Journal of Mathematics Education
~JME~
Website: http://usnsj.com/index.php/JME
Email: editor.jme@usnsj.com

The Effectiveness of SPSS-Assisted Troubleshooting Tutorial Videos in Virtual Classroom Against Student Statistics Performance

AUTHORS INFO
Arbain
Universitas Sembilanbelas November Kolaka
Indonesia
abughazwanalhasan@gmail.com

ARTICLE INFO
o-ISSN: 2528-2026
p-ISSN: 2528-2468
Vol. 6, No. 1, June 2021
URL: http://doi.org/10.31327/jme.v6i1.1597

Suggestion for the citation and bibliography
Citation in text:
Arbain (2021)

Bibliography:
Arbain. (2021). The Effectiveness of SPSS-Assisted Troubleshooting Tutorial Videos in Virtual Classroom Against Student Statistics Performance. *Journal of Mathematics Education*, 6(1), 43-48. http://doi.org/10.31327/jme.v6i1.1597

Abstract

One of the learning challenges during the Covid-19 pandemic is the low mastery of material by students, especially abstract material such as statistics. As an alternative solution, statistical learning is carried out using problem solving video tutorials assisted by SPSS to further measure its effectiveness on academic performance. This type of research is true-experimental with Posttest Only Control Design. The sample of this study was students of the management study program of the Faculty of Social and Political Sciences, Ninebelas November Kolaka University who took statistics courses in the odd semester of the 2020 Academic Year which consisted of two classes, namely class C with 32 students and class D with 33 students. The instrument used is a learning achievement test in the form of an essay. The research data were analyzed using one sample t-test and independent sample t-test. The results of data analysis showed that the statistical performance of students taught using SPSS-assisted videos was better than those taught using learning modules.

Keywords: statistical performance, virtual class, SPSS video tutorials

A. Introduction

Equipping students with an understanding of statistical concepts is necessary. In addition to having many applications in daily life, statistical science is also the basis of support for most students in completing their final project or thesis as the final stage in completing their studies. Therefore, most undergraduate programs that have a research component in both a science major and a social department require students to take at least one statistics course. With basic statistical knowledge, students will be able to manage data sets, use appropriate statistical tests to analyze data in an effort to answer research questions, and interpret and report the results of these analyzes in a scientific and understandable way (Nurizzati, 2017).

However, not all students have good performance with statistics courses. This is especially true for students with a background in social studies. Several researchers have reported that most students majoring in social science experience high statistical anxiety. Some students choose social studies because they are prone to mathematics and have unpleasant experiences and feelings about their mathematics lessons at school (Paechter et al., 2017; Faradiba & Walida, 2019). The challenge of learning statistics has been exacerbated by the recent outbreak of Covid-19, where student and lecturer interactions no longer take place face-to-face but are carried out online or in virtual classes.

The results of initial observations by researchers at the Ninebelas November Kolaka University (USN Kolaka) campus showed that during the Covid-19 pandemic, lectures were conducted online using a combination of WA Group and virtual classroom applications such as Edmodo and Google Classroom. Learning content in the form of text is distributed to students in virtual classes for further discussion through the WA Group. Only some lecturers include videos to enrich learning content. Verbal and face-to-face explanations via the Zoom Meeting application cannot be carried out due to network infrastructure constraints. These results are relevant to the findings of Arbain & Farman, (2021).

As a result, lectures at USN Kolaka cannot be carried out using video conferencing and have an impact on students' mastery of the material. Most students have difficulty understanding the material, especially material that is computational and formulas such as statistics. As reported by Arbain & Farman, (2021), that students prefer to take mathematics courses including statistics which are explained verbally by lecturers or using videos.

Based on the description above, it is necessary to carry out an innovative approach to online statistics learning, both strategies and learning media. The use of appropriate learning media and according to the needs of students makes the learning process more meaningful and can ultimately support the learning process itself. One of the media that can be used to support online learning is video. Video learning is an attractive option for distance mathematics education (Munir, 2013). Learning videos can better accommodate students' learning styles, because they can activate the function of the senses of hearing and sight and can create quality learning (Woolfitt, 2015; Nurdin et al., 2019). Through internet access, learning videos available online can reach students all over the world.

