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IMPROVING STUDENT'S LEARNING OUTCOMES BY USING MICROSOFT EXCEL AND STATISTICAL PROGRAM OF SOCIAL SCIENCE

Herlina^{1*}

¹Universitas Sembilanbelas November Kolaka, Kolaka, Indonesia

*Corresponding author.

E-mail: herlina8072@gmail.com ^{1*)}

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Abstract

One of the factors causing the low score of student learning outcomes Statistics and Probability on midterm exams is that during practice or studying on their own, students feel the complexity of solving questions about data analysis in Statistics and Probability courses and the difficulty of obtaining confirmation of correct answers. This encourages to find alternative solutions. One of them is using Excel and Statistical Program of Social Science (SPSS) software in Statistics and Probability learning. The purpose of this research is to improve the learning outcomes of Statistics and Probability using Excel and SPSS software. The method used in this research is the One-Group Pretest-Posttest Design. Samples were selected using the Cluster Random Sampling technique. To see if there is an increase in learning outcomes, it is done by comparing the average learning outcomes of the midterm exams (before using Excel and SPSS software) and final semester exams (after using Excel and SPSS software). The results of the Wicoxon test showed Asymp. Sig. (2-tailed) 0.000 less than 0.05, so it can be concluded that the pretest and posttest means are significantly different. This shows that there is an increase in learning outcomes before and after learning using Excel and SPSS software, so it is concluded that student learning outcomes in Statistics and Probability courses can be improved through learning by using Excel and SPSS software.

Keywords: Excel; learning outcomes; software; SPSS.

Abstrak

Salah satu faktor penyebab rendahnya nilai hasil belajar Statistik dan Probabilitas mahasiswa pada ujian tengah semester disebabkan pada saat latihan atau belajar sendiri. Mahasiswa merasakan rumitnya penyelesaian soal tentang analisis data pada mata kuliah Statistik dan Probabilitas dan sulitnya memperoleh konfirmasi jawaban benar. Hal ini mendorong untuk menemukan alternatif solusi. Salah satu alternatif solusi adalah memanfaatkan software Excel dan Statistical Program of Social Science (SPSS) dalam pembelajaran Statistik dan Probabilitas. Tujuan penelitian ini adalah untuk meningkatkan hasil belajar Statistik dan Probabilitas menggunakan software Excel dan SPSS. Metode yang digunakan dalam penelitian ini adalah One-Group Pretest-Posttest Design. Sampel dipilih dengan teknik Cluster random Sampling. Untuk melihat apakah ada peningkatan hasil belajar, dilakukan dengan membandingkan rata-rata hasil belajar ujian tengah semester (sebelum memanfaatkan software Excel dan SPSS) dan ujian akhir semester (setelah memanfaatkan software Excel dan SPSS). Hasil uji Wicoxon menunjukkan Asymp. Sig. (2-tailed) 0,000 kurang dari 0,05 sehingga disimpulkan bahwa rata-rata pretest dan posttest berbeda secara signifikan. Hal ini menunjukkan bahwa terjadi peningkatan hasil belajar sebelum dan sesudah pembelajaran memanfaatkan software Excel dan SPSS, sehingga disimpulkan bahwa hasil belajar mahasiswa pada mata kuliah Statistik dan Probabilitas dapat ditingkatkan melalui pembelajaran dengan memanfaatkan software Excel dan SPSS.

Kata kunci: excel; hasil belajar; software; SPSS.



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INTRODUCTION

Learning outcomes are influenced by many factors. One of them is the learning media factor. Especially in statistics and probability courses, which mostly analyze data, the learning media that can be used is software. Currently, there are many media in the form of software that can be used to analyze data easily. These include software Microsoft Office Excel (Excel) and the Statistics Program Social Science (SPSS). Excel is generally used by most people in dealing with numerical processing and many mathematical functions can be related to statistics (Petro & Swatan, 2019).

Several previous studies that used Excel and SPSS as learning media to facilitate students in understanding the subject matter concluded that both learning using Excel and SPSS could improve student learning outcomes (Martiningsih (2015), (Ramadhani & Sribina (2019), Sundayana (2012), Nurhayati & Novianti (2020), Nurjanah et al. (2020), (Tarigan et al., 2020), Jayadi & Anwar (2017), Hasibuan & Hasibuan (2017) and Julaeha (2019)). Other studies that have been conducted also conclude that learning using Excel and SPSS can increase interest (Hasyim & Listiawan, 2014) and can also improve student attitudes towards learning (Nasyaroeka, 2017). Meanwhile, research conducted by Sadchikova & Rodin (2017) concluded that SPSS is one of the most complete applications in terms of data analysis capabilities.

