Table 1 is an example of a two-way design. It means that two independent variables, or factors, are being studied and researched. In this case, the first variable is the learning model, which has four levels. The second variable is the classroom schedule which also has four levels. Thus, the correct description to describe this research is that this study has a 2x4 factorial design, which means it has two variables or factors, both of which have four levels, (Wilcox, 2003).

Thus, in this study's data analysis model with two-way ANOVA, two independent variables are as level/category. While the other variable, the dependent variable, is 1, which is numeric.

Data Analysis Techniques

Data analysis in this study used inferential statistical analysis with two-way ANOVA. However, as a first step, it is necessary to test some assumptions in a two-way ANOVA using a model in inferential statistics to obtain reliable and statistically valid (Mahesya, Triwijati, & Fuadhy, 2021). The two tests are the homogeneity test and the data normality test. The Kolmogorov-Smirnov statistic and the Shapiro-Wilk Test were applied for the normality test, while Levine's Test of Equality of Error Variance statistic was applied for the homogeneity test (Emrisena, Abdurrahman, & Suyanto, 2018). Both tests were processed using SPSS software.

The statistical hypotheses applied in this study are as follows:

The first hypothesis (I)

H_0 : There is no significant difference in the value of the learning model on students' Statistics and Probability exam results.

H_1 : There is a significant difference in the value of the learning model on students' Statistics and Probability exam results.

The second hypothesis (II)

H_0 : There is no significant difference in the value of the classroom schedule on students' Statistics and Probability exam results.

H_1 : There is a significant difference in the value of the classroom schedule on students' Statistics and Probability exam results.

The third hypothesis (III)

H_0 : There is no significant difference in the interaction value between learning models and class schedules on students' Statistics and Probability exam results.

H_1 : There is a significant difference in the interaction value between learning models and class schedules on students' Statistics and Probability exam results.

RESULTS AND DISCUSSION

Initial testing on the two-way ANOVA test is required because, even when the group sizes are the same, violations of the homoscedasticity and normality assumptions (error variances inequality) will have an impact on the F statistic value (Friedrich, Konietschke, & Pauly, 2017). In other words, when an assumption is violated, the two-way ANOVA test's results may not be reliable. Therefore, as an initial step in the research data analysis phase, the data of normality and homogeneity tests are carried out first.

Normality test

The initial step in analyzing the research data is to do a normality test and then a homogeneity test with SPSS software for data processing. The normality test of the data in this study used the Kolmogorov-Smirnov test. The level of significance used is equal to $\alpha = 0,05$. Table 2 shows the results of the data normality test:

Table 2. Normality Test Results with Kolmogorov – Smirnov Test

	Unstandardized Residual
N	50
Kolmogorov – Smirnov Z	1,89
Asymp. Sig (2-tailed)	0,15

According to (Fox & Weisberg, 2018), if the value of Kolmogorov – Smirnov is greater than the significance level of $\alpha = 0,05$, then the result is significant, and the data is proven to be normally distributed. In Table 2, the Kolmogorov-Smirnov significance value for $\alpha = 0,05$ is 0.15. From the results obtained, it is clear if 0.15 $>$ 0.05, which means significant, then H_0 is accepted so that it can be concluded that the data used in this study is normally distributed.

Homogeneity Test

After calculating the three data groups, the value of *W* is 3.052. Additionally, the α chosen value is 0.05, so $\alpha = 0,05$. Then, check the value of $F_{(\alpha,k-1,N-k)} = F_{(0,05,2,49)} = 3,19$ once more because the value of $W < F_{(0,05,2,49)} \rightarrow 3,052 < 3,19$, then H_0 is accepted so that it can be concluded that the variance of the studied group is the same.

Then, the results obtained above are also compared with the results obtained through data processing with SPSS software, the following results are obtained:
In the two way ANOVA analysis, the second assumption test that must be carried out in ANOVA is the homogeneity test using the Levene test (Levine's Test of Equality of Error Variance).
The hypothesis is as follows:
H_0 = Both population variances are the same
H_1 = Both population variances are not the same

Decision-making criteria:
a) H_0 is accepted if the significant value is $> 0,05$
b) H_0 is rejected if the significant value is $< 0,05$

Table 3 shows the output of the SPSS software for this test:

Table 3. Homogeneity Test Result with Levene's Test

F	df1	df2	*Sig.*
11,344	15	34	0,060

According to (Fox & Weisberg, 2018), if the value of Sig. greater than the level of significance, then the result is significant. Based on the results of the homogeneity test from Table 3, the significance level is 0.060. From the results

obtained, it is 0.060 > 0.05, which means significant, then H0 is accepted. So it can be concluded that the variance is assumed to be the same for the four learning models and the four class schedules. In other words the assumption that the two population variances are the same (homogeneous) is already acceptable.

Interpretation of Two-Way ANOVA Results based on SPSS Output

In Table 4, the design of the two factors is presented with a total sample of 50 students. While in Figure 1 is presented a graph of the Statistics and Probability students' average score. Then, Table 5 shows the descriptive statistics results of students' Statistics and Probability exam scores.

