

A WORKSHOP ON BASIC STATISTICS WITH THE R PROGRAMMING LANGUAGE AT SMA ERENOS TANGERANG

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ABSTRACT

The goal of the article is to find out and interpret the effect of giving a workshop on basic statistics with the R Programming Language at SMA ERENOS Tangerang. Researchers used descriptive statistics and basic inferential statistics to analyse student performances. The sample was taken as seventy-two students from SMA Erenos, where the actual number of students was ninety-six for grades X and XI majoring in science and social studies. The score of students was carried out directly from the Quizziz website and it is divided into two sessions, namely the Pre-Test and Post-Test. The results of this study obtained a real influence on learning basic statistics before and after the workshop. Therefore it can be concluded that when students have been given the right method to learn statistics or any other subject, it would be increased the performance of the students.

Keywords: Statistics, Pre-test, Post-test, Learning Evaluation.

INTRODUCTION

Statistics is a branch of mathematics that is currently starting to take many roles in aspects of human life because in the digital era like today, almost all fields are related to simple data as well as big and complex data (Riasari et al., 2023). It is known that statistics plays an important role in processing research data (Kurniasih et al., 2023). However, there are still many people, especially students in Indonesia who have a bad interest in learning Statistics because they still find it difficult and complicated to understand. According to (Danet, 2021) Statistics will play an important role in the development of the times. To overcome the problem of thinking that statistics is difficult to understand, there must be different and more interesting learning methods, for example by using *software* assistance (Machali et al., 2021). This learning method that involves software and technology can be a trigger to motivate Siswa-i-i extrinsically, as well as a teaching strategy and as a tool to achieve goals (Rahman et al., 2022).

According to (Sabaniah et al., 2021) Statistics is a technique for collecting data, analyzing, forecasting or predicting, and interpreting an event. (Azizah & Nugraha, 2022) argues that statistics is the science of ways and rules in terms of data collection, processing, analysis,

conclusions, presentation and publication of a conclusion in the form of numbers. It can be concluded that statistics is a science that studies how to collect, process, analyze and explain the meaning contained in data so that it is easy to understand and useful (Wahyuningrum et al., 2020).

The digital era as it is today makes the demand for data scientists continue to increase (Muhammad et al., 2023). According to an article written by Naufal in June 2022 in kompasiana.com it was stated that the availability of human resources who have understanding and ability in the field of data processing is very small. Based on this background, the Statistics Study Program of Matana University continues to strive to introduce data processing from an early age and provide briefing through learning Mathematics, especially in the field of Statistics (Bakti & Hartono, 2022). The partners who are the target of PKM Universitas Matana are equivalent high school students, this age range is considered to have good potential in the development process and provision of interest in learning about Statistics through its application in everyday life. In this article, it is described how the process of Basic Statistics Training with R Programming Language at SMA ERENOS Tangerang.

METHOD AND IMPLEMENTATION

The methods and implementation of activities that will be PKM are as follows:

Unveiling

At the beginning of the activity, we from the PKM team of the Business Statistics Study Program of Matana University introduced ourselves to the students of Erenos High School. Next, provide an overview of the purpose of the training activity.

Sharing Students and Lecturers

In this section, two students and lecturers share experiences and descriptions of statistics, for example the reasons for choosing the Statistics department and the job prospects that will be expected from the Statistics department.

Pre Test

Furthermore, a Pre-Test *is carried out* where all students try to answer some questions or questions related to Statistics. In this activity, *Quizziz* media is used to make this learning section as a form of game so that students don't get bored.

Training Process

After the student answers the question, the PKM team will provide a solution to the problem. So, the students can understand to solve the problem. The whole series of activities is carried out in a non-formal and relaxed manner, for example i-Students who answer correctly will be asked to come forward to provide ways to complete it. Furthermore, the PKM Team provided an explanation and provided a faster solution using the R programming language, students were directed to try to do it.

