

*Regular*  
**Proceeding**

Innovation In STEM Education: Current Research Trends and Practices in Mathematics and Mathematics Education

3<sup>rd</sup> ISIMMED  
2019



Department of Mathematics Education  
Universitas Negeri Yogyakarta

<http://isimmed.uny.ac.id/proceeding-2019>

*Regular*  
**Proceeding**

International Seminar on Innovation in  
Mathematics and Mathematics Education

3<sup>rd</sup> ISIMMED 2019

“Innovation in STEM Education: Current Research Trends and  
Practices in Mathematics and Mathematics Education”

OCTOBER 3-4, 2019  
UNIVERSITAS NEGERI YOGYAKARTA

Organized by :



Department of Mathematics Education  
Universitas Negeri Yogyakarta

ISBN : 978-602-73403-5-0

PAPER • OPEN ACCESS

## The effect of applying TPS type cooperative learning model assisted by SPSS software on students' skills in IT-based statistical data analysis course

To cite this article: R Ariawan and A Wahyuni 2020 *J. Phys.: Conf. Ser.* **1581** 012027

View the [article online](#) for updates and enhancements.



**IOP | ebooks™**

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

# The effect of applying TPS type cooperative learning model assisted by SPSS software on students' skills in IT-based statistical data analysis course

R Ariawan and A Wahyuni

Faculty of Education and Teacher Training, Universitas Islam Riau, Pekanbaru, Indonesia

E-mail: reziariawan@edu.uir.ac.id

**Abstract.** This study aimed to discover the effect of applying TPS type cooperative learning models assisted by SPSS software on students' skills in IT-based statistical data analysis course. The research method of this study was a Quasi Experiment with pretest-posttest non-equivalent multiple-group research design. The samples were selected by using the purposive sampling technique. The samples were the sixth semester students of the Mathematics Education Study Program of FKIP Islamic University of Riau Academic Year 2018/2019, who were attending IT-Based Statistical Data Analysis course. The instrument of this research was questionnaires. The data were collected by using a non-test technique; then, the data were analyzed by applying inferential statistical analysis. Based on the results of data analysis, it was obtained that the value of Sig.  $0.684 > 0.05$  or  $H_0$  was accepted. Thus, it can be stated that there is no effect of the application of TPS type cooperative learning model assisted by SPSS software on students' skills in IT-based statistical data analysis course.

## 1. Introduction

Learning activities in the globalization era begins to be affected by technological developments, in which the classroom learning has begun to be designed and developed based on technology, both in media, such as books, and multimedia, such as software, that supports learning process. This is also expected to happen in learning mathematics at higher institutions. This is in line with [1] who states that electronic technologies such as calculators and computers are the learning media needed for learning mathematics. The use of softwares can make it easier for students to understand the subjects and to improve their skills (soft skills). Thus, efforts to improve the skills (soft skills) of students must be done continuously by lecturers as it is very crucial in the work field later.

Based on observations conducted by the researchers on March 2, 2018 on the students of Mathematics Education Study Program at FKIP UIR grade 6B, it was found that: First, the lecturer had implemented the statistical calculation application, namely Anatest, for learning. Second, only a few students paid attention and tried to follow the steps of using the application when the lecturer explained the material related to the use of the application; as a result, the majority of students did not understand the material. Third, after explaining the material, the lecturer gave one task for the exercise. At that time, the lecturer did not put the students to work in groups, so only students who understood worked on the task. Fifth, the assistance in working on the problems was also limited, so that students, who were still confused, found it difficult and did not complete the given task.



In addition to the observations, the researchers also conducted an interview with the lecturers. The lecturers were asked about the effectiveness of learning by implementing Anatest, if it is viewed from the level of students' understanding about the material, and related to the sharpening of students' skills. The results of the interview revealed that implementing Anatest application facilitated the students, yet many students did not focus on learning. Then, the use of this application was limited for a few materials. Because the learning process was not optimal, the students still had insufficient understanding and their skills was also low.

