The Effectiveness of Research Based Learning in the Inferential Statistics Course in the Islamic Economics Department of IAIN Tulungagung

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Abstract: Inferential Statistics is a course that requires an appropriate learning strategy to improve students' critical thinking skills. This course underlies students to conduct the research especially in analyzing research data for the purpose of the final project. In fact, the limited understanding of students to this subject matter resulted in the research of students in the Department of Islamic Economics of IAIN Tulungagung only limited in correlation and regression even though there are many methods that can be used. One learning method can improve student understanding is Research Based Learning (RBL). The purpose of this study is to analyze the effectiveness of RBL in Inferential Statistics courses compared to conventional methods. The results of the analysis used the Mann-Whitney test ($\alpha = 5\%$) indicate that the RBL method is more effective than conventional methods to improve students' understanding of Inferential Statistics lectures with an average value of 85.47.

Introduction

Education is one of the main benchmarks in the progress of a nation. Quality education will produce quality and productive human resources (Sota and Peltzer, 2017). Quality resources can be obtained from a quality learning process so by using qualified learning processes the learner are easier in understanding the lesson. The learners here are university students. Quality learning process is a learning process that must be able to create competitive situations (Kaanklao & Suwathanpornkul, 2018). One of the courses that students need to understand more seriously is Inferential Statistics. This is because this course is the subject that underlies students in conducting research especially in analyzing research data. Inferential statistics is a way of making inferences about populations based on samples (Tarman, Kilinc, & Aydin, 2019; Kalish & Harrison, 2014) With the right data analysis technique, answers will be obtained from the right problem formulation so that the right conclusions can be

drawn. In fact, that student of Islamic Economicsin IAIN Tulungagung only focused on correlation and regression research between variables though many other methods can be used in analyzing research data (Fauzan, 2014). This is due to the lack of student understanding in the application of data analysis techniques learned in the Inferential Statistics. By using good learning method which appropriate with student's characteristic, it can make the students are easier in understanding the materials/lesson (Haryanto, 2020).

Inferential Statistics is a course that requires special learning strategies that can improve students' critical thinking skills, especially in terms of synthesis analysis (Rafikasari, E.F., 2019). The success of the learning process is influenced by many factors.One of them is the use of learning methods with appropriate learning strategies. Learning strategies become very important to change someone from not knowing to knowing and can improve one's ability, especially in cognitive, affective and psychomotor aspects

(Sota and Peltzer, 2017). Research based learning (RBL) is one of learning strategies that can be used to improve student's ability. RBL is a learning technique that uses aspects of research in the learning process. RBL can improve student's knowledge, cognitive ability, critical and thinking ability. Johnston (2009) and Choeisuwan (2015) in their research Chulaporn (2017) about RBL in Thailand stated that RBL is a more effective method when compared to conventional learning methods where the lecturer explains the material and students listen with occasional discussion. The RBL is not only more effective but also recognized as being able to improve capabilities in information and communication technology (Wannapiroon, 2014).

The subject that requires the application of learning strategies with the RBL technique is Inferential Statistics which is a compulsory subject that must be taken by all students in all study programs as well as in the Department of Islamic Economics, Faculty of Economics and Islamic Business (FEBI) IAIN Tulungagung (Rafikasari, E.F., 2019). Inferential Statistics is very useful course for students to conduct research and to conduct their thesis. The main material in this course covers techniques in obtaining data to select appropriate research methods to be used in data analysis. RBL is needed in this course because students not only need knowledge about research methods, but also practice in terms of data search, analysis phase up to writing research results. This is what underlies the need for research on the effectiveness of RBL on students' understanding of Inferential Statistics courses when compared to conventional methods.

Method

The data used in this study are primary data that is data obtained directly by researchers through an assessment of students' understanding of Islamic Economics majoring in FEBI IAIN Tulungagung in the Inferential Statistics course. Assessment is done by first making an assessment instrument in the form of worksheets and questions. The data obtained came from 2 different groups, namely students who used Research Based

Learning in learning activities (as many as 3 classes) and who used conventional methods (discussion and presentation of material) (as many as 2 classes).