Table 4. 2x4 Trial Design

		Label Value	N
Learning Model	1.00	A	13
	2.00	B	12
	3.00	C	12
	4.00	D	12
Class Schedule	1.00	Morning	12
	2.00	Daylight	12
	3.00	Afternoon	13
	4.00	Evening	13
Total			50

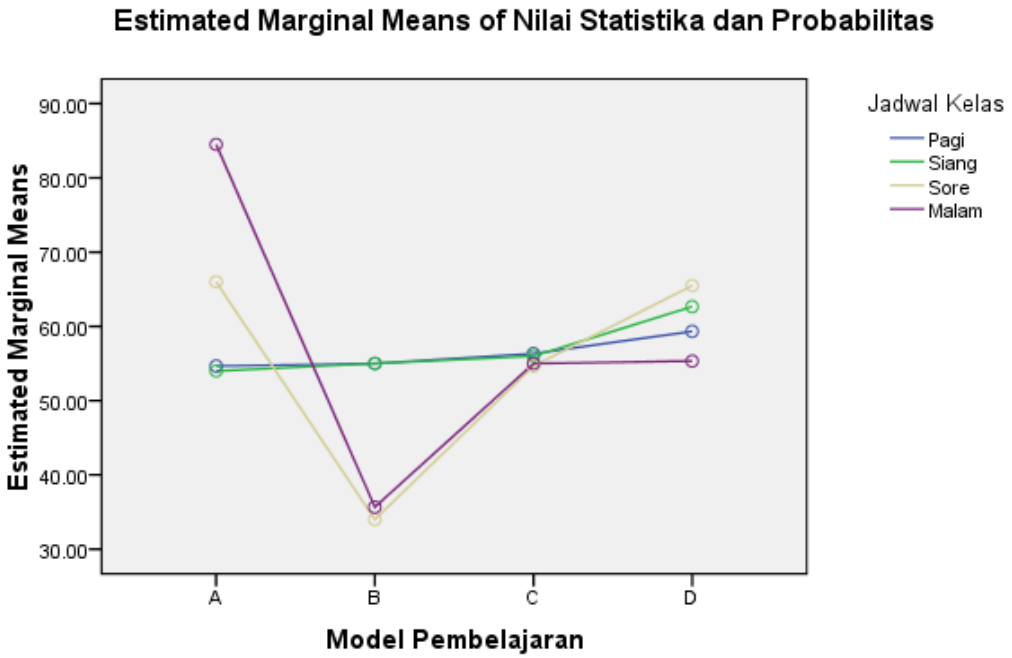

Figure 1. Graph of the Statistics and Probability Students' Average Score

Figure 1 shows that:

1. The average scores of students' Statistics and Probability exam results from various classes are still in the low category; it is in the range of 55-61.
2. Some students from the afternoon and evening classes have a relatively high average score compared to the others, ranging from 68-88. Thus, on average, it is necessary to improve the learning model so that it is expected that there will be an increase in student learning outcomes on the scores of Statistics and Probability exam results from various class schedules.

Table 5. Descriptive Statistics

Descriptive Statistics

Dependent Variable: Statistics and Probability Exam Score

Learning Model	Class Schedule	Mean	Std. Deviation	N
A	Morning	54.6667	.57735	3
	Daylight	54.0000	.00000	3
	Afternoon	66.0000	18.19341	4
	Evening	84.5000	4.50925	4
	Total	66.3077	15.58912	13
B	Morning	55.0000	1.00000	3
	Daylight	55.0000	2.64575	3
	Afternoon	34.0000	18.24829	3
	Evening	35.6667	4.04145	3
	Total	44.9167	13.27649	12
C	Morning	56.3333	2.08167	3
	Daylight	56.0000	2.00000	3
	Afternoon	54.6667	1.15470	3
	Evening	55.0000	1.00000	3
	Total	55.5000	1.56670	12
D	Morning	59.3333	4.04145	3
	Daylight	62.6667	6.42910	3
	Afternoon	65.5000	12.76715	4
	Evening	55.3333	2.30490	3
	Total	61.0769	8.21037	13
Total	Morning	56.3333	2.74434	12
	Daylight	56.9167	4.69929	12
	Afternoon	55.8462	18.11486	13
	Evening	59.6923	19.19802	13
	Total	57.2200	13.40315	50

From Table 5, the following information is obtained:

1. Learning Model A perfectly influences the evening class, with an average value of Statistics and Probability of 84.50, however
2. Learning Model B badly influences the afternoon class, with an average value of statistics and probability of 34.00.