This learning conditions must be enhanced by finding an alternative mathematical application and using a learning model that can help students to build their knowledge independently or in groups. One application that is considered feasible is SPSS software. SPSS is a computer program used to process statistical data quickly and precisely and it provides various outputs desired by decision makers[2]. The learning is performed by using SPSS software to make it easier to understand the material and facilitate the statistical data analysis. In addition, students will also be trained to be skillful in using SPSS software. Based on this opinion, SPSS will be used as a research tool for IT-based statistical learning.

Moreover, a learning model that can help students to be able to build their knowledge either independently or in groups is TPS type cooperative learning model. This model students are directed to sit in pairs in their teams[3][4]. Before starting the activities, the teacher asks questions; then, the students are directed to think of an answer of their own. After that, the students sit in pairs to discuss the answer. Finally, the teacher asks students to share their opinions with other groups in the class. Referring to this opinion, the TPS type cooperative learning model in this learning is performed by applying SPSS software to help the students understand the material and to facilitate statistical data analysis. In the other hand, students will also be trained to be skillfull in using SPSS software. Skills is the ability to use reason, thoughts, ideas and creativity in doing or making something more meaningful so that itcan produce a value from the results of the work. In this study, four types of skills were reviewed according to [5]; they are: technical skills, social skills, conceptual skills and managerial skills.

Based on these problems, the researchers conducted a research on the effect of applying the TPS type cooperative learning model assisted by SPSS software on student skills in IT-based statistical data analysis courses.

## 2. Method

Based on the problems stated earlier and the objectives of this study, this study was an experimental research. Experimental research aims to see the effect of certain treatments on others under controlled conditions [6]. This research design was the Pre-test and Post-test Non-Equivalent Group proposed by [6] which is described as follows:

### Pre-test and Post-test Non-Equivalent Group Design

	Pretest	Treatment	Posttest
Experiment	O1	X	O2
Control	O3	-	O4

Note :

- O1 : The scores of pretest and posttest from the experimental class and the control class
- X : The treatment by applying the TPS-type cooperative learning model assisted by SPSS
- : Treatment by applying conventional learning

This research was conducted at Islamic University of Riau in IT-Based Statistical Data Analysis course. It was conducted in the even semester of the academic year 2018/2019.

The population in this study were all sixth semester students of Mathematics Education Study Program Academic Year 2018/2019. The samples were selected by purposive sampling techniques or

with consideration. The considerations in taking this sample were: there were two lecturers teaching IT-based statistical data analysis course, namely Astri wahyuni, M.Pd., who taught in MKPIT6B and MKIT6C, and Fitriana Yolanda, M.Pd., who taught in MKPIT6D and MKPIT6E. The MKPIT6B and MKPIT6C classes were chosen as the samples because the researcher taught in those classes. As a result, the researchers conducted the the research more freely in their own classes.

The data collected were the results of the questionnaire of students' skill during the pretest and posttest. The questionnaire was adopted from the theory proposed by [5], while the indicators of students' skill questionnaire are as follows:

**Table 1.**The indicators of student's skills questionnaire

Skill dimensions	Indicators	Items of statement		Number of items
		Positive	Negative	
Technical skills	Utilizing technology equipments	1	6	2
	Performing the procedures	3	5	2
	Handling work interference	7	16	2
Social skills	Serving others	21	11	2
	Encouraging others	22	10	2
	Communicating orally and written	20	9	2
	Collaborating on team work	2	19	2
Conceptual skills	Responding to changes	17	23	2
	Utilizing opportunities	12	24	2
	Conviding ideal	15	18	2
	Providing considerations for problem solving	4	25	2
Managerial skills	Providing supports for increasing the potency	13	26	2
	Controlling members	8	27	2
	Resolving conflicts	28	14	2
	Arranging program planning	29	31	2
	Directing friends	30	32	2
Total items				32

To measure the students' skills, the validity and reliability of the instrument were checked. In this research, the data were analyzed through 2 stages. The first stage was a prerequisite test in the form of a normality test which was aimed at seeing whether the sample data were normally distributed. If the data obtained are normally distributed, the analysis is continued to homogeneity test. But if it does not, the homogeneity test will not be conducted. The second stage was testing the hypothesis based on the formulation of the research problem. The hypothesis was tested by difference test of 2 free sample consisting of t-test (if the data is normally distributed and homogeneous) and t-test (If the data are normally distributed but not homogeneous) and Mann Whitney test (if the data are not normally distributed). All calculations of data analysis were performed by using SPSS 16.