Data analysis was performed descriptively quantitative to further test the assumption of data normality. Testing the assumption of data normality is done to determine the test statistics that will be used. The parame trick test statistic is used if the data meets the assumption of data normality while the nonparametric test is used if the data does not follow the normal distribution pattern. The stages of research in a flowchart can be seen in Figure 1.
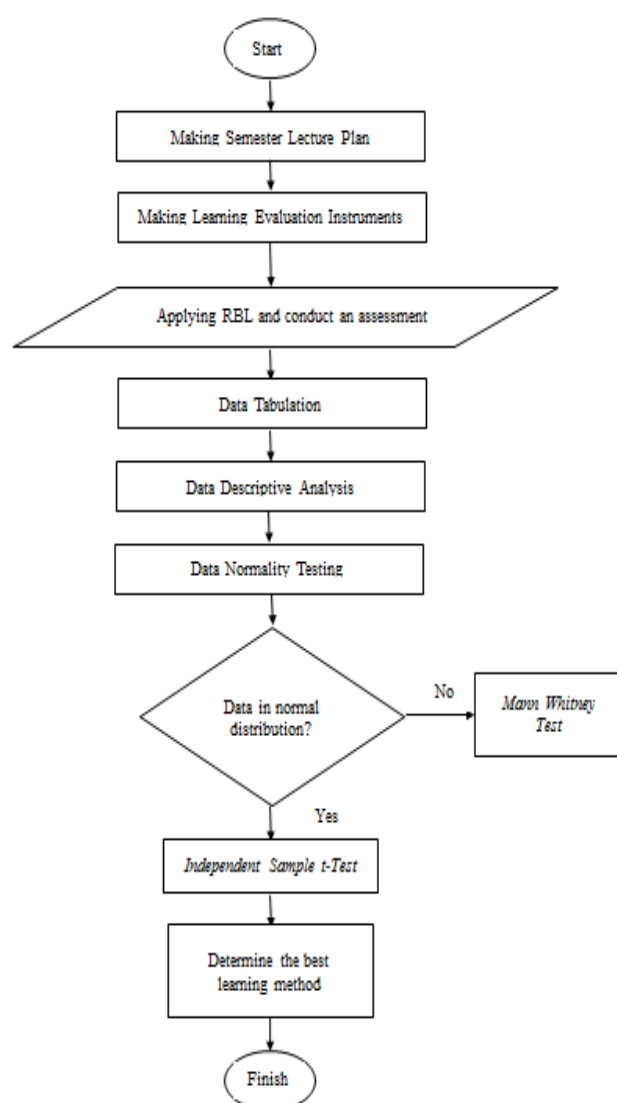

Figure 1. Research Flow Diagram

The stages of the research carried out are as follows:

1. Making Semester Lecture Plans (RPS) for Inferential Statistics courses
2. Conducting learning activities by applying conventional and Research Based Learning methods to the two class groups used
3. Making learning evaluation instruments
4. Conduct an assessment of student understanding
5. Tabulate student grade results
6. Conduct a descriptive analysis of student grades
7. Conduct data normality testing
8. Perform different tests with t test statistics (if the data are normally distributed) or nonparametric statistics of two independent samples (if the data are not normally distributed)

9. Determine the best learning method

Results and Discussion

Descriptive data analysis was performed to determine the description of existing data before further analysis. This study uses interval scale data which is the value of student evaluation results on Nonparametric Correlation Analysis material. The data is grouped into two by giving code 1 for data from groups of students who use the RBL method in learning as many as 129 data. Code 2 is given for data from 89 students using conventional methods. Descriptive statistics of the data can be seen in Table 4, Figure 3 and Figure 4.

Table 4. Descriptive Statistics of Student Value Data

CODE	METHOD	N	AVERAGE	STANDARDS DEVIATION
1	RBL	129	85,47	19,207
2	CONVENTIONAL	89	77,47	20,837

Table 4 shows that the average value of students using the RBL method during learning activities was 85.47 with a standard deviation of 19.207. Students who use conventional methods in learning activities obtain an average value of 77.47 with a standard deviation of 20.837. Numerically this shows that the average value of students who