The studies mentioned above, in improving learning outcomes have used Excel and SPSS. However, from these studies, not many have combined the use of Excel and SPSS, especially on statistical material and subject

probability. Its use is still applied to different classes.

Not all data types can be solved easily using Excel alone or SPSS alone. The two must complement each other. In addition, if students only use SPSS, students cannot practice the algorithm and do not have a solid foundation in statistical formulas. Likewise if students only use Excel, students cannot easily confirm their manual answers. Although complete for all types of research data, there are certain types of data that cannot be solved using SPSS. For example in linear regression, if there is no repetition of data on the independent variables, then the linearity test cannot be tested using SPSS (lack of fit test). To test linearity, the model adequacy test (model adequacy) must be used manually and using Excel (Suyono, 2015). So that manual processing using Excel must still be used to anticipate problems that cannot be solved with the help of SPSS.

The value of learning outcomes for Statistics and Probability subjects in the middle of the semester is still low. The low learning outcomes are caused by several factors, including the density of the material which is carried out in only 14 meetings and most students do not like mathematics, while statistics and probability subjects are more about mathematics with long and complicated procedures.

Based on these problems, we need a media that can help students practice working on questions about data analysis to get confirmation of answers that are done manually by students using the Excel then the students checked their answers using SPSS. Excel can be used for manual processing. Then proceed with SPSS to confirm student answers.

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This study aims to improve student learning outcomes in Statistics and Probability subjects using Excel and SPSS. This can be seen from the comparison of learning outcomes before and after learning using Excel and SPSS. The hypothesis in this study is whether there is a significant difference between student learning outcomes before and after learning using Excel and SPSS.

METHODS

This type of research is an experiment in one group. In that group, learning was carried out without using Excel and SPSS at the beginning of the semester, then given a test (pretest). After that, the learning continued with learning using Excel and SPSS, then given another test (posttest) at the end of the semester. The results of the pretest and posttest were analyzed and compared.

This study used the design of One-Group Pretest-Posttest Design (Neuman, 2014) by comparing the average learning outcome scores of the students before and after treatment using Excel and SPSS software. The design of this study as follows table 1.

Tabel 1. One group, pre-test post-test designs

Pre-test	Independent variabel	Post-tes
T1	X	T2

The population in this study were 5 classes with a total of 200 students in the Information Systems Study Program, Faculty of Information Technology of Universitas Sembilanbelas November Kolaka batch 2018. Samples were taken using cluster random sampling technique. From the 5 existing classes, one class was chosen

randomly as the research sample. The selected class was class E consisting of 41 students in even semester IV.

The instrument used in this study was a test instrument in the form of a valid essay test, namely pretest and posttest. The technique of collecting data is by giving a test. The scores from the results of these two tests were analyzed and compared. Both of these test results were analyzed by the *t test*

This study started with analyzing the midterm test results data which covered the mean score, maximum score, minimum score, and standard deviations. After that, the research continued by implementing Excel and SPSS software in learning for 7 meetings, then students were given a final semester exam. The final semester examination results were analyzed to obtain the mean score, maximum score, minimum score, and standard deviation. The mean scores, maximum scores, minimum scores, and standard deviations of the two test results, namely mid-test and final test, were compared. To find out whether the difference in the mean scores was significant for the population, a two-mean difference test for two pairs was used. To determine the difference test used, first the normality test was performed using the Kolmogorof Smirnov test. If the data was normally distributed, a paired t test was used namely Mann-Whitney. But if the data was not normally distributed, then the Wilcoxon Rank test was performed. The results from Kolmogorof Smirnov test and two-mean difference test were analyzed using SPSS Statistics 20.

RESULT AND DISCUSSION

The description of the average score, maximum and minimum score,

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and standard deviation of the pre-test and post-test was presented in Table 2.

Table 2. Value of Average, Maximum, and Minimum of Pre-Test and Post-Test

Value	Pretest	Posttest
Average	30,97	86,5
Maximum	100	100
Minimum	0	70
Standar deviasi	18	9,72

Based on Table 2, the average score of pre-test was 30,97 and the mean score of post-test was 86,5. This showed that the average learning outcomes after the learning process using Excel and SPSS software were higher than the average learning outcomes before the students used Excel and SPSS software. Standard deviation at pre-test was 18 and at the post-test it was 9,72. It showed that the distribution of data from the mean score at pre-test was higher than post-test. Thus, it could be concluded that the data at the post-test was more stable.