### 3. Result and Discussion

#### 3.1 Inferential analysis of pretest data

The analysis of pretest data was obtained from the initial test results before the treatment. The analysis of pretest data is as follows:

*3.1.1 Normality test of pretest score.* The normality test of pretest data was calculated by Kolmogorov-Smirnov (K-S) test for the data over 50 samples, which was assisted by the IBM SPSS Statistics program. The data were normally distributed ( $H_0$  accepted) if the Sig.  $\geq \alpha$  ( $\alpha = 0.05$ ). The results of the normality test are presented in Table 2 as follows.

**Table 2.** Normality test results of pretest score

Classes	Kolmogorev-Smirnov			Conclusion
	Statistic	df	Sig.	
Experiment	0.157	26	0.096	$H_0$ Accepted
Control	0.101	28	0.200	$H_0$ Accepted

Source: researchesr's processed data

Based on the table above, the pretest scores of the students' skills from the experimental class and control class have a Sig.  $\geq \alpha$ , that is the value of experimental class is  $0.096 \geq 0.05$  while the value of control class is  $0.200 \geq 0.05$ , so that  $H_0$  is accepted. This shows that the pretest score of the students' skills in the experimental class and control class were normally distributed.

*3.1.2 Homogeneity test of two variants of pretest score.* After conducting the normality test of the pretest data, it was obtained that the data obtained from the two classes were normally distributed. This means that the homogeneity test was conducted. If the data variance is homogeneous, the analysis can be continued with t test. However, if the data variance is not homogeneous, the data can be tested by t test. The data are homogeneous ( $H_0$  is accepted) if the Sig.  $> \alpha$  ( $\alpha = 0.05$ ). The results of the homogeneity test of the pretest scores of student skills can be seen in the following Table 3.

**Table 3.** The use of digital media by Indonesian language teachers

Homogeneity test	Levine statistic	Sig.	Conclusion
Based on mean	0.148	0.702	$H_0$ Accepted

Based on the table above, the pretest scores of the experimental class and control class have a Sig.  $\geq \alpha$  that is equal to  $0.702 \geq 0.05$ , so  $H_0$  is accepted. This shows that both variances from both the experimental class and the control class are homogeneous or the same.

*3.1.3 Difference test of two average of pretest values.* After testing the homogeneity of the pretest data, the data obtained from both variants were homogeneous. Then, the pretest data were tested by the t-test. This test was used to see the initial ability of students before getting the treatment both from the experimental class and the control class. The hypotheses used to see the difference between the two pretest average student skills are:

- $H_0 (\mu_1 = \mu_2)$ : There is no difference of the students' skills in the experimental class and the control class.
- $H_1 (\mu_1 \neq \mu_2)$ : There is a difference of the students' skills in the experimental class and the control class.

Note:

- $\mu_1$  : Students' skills of the experimental class before getting the treatment
- $\mu_2$  : Students' skills of the control class before getting the treatment

The statistical test criteria are as follows:

- If the Sig. (2-tailed)  $< \alpha$  ( $\alpha = 0.05$ ),  $H_0$  is rejected
- If the Sig. (2-tailed)  $> \alpha$  ( $\alpha = 0.05$ ), then  $H_0$  is accepted

The results of the t-test of the pretest scores of student skills can be seen in Table 4 as follows.