use the RBL method is better than students who use conventional methods. The standard deviation or standard deviation for the RBL method is smaller than the conventional method. This shows that the value of students with the RBL method is more homogeneous or even when compared to students with conventional methods.
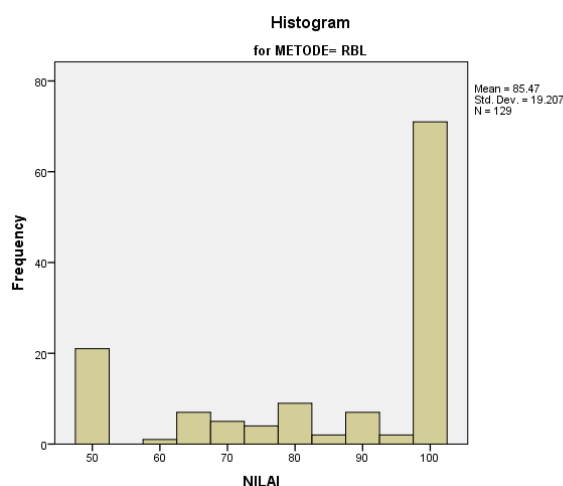

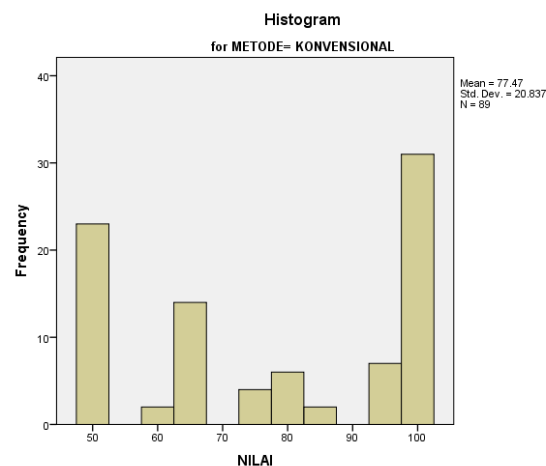
Figure 3 Histogram of the RBL Method

Figure 4 Histogram of the ConventionalMethod

Figure 3 shows that the histogram chart of student grade data using the RBL method graphically does not follow the normal distribution pattern. This is also seen in Figure 4 for the histogram of student grade data using the conventional method. To ensure the assumption of normality of data further testing using the Kolmogorof-Smirnov method.Testing the assumption of data normality is done using SPSS 21 software with the following hypotheses:

H_0: Data in normal distribution

Table 5. Test Results for Data Normality Assumptions

H_0: Data not in normal distribution

The test results can be seen in Table 5. Table 5 shows that the data of student grades both using the RBL method and conventional methods do not meet the assumption of data normality. This is indicated by the value of sig using both the Kolmogorov-Smirnov and Shapiro-Wilk methods, which means that they are rejected or the data are not normally distributed.

Tests of Normality

METODE		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
NILAI	RBL	.326	129	.000	.727	129	.000
	KONVENSIONAL	.227	89	.000	.806	89	.000

a. Lilliefors Significance Correction

The sample comes from groups that are mutually independent or not related to each other, namely groups of students using the RBL and conventional methods when learning activities. In addition, the .

violation of the assumption of data normality requires that the data be analyzed using nonparametric statisticswith the Mann-Whitney method

Table 6. Value Data Rank

Ranks

	METODE	N	Mean Rank	Sum of Ranks
NILAI	RBL	129	119.63	15432.00
	KONVENSIONAL	89	94.82	8439.00
	Total	218		

Table 7. Results of Statistical Tests with Mann-Whithney

Test Statistics[a]

	NILAI
Mann-Whitney U	4434.000
Wilcoxon W	8439.000
Z	-3.029
Asymp. Sig. (2-tailed)	.002

The hypothesis to be tested is as follows:

$H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 \neq \mu_2$

$sig = 0.02 < 0.05 = \alpha$

Hypothesis testing results indicate that so the null hypothesis which states that "the average value of student learning outcomes with the RBL method and the conventional method is the same" is rejected. In other words, the results of this study indicate that the average value of students using the RBL method is different from students who use conventional methods in their learning activities. This can also be seen in Table 4 which shows that the average value of students using the RBL method is 85.47 which is higher than students with conventional methods with an average of 77.47.

Conclusions

The learning method as an alternative to improving students' understanding of Inferential Statistics is Research Based Learning (RBL). This method is proven to be more effective than the conventional method seen from the average value of students with RBL (85.47) which is greater than the conventional method (77.47). In addition, the results of testing the average difference with the Mann Whitney Test also showed that the hypothesis that reads "the average value of student learning outcomes with the RBL method and the conventional method is the same" was rejected.

Thus the average value of students with RBL and conventional is different from the value of students with RBL that is greater than conventional methods.

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