The learning videos distributed to students in virtual classes are in the form of problem solving tutorials assisted by the Statistical Program for Social Science (SPSS). SPSS is a parametric and non-parametric data analysis software that provides analysis features that are flexible, easy to understand and run and provide fast and easy-to-read output (Jayadi & Anwar, 2017). Given that dozens of methods of data analysis are available in the SPSS program, such as descriptive analysis, inferential analysis, parametric and nonparametric statistics, to make it easier to understand how to operate the SPSS program, video tutorials are needed that are applicable and practical.

Several related studies, for example Nurhayati & Novianti, (2020) concluded that SPSS-assisted statistical learning is more effective than conventional learning in terms of student statistical performance. Riyanto & Nugrahanti, (2018) suggested that learning statistics through a combination of theory and practice using the multimedia-assisted SPSS program strongly supports the achievement of student understanding of the basic concepts, steps and procedures of data analysis and how to interpret the results of data processing with SPSS.

Other researchers, for example Woolfitt, (2015), concluded that video-based learning can stimulate students' passion and concentration in participating in learning through repeated viewing activities as needed so that holistic understanding is obtained and ultimately improves learning outcomes. The same thing was conveyed by Ziden & Abdul Rahman, (2013) that videos containing learning content are able to accommodate the tendency of students' learning styles

because they combine audio and visual with animation so as to encourage learning motivation and can improve learning outcomes.

From several previous studies, no one has examined the effectiveness of using SPSS-assisted problem-solving tutorial videos as online learning media in terms of student statistical performance. Therefore, the purpose of this study was to determine the effectiveness of problem-solving video tutorials using SPSS software in online learning on student statistical performance.

B. Methodology

This research was conducted at the Management Study Program, Universitas Sembilanbelas November Kolaka with a true-experimental type of research. The design used is a Posttest Only Control Design. Two classes, namely class C and class D, were selected as research samples using a purposive sampling technique from a total of four classes A, B, C, and D who took the Statistics course in the odd semester of the 2020/2021 academic year. Class C which consists of 32 students is hereinafter referred to as the control class and class D which consists of 33 students is called the experimental class.

The experimental class received treatment in the form of learning using SPSS-assisted problem solving video tutorial media. The treatment given to the control class was in the form of learning using learning module media. Lectures take place online or through virtual classes using a combination of Google Classroom and WA Group applications. Google Classroom is used to share learning content while WA Group is used for open discussions and sharing other important information. The experiment lasted for six weeks with six meetings with the topics of discussion, namely: (1) hypothesis testing about the average; (2) hypothesis testing about correlation; and (3) hypothesis testing about ANOVA.

Data on student statistical performance was measured using a learning achievement instrument in the form of five essay questions held at the end of the treatment (posttest). The questions or problems given require cognitive operations ranging from knowledge reproduction, application of knowledge (eg, calculations) to analyzing and explaining information. Each student receives the same questions or exam questions and the same processing time. The answers to the exam questions are scored for further analysis descriptively and inferentially. Descriptive analysis is intended to describe the statistical performance scores of students in both classes (experimental and control).

The two learning approaches (experimental and control) are said to be effective in terms of student statistical performance if the average posttest score obtained is in the good category (>75). The effectiveness test was carried out by using one sample t-test. The formulation of the hypothesis is as follows:

$H_0 : \mu \leq 75$

$H_1 : \mu > 75$

Through inferential analysis, it will also be seen the difference in the average posttest scores of the two classes (experimental vs. control) or the difference in the effectiveness of the two learning approaches (experimental vs. control) in the form of statistical independent sample t-test. The proposed hypothesis is as follows:

$H_0 : \mu\_1 = \mu\_2$

(The statistical performance of the experimental class students is the same as the statistical performance of the control class students)

$H_1 : \mu\_1 > \mu\_2$

(The statistical performance of the experimental class students is better than the statistical performance of the control class students).

Normality test and homogeneity test were also carried out as an assumption test. All data analysis was performed using SPSS software with a significance level of 0.05.

C. Findings and Discussion

Descriptively, the statistical performance of students who were taught using SPSS-assisted problem solving video tutorials in a virtual classroom was better than the statistical performance of students who were taught using learning modules. This can be confirmed by looking at the average value of the two classes, where the experimental class shows an average

of 79.27 while the control class has an average value of 71.78. A description of the statistical performance of students in both classes (experimental & control) is presented in Table 1.