**Table 4.**T-test results of pretest value

T-test	Sig. (2-tailed)	Conclusion
Equal variance assumed	0.338	$H_0$ Accepted

Based on the results of the T-test in the table above, the Sig. (2-tailed) is 0.384. The value of Sig. (2-tailed) is  $0.384 > 0.05$ , so  $H_0$  is accepted. Because  $H_0$  is accepted, it can be interpreted that there is no difference of the students' skills in the experimental class and the control class. Thus, it can be concluded that the initial abilities of the two classes (experiment and control) are similar.

### 3.2 Inferential analysis of posttest data

The analysis of posttest data was obtained from the results of students' final test after getting the treatment. The analysis of posttest data is processed as follows:

**3.2.1 Normality test of posttest value.** The normality test of posttest data was calculated by Kolmogorov-Smirnov (K-S) test for the data over 50 samples with the help of IBM SPSS Statistics program. The data is normally distributed ( $H_0$  accepted) if the Sig.  $\geq \alpha$  ( $\alpha = 0.05$ ). The results of the normality test are presented in the following Table 5.

**Table 5.**The results of normality test of posttest value

Classes	Kolmogorev-Smirnov			Conclusion
	Statistic	df	Sig.	
Experiment	0.143	26	0.180	$H_0$ Accepted
Control	0.192	28	0.009	$H_0$ Rejected

Source: researcher's processed data

Based on the table above, it can be seen that the posttest scores of students' skills in the experimental class have Sig.  $\geq \alpha$  that is equal to  $0.180 \geq 0.05$  while the students in the control class have a Sig.  $< \alpha$  that is equal to  $0.009 < 0.05$ , so  $H_0$  is rejected. This shows that the posttest score of the experimental class is normally distributed while the control class is not normally distributed.

**3.2.2 Difference test of two mean of posttest values.** After conducting the normality test of posttest data, it was obtained that the data of the experimental class are normally distributed while the data of the control class are not normally distributed. Because one of the data is not normally distributed, the posttest data were tested by non-parametric tests which is Mann Whitney test. This test is useful to see the student's final ability after getting the treatment from both the experimental class and the control class. The hypothesis to see the difference between the two averages of posttest is:

- $H_0$  ( $\mu_1 \leq \mu_2$ ): There is no influence of student skills in the experimental class and control class.

- $H_1$  ( $\mu_1 > \mu_2$ ): There is an influence of student skills in the experimental class and control class.

Note:

- $\mu_1$  : The students' skills in the experimental class after getting treatment
- $\mu_2$  : The students' skills in the control class after getting treatment

The statistical test criteria are as follows:

- If the Sig.  $< \alpha$  ( $\alpha = 0.05$ ),  $H_0$  is rejected
- If the Sig.  $\geq \alpha$  ( $\alpha = 0.05$ ),  $H_0$  is accepted

The results of the difference test in the two average posttest scores can be seen in Table 6 as follows:

**Table 6.**Result of difference test of two average of posttest value

	Value
Mann Whitney U-test	340.500
Wilcoxon W	746.500
Z	-0.407
Asymp. Sig.	0.684

Source: researcher's processed data

Based on the results displayed in the table above, it is revealed that the Sig. 0.684. The value of Sig. Value  $0.684 > 0.05$ , so  $H_0$  is accepted. Because  $H_0$  is accepted, it can be interpreted that there is no influence of the students' skills in the experimental class and the control class. Thus, it can be concluded that the final ability of the two classes (experiment and control) is similar.

Based on the results obtained, there are several findings to answer the reason why there is no influence on the students' skills in the experimental class and the control class. Some of them are: (1) when lecturers delivered the materials, the students tended to be quiet and confused, it seemed that it was difficult for them to understand the materials. This was because the students still have insufficient knowledge of basic statistics; the students learn the statistical materials in the same semester with IT-based statistical data analysis course. As a result, a negative impact emerged that students were not technically and conceptually proficient. Another aspect of skills that were not mastered by students during the learning process is that the students are not yet accustomed to learning to use software so they do not have difficulties in understanding the steps to complete data analysis.