Post Test and Closing

Then, all students will answer the same questions, but randomized the sequence number. In this activity, it will be seen how the influence of the process of providing solutions to the problem. Then, at the end of the activity there will be a questionnaire that will be answered by the students related to the PKM team from Matana University.

The method of expanding learning in the implementation of Community Service is quantitative analysis. The most suitable quantitative method is used to see the relationship between variables (Nasution, 2017). This research was conducted precisely at Erenos High School, South Tangerang in 2023. The population contained in this study amounted to 96 students, then for the sample used amounted to 72 students, please note that the i-students included in the sample and population were class X and XI students majoring in science and social studies. In this case, the PKM Team wants to know that whether there are differences in participants' knowledge before and after the training is carried out, evaluated based on Pretest and Posttest scores. Hypothesis testing is performed using the ANOVA method for. Data collection is carried out through the results of question work from all students who participated in the training.

RESULTS AND DISCUSSION

Figure 1 shows some documentation of PKM implementation of Basic Statistics Training with R Programming Language at SMA ERENOS Tangerang. In addition to providing learning, the PKM Team of the Statistics Study Program of Mataingin University also conducted research to find out whether there was an influence of learning basic statistics material on the results of working on questions for students at Erenos High School. The main reference in this study is the average result of correct answering accuracy from question work by i-students at Erenos High School which was carried out before and after learning basic statistics carried out using the help of the Rstudio application.

Table 1. The average accuracy result of the student answered correctly from working on 20 questions at Erenos High School

Information	Pre-test	Post-test
Average accuracy	66,11%	88,79%



Figure 1. PKM Implementation at Erenos High School

Based on table 1, it can be assumed that before being given basic statistics learning by a team from Matana University, the accuracy of answering correctly from all students who participated in doing the questions was lower than the results after being given learning. From

the results of the Pretest, the PKM Team has a strong reason to state that most students feel that statistics lessons are complicated. On the other hand, the results of Posttest, can reinforce that actually students can learn optimally if given different learning methods (Yoong et al., 2023). In this case, as done by the PKM team of the Statistics Study Program of Matana University who uses the help of the Rstudio application in the learning process and conducts learning while playing so as to attract the attention of Siswa-i. Based on table 1, it can be seen that there are differences in the results before and after learning basic statistics material. To test the hypothesis that there is a significant difference between the average scores of students before and after training, the PKM Team conducted ANOVA testing using the help of the Rstudio application. The hypothesis in this case is: H_0 : There is no influence of learning basic statistics on the results of doing questions at Erenos High School, H_a : There is an influence between learning basic statistics and the results of doing questions at Erenos High School. The significance level is 0.05 and the test criteria in this case are as follows: If the p-value < the significance value, then H_0 is rejected. If p-value \geq significance value, then H_0 is accepted.

By using the help of the R programming language, where using the Rstudio application obtained the results of the ANOVA test as follows:

	Df	Sum Sq	Mean Sq	F value	Pr (>F)
Data	1	11654	11654	29.08	0.000000891
Residuals	70	28057	401		

Based on these results, it is known that the p-value of 0.000000891 which is less than the significance level of 0.05 thus H_0 is rejected and H_a is accepted, meaning that there is an influence between basic statistics learning on the results of working on questions at Erenos High School, this is evidenced by the difference in the average accuracy of Student-i's answers.

CONCLUSION

Based on data processing and analysis, it can be concluded that there is an influence between learning basic statistical material and the results of working on questions for Erenos High School students. This can be proven from the results of the ANOVA test using the R programming language where the p-value results are less than the significance level, namely $0.000000891 < 0.05$ thus this shows that the learning method provided is very effective. The suggestions that can be recommended based on the results of the implementation of PKM can be divided into two parts. The first part, suggestions for Student-i are; Continue to learn about statistics and data processing independently, increase confidence in communicating, be more courageous to explore the outside world, especially in the field of data analysis and data processing. The second part, Advice for the school is; Schools can continue learning methods as done by the PKM team of the Matana University Study Program to open opportunities for students to learn data analysis with the help of technology or software such as the R programming language.

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