Table 1. Description of Student Statistics Performance in Experiment Class and Control Class

No	description	Class	
		Experiment	Control
1	mean	79.52	73.00
2	Std. Deviation	6.88	8.59
3	Minimum	65.00	55.00
4	Maximum	92.00	89.00
5	Ideal Maximum	100	100
6	N	33	32

The statistical performance score of students in the experimental class is higher than the control class as shown in Table 1 indicating the important role of SPPS-assisted problem solving tutorial videos in supporting students' absorption and understanding of statistics lecture material. The posttest scores of the two classes were further categorized based on the applicable assessment standards at USN Kolaka and are presented in Table 2.

Table 2. Distribution of Student Statistics Performance by Category

No	Score	Category	Experiment		Control	
			Frequency	Percentage	Frequency	Percentage
1	86 – 100	Special (A)	7	21.21%	2	6.25%
2	81 – 85	Very Good (AB)	5	15.15%	3	9.375%
3	76 – 80	Good (B)	11	33.33%	7	21.875%
4	71 – 75	Pretty good (BC)	6	15.15%	8	25%
5	61 – 70	Enough (C)	4	12.12%	8	25%
6	51 – 60	Less (CD)	0	0%	4	12.5%
7	41 – 50	Very less (D)	0	0%	0	0%
8	0 – 40	Fail	0	0%	0	0%

Furthermore, to determine the significance of the role of the video tutorial on the statistical performance of students, a t-test was carried out. Preliminary tests carried out as an assumption test were the Shapiro Wilk normality test and the Lavene Test for homogeneity. Normality test was conducted to determine whether the data distribution follows a normal distribution or not. The homogeneity test is intended to see the similarity of the variance of the two variables. The recapitulation of normality test and homogeneity test are presented in Table 3 and Table 4.

Table 3. Recapitulation of the Normality Test of Student Statistics Performance

No	Data source	*Shapiro Wilk*		Information
		Statistics	*Sig.*	
1	Experiment Class	0.951	0.146	Normal
2	Control Class	0.975	0.651	Normal

Source: Researcher (2021)

Table 4. Recapitulation of the homogeneity test of student statistical performance

No.	Data source	*Lavene Statistics*	*Sig.*	Information
1	Student Statistics Performance	1,827	0.181	Homogeneous

Source: Researcher (2021)

Table 3 presents the value of Shapiro Wilk's experimental class statistic of 0.951 with a sig. 0.146 and the value of Shapiro Wilk statistical control class is 0.975 with a sig value. 0.651. sig value. both classes which are greater than the 0.05 level of significance indicate that the two data can be said to be normally distributed. The results of the homogeneity test in Table 4 show the Levene statistic of 1.827 with a sig. 0.181 is greater than the 0.05 significance level, so it can be

concluded that the statistical performance data of students is homogeneous. Data analysis was continued by testing one sample t-test to determine the effectiveness of the two learning approaches used in the control class and the experimental class in terms of student statistical performance. The recapitulation of test results is presented in Table 5.

Table 5. Recapitulation of one sample t-test

No	Data source	t	Sig. (2 Tails)
1	Experiment Class	3,771	0.001
2	Control Class	-1,317	0.198

Source: Researcher (2021)

Based on Table 5, it can be seen that the value of Sig. in the experimental class 0.001 < 0.05 and the value of Sig. in the control class 0.198 > 0.05. This means that at the 0.05 level of significance an effective learning approach to student statistical performance is learning using SPSS-assisted problem-solving video tutorials (experimental class). While learning using the media module (control class) is not effective. To find out the significance of the difference in the effectiveness of the learning approach between the experimental class and the control class, an independent sample t-test was conducted whose recapitulation is presented in Table 6.