A skill learned aimed to increase a person capacity in terms of learning, to better understand the concept of learning and to emphasize practical implications on the application of the concept of the tangible in day-to-day activities. The ultimate goal of skilled in learning math is expected skills they have been given is reached in to learning mathematics in a high accountability (Risnawati, 2013).

In addition, it is known that students also still hesitate in group learning, they are still accustomed to direct learning which the lecturer explains all the material and students only accept it. In the learning process it is known that only a few students feel able and comfortable with group learning, this is causes students skills not develop properly so that the results of this research lead to no influence on student skills or  $H_0$  is accepted. This research is a follow-up of several research that have been conducted by researchers or perhaps by others, in this experimental research it is usual to use cooperative learning models with the TPS type, but usually researchers only want to see their effects on student learning results. After learning reflection, the results show that the independence of students in learning in the classroom is still very low, as well as student skills. Is influence think learning model, twisted share think learning model twisted share investigation and conventional learning model to the ability to communicate mathematical ((Rifa Fahrullisa, Fredi Ganda Putra,



Nanang Supriadi. 2018) and A significant difference in understanding the concept of students who been the motivation high and low been the motivation (Miftachus Sururoh, Punaji Setyosari, Subanji. 2018). Therefore, researchers want to conduct research that applies a learning model and see its effect on the independence and skills of students, especially in using SPSS software in IT-based statistical data analysis courses.

#### 4. Conclusions

Based on the results of the analysis, it can be concluded that there is no significant effect of the application of the TPS type cooperative learning model assisted by SPSS Software on the students' skills in IT-Based Statistical Data Analysis course. From the research, the researchers provide advice related to the effect of applying the learning model, including: for researchers who will conduct research on IT-based statistical data analysis courses, it is suggested to firstly ensure that students have studied educational statistics so that they easily understand the materials presented at the time of the study; and the researchers should practice using SPSS software before conducting research so that students are more capable to use the software.

#### References

- [1] E E Kumalasari, "Perancangan media pembelajaran kalkulus berbasis multimedia menggunakan macromedia flash (design of learning media based on multimedia using macromedia flash).," *J. Edukasi*, vol. 1, 2018.
- [2] Y S Nugroho, P H Sasongko, and T Haryono, "Penggunaan software spss untuk analisis faktor daya beli listrik pada sektor rumah tangga dengan metode regresi linier berganda," in *Simposium Nasional RAPI VIII*, 2009, p. 82.
- [3] M Sururoh, P Setyosari, Subanji. 2018. Pengaruh Model Pembelajaran Think Pair Share terhadap Pemahaman Konsep dan Motivasi Belajar. *Jurnal Pendidikan: Teori, Penelitian dan Pengembangan*; Volume: 3 Nomor: 11 Bulan November Tahun 2018 Halaman: 1499—1506.
- [4] R I Arends and A Kilcher, *Teaching for student learning (becoming an accomplished teacher)*. New York and London: Routledge Ratlor and Francis Group, 2010.
- [5] R Fahrullisa, F G Putra, N Supriadi. 2018. Pengaruh Model Pembelajaran Kooperatif Tipe Think Pair Share (TPS) berbantuan Pendekatan Investigasi terhadap Kemampuan Komunikasi Matematis. *Numerical: Jurnal Matematika dan Pendidikan Matematika*, Vol. 2, No. 2, Desember 2018
- [6] Risnawati. 2013. "Keterampilan Belajar Matematika". Aswaja Pesondo: Yogyakarta.
- [7] Slavin, *Cooperative learning: theory, research, and practice*, 2th editio. Pearson, 1985.
- [8] S Adrianto, "Pengaruh keterampilan teknis, keterampilan sosial, keterampilan konseptual, dan keterampilan manajerial terhadap kinerja kepala sekolah Dasar Negeri di wilayah Jakarta Pusat," *J. Manaj. Pendidik.*, pp. 293–294.
- [9] Sugiyono, *Metode penelitian pendidikan (pendekatan kuantitatif, kualitatif, dan R&D)*. Bandung: Alfabeta, 2013.