Before comparing two-mean difference, the data was firstly tested for its normal distribution. The test results for the normal distribution of the data from SPSS were as follows Table 3.

Table 3. Normality Test

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.290	41	.000	.824	41	.000
Posttest	.201	41	.000	.900	41	.002

Based on the Table 3, it can be seen that the sign value of Kolmogorov Smirnov test ($0,000 < 0,05$). It can be concluded that the pre-test and post-test data were not normally distributed. Thus, the next hypothesis testing used the Wilcoxon test. The result of the Wilcoxon test can be seen in Table 4.

Table 4. Ranks of Pretest and Posttest

		N	Mean Rank	Sum of Ranks
Posttest - Pretest	Negative Ranks	1 ^a	1.00	1.00
	Positive Ranks	39 ^b	21.00	819.00
	Ties	1 ^c		
	Total	41		

- a. Posttest < Pretest
- b. Posttest > Pretest
- c. Posttest = Pretest

Based on the Table 4, it can be seen that:

1. There was 1 student who experienced a decline in scores from pre-test to post-test with an average of 1 and sum of negative ranks 1.
2. There were 39 students who had increasing scores from pre-test to post-test with an average score of 21 and sum of positive ranks 819.
3. There was 1 student who had the same score on pre-test and post-test.

The results of the Wilcoxon test were obtained as shown in Table 5.

Table 5. The result of Wilcoxon test

Posttest - Pretest	
Z	-5.506
Asymp. Sig. (2-tailed)	.000

Based on the table 5, it was found out that the value of Asymp. Sig. (2-tailed) 0,000 was less than 0,05. So it was concluded that the average scores of pre-test and post-test were different significantly. This showed that there was an increase in learning outcomes before and after learning using Excel and SPSS. This increase is due to the influence of learning using Excel and SPSS.

This is because most students when working on math problems in Statistics and Probabilistic courses

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manually require reinforcement of answers, whether their answers are correct or still wrong. Students can confirm the answers to the results of the work manually by performing data analysis procedures through SPSS according to the step-by-step instructions. Thus, students can correct the answers produced manually if they are still wrong. There are also many students who do not like mathematics in Statistics and Probabilistic subjects because the procedures are long and complicated. Through Excel and SPSS, students can confirm their answers, so as a reinforcement for correct answers and as corrections for correcting wrong answers. The use of Excel and SPSS software also facilitates long and complicated mathematical processes, so that they can provide solutions for students who do not like mathematics.

The advantage of using Excel media combined with SPSS is to keep students' mathematical formula and algorithm application skills being trained using Excel and then being able to confirm answers using SPSS. In addition, these two applications can cover each other's shortcomings.

In addition to the advantages, there are also disadvantages in this study, namely in learning and when working on practice questions, students must use laptops or computers while not all students have laptops or computers.

After going through data analysis with prerequisite tests, this study found that learning in statistics and probability courses by combining Excel and SPSS can significantly improve learning outcomes, from an average of 30.97 to 86.5. This is due to the selection and use of learning media in accordance with the characteristics of the material in statistics and probability courses. This research is in line with the research

conducted oleh Martiningsih (2015), Ramadhani & Sribina (2019), Sundayana (2012), Nurhayati & Novianti (2020), Nurjanah et al. (2020), Tarigan et al. (2020), and Julaeha (2019). The use of SPSS also makes students excited to want to know the truth of their manual answers, causing their interest and attitude to become better towards statistics and probability courses. This is in line with research conducted by Hasyim & Listiawan (2014) and Nasyaroeka (2017).

The impact of the results of this study, in addition to improving learning outcomes, students can also recognize and master the use of Excel and SPSS which are very necessary for the completion of the final project in managing research data.

CONCLUSION AND SUGGESTION

Based on the results and discussion, it is concluded that learning using manual completion combined with excel and SPSS software can improve student learning outcomes in Statistics and Probabilistic learning. Excel and SPSS software can improve students' learning outcomes in Statistics and Probability subject. Excel and SPSS software are used to confirm students' answers in practicing mathematical questions and can overcome long and complicated mathematical procedures.

Suggestions for lecturers in the future to be able to use various available facilities to improve student learning outcomes, especially using additional excel and SPSS software to support manual completion with the aim of confirming student answers in practicing completing exercises in independent study in Statistics and Probabilistic courses.

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