But the two pieces of obtained information above cannot represent the overall results of the test (they cannot be generalized yet). The general test results were carried out through hypothesis testing with a two-way ANOVA analysis, which can be shown in Table 6:

Table 6. Two-Way ANOVA Test Results

Tests of Between-Subjects Effects

Dependent Variable: Statistics and Probability Exam Score

Type III Sum of Squares Source		df	Mean Square	F	Sig.
Corrected Model	6727.913[a]	15	448.528	7.351	.000
Intercept	158054.215	1	158054.215	2590.220	.000
Learning Model	2727.161	3	909.054	14.898	.000
Schedule Class	45.807	3	15.269	.250	.861
Learning Model * Schedule Class	3524.462	9	391.607	6.418	.000
Error	2074.667	34	61.020		
Total	172509.000	50			
Corrected Total	8802.580	49			

a. R Squared = .764 (Adjusted R Squared = .660)
b. Design : Intercept + Learning Model + Schedule Class + Learning Model* Schedule Class

Based on the the two-way ANOVA test results in Table 6, it is concluded that:

1. In the **Learning Model** row, the value of Sig. = 0.000 < significance level of 0.05. It can be concluded that there are significant differences in Statistics and Probability scores between learning models A, B, C and D. In other words, improvement in learning models has a significant effect on students' Statistics and Probability exam results.

   Because the test results show a significant difference between the four learning models, the next test is to do a Post Hoc test to see which groups differ from type A-D.

The following are the results of the advanced testing with Post Hoc tests:

Table 7. Results of Advanced Testing with Post Hoc Test

Dependent Variable: Statistics and Probability Exam Score

Model P(I)	Model P(J)	Mean (I-J)	Std. Error	Sig.
A	B	18.18*	4.096	0.000
	C	9.31	4.013	0.149
	D	8.68	4.096	0.237
B	A	-18.18*	4.096	0.000
	C	-8.87	4.096	0.213
	D	-9.50	4.177	0.166
C	A	-9.31	4.013	0.149
	B	8.87	4.096	0.213
	D	-0.63	4.096	1.000
D	A	-8.68	4.096	0.237
	B	9.50	4.177	0.166
	C	0.63	4.096	1.000

*The mean difference is significant at the 0,05 level

Table 7 shows the results, the groups that show a difference in the average learning model (marked with an asterisk "*") are the "Learning Model A" and "Learning Model B" groups. Thus, from the four learning models it is known that the types of model A and model B are different.

2. In the **Class Schedule** row, the value of Sig. = 0.861 > level of significance of 0.05. It is concluded that there is no significant difference in Statistics and Probability scores, between morning, daylight, afternoon and evening classes. In other words, class schedule has no significant effect on students' Statistics and Probability exam results.
3. In the **Learning Model*Class Schedule** row, the value of Sig. = 0.000 < level of significance of 0.05, it is concluded that there is an interaction between the improvement of the learning model and the class schedule, in terms of influencing the students' Statistics and Probability exam results.

The results of the hypothesis test that was obtained above clearly show that it is necessary to make improvements in the learning model in various class schedules. Thus, there is an increase in student learning outcomes, as seen from the score/value of the Statistics and Probability exam results. It also answers the problems researchers have felt for the next; students will have an increased ability to solve problems and think more creatively with the suitable learning model. In other words, to get good results in the learning process, a specific model is needed to make it easier for students during the learning process. Ultimately, each learning model requires a different management system and learning environment that applies to various class schedules.

This study almost has the same result as the research conducted by Amanda, Subagia, & Tika (2014), which states that there is a significant difference in values related to Natural Science Learning outcomes between students who follow project-based learning models and conventional learning models with FA = 20.688 > Ft= 3.96. Thus, the two learning models above clearly affect students' Natural Science learning outcomes in class. The results of this study are also relevant to the research results obtained by Damayanti & Jirana (2018), which concluded that there was a significant difference in value between the variables of the inquiry learning model and the teacher-centered learning model in learning outcomes for students of class XI IPA SMAN 1 Tinambung in the form of chemistry exam results, with a significance value of 0.000.

Ultimately, this research is limited to only two variables or two factors with one dependent variable. This research is necessary because students' low comprehension of the subject matter affects their learning outcomes, which are directly proportionate correlated with their exam scores. Solutions must be found quickly so the problem does not remain for an extended period. Therefore, in this study, researchers seek novelty by conducting research at the university level using relevant test models and statistics to be helpful and provide more comprehensive information for all teachers and students.

CONCLUSIONS AND SUGGESTIONS

Based on the research results by testing the hypothesis using two-way ANOVA, three conclusions were obtained: (1) The learning model variable has a significant effect on the variable value of the student's Statistics and Probability exam results, with a significant value of 0.000. (2) The class schedule variable does not significantly affect the student's Statistics and Probability exam results, where the significant value is 0.702. (3) A significant interaction between the learning model variables and class schedule influences students' Statistics and Probability exam results, with a significant value of 0.000. Thus, it is clear that it is necessary to improve the learning model in various class schedules to change student learning outcomes and increase student exam scores in Statistics and Probability Subject.

This research is limited to using only two independent variables and one dependent variable. It is expected that further research can use more research variables and add to the formulation of the problem.

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