Table 6. Recapitulation of independent sample t-test

No	Data source	t	Sig. (2 Tails)
1	Experiment Class Control Class	3,387	0.001

Source: Researcher (2021)

Table 6 shows that the calculated value of the independent sample t-test is 3.387 with a sig. 0.001 is smaller than the set significance level of 0.05. This confirms that the statistical performance of the experimental class students is better than the statistical performance of the control class students. In other words, the use of SPSS-assisted problem-solving video tutorials in virtual classrooms has proven to be effective in terms of student statistical performance. This effectiveness can be explained because in learning using video, the majority of students show active participation in the learning process. Learning content presented in audio and visual aided by SPSS with a shorter duration than having to read modules and can be watched repeatedly makes students tend to be excited and motivated to listen to the material. This tends to make it easier for students to understand the basic concepts of statistics, steps to solve problems with SPSS, and how to interpret the results of statistical data processing and ultimately improve statistical performance.

The results of this study are relevant to research Woolfitt, (2015), which states that video-based learning can stimulate students' passion and concentration in participating in learning through repeated viewing activities as needed so that holistic understanding is obtained and ultimately improves learning outcomes. The same thing was also conveyed by Ziden & Abdul Rahman, (2013) that video media containing learning content is able to accommodate the tendency of students' learning styles because it combines audio and visual so as to encourage learning motivation, helping students understand the material through listening (seeing and hearing) activities that can played repeatedly and ultimately can improve learning outcomes.

The application of SPSS-assisted video tutorials has supported student learning and understanding of statistics material in online learning. Videos presented in Google Classroom provide an opportunity for students to repeat lessons at any time as needed and can focus on things that are not yet clear. Video content that combines conventional concept explanations and uses SPSS software and includes examples of real problems makes learning more concrete so that it helps students understand the material. The results of student reflections and experiences from watching videos can be discussed openly and flexibly through the WA group.

SoftwareSPSS which has analysis menus that are flexible and easy to operate also contributes to the success of learning. This is in line with Nurhayati & Novianti, (2020) that the use of SPSS software as a medium for learning mathematics, especially statistical data analysis material can help students in the learning process and improve learning outcomes.

E. Conclusion

This study found that there was a significant difference in the statistical performance of students who were taught using SPSS-assisted learning modules with those taught using SPSS-assisted problem-solving video tutorials in online learning. The statistical performance of students by learning using SPSS-assisted video tutorials is better than the statistical performance of students by learning using modules.

Video-based learning can be one of the strategic solutions in online learning during the Covid-19 pandemic, especially material that is complex and abstract such as statistics. The combination of conventional concept explanations and using the SPSS application that is mixed into a single unit in a learning video with a shorter duration than having to read modules is one of its own advantages to support students' understanding of statistical concepts.

G. References

Arbain, A., & Farman, F. (2021). Pembelajaran Daring Masa Darurat Covid-19 Pada Mahasiswa Pendidikan Matematika. *HISTOGRAM: Jurnal Pendidikan Matematika*, *4*(2). https://doi.org/10.31100/histogram.v4i2.720

Faradiba, S. S., & Walida, S. El. (2019). KECEMASAN STATISTIK PADA MAHASISWA CALON GURU. *JPM : Jurnal Pendidikan Matematika*. https://doi.org/10.33474/jpm.v6i1.3634

Jayadi, A., & Anwar, Z. (2017). *Pemanfaatan Aplikasi SPSS untuk Meningkatkan Keterampilan Mahasiswa Mengolah Data Statistika*. JURNAL VISIONARY.

Munir, M. (2013). Multimedia: konsep dan aplikasi dalam pendidikan. Bandung: Alfabeta.

Nurdin, E., Ma'aruf, A., Amir, Z., Risnawati, R., Noviarni, N., & Azmi, M. P. (2019). Pemanfaatan video pembelajaran berbasis Geogebra untuk meningkatkan kemampuan pemahaman konsep matematis siswa SMK. *Jurnal Riset Pendidikan Matematika*. https://doi.org/10.21831/jrpm.v6i1.18421

Nurhayati, N., & Novianti, N. (2020). PENGARUH SPSS TERHADAP HASIL BELAJAR PADA MATERI STATISTIKA DESKRIPTIF. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(1). https://doi.org/10.24127/ajpm.v9i1.2609

Nurizzati, Y. (2017). Peranan Statistika Dalam Penelitian Sosial Kuantitatif. *Jurnal SAINTEKOM*, *6*(2).

Paechter, M., Macher, D., Martskvishvili, K., Wimmer, S., & Papousek, I. (2017). Mathematics Anxiety and statistics anxiety. Shared but also unshared components and antagonistic contributions to performance in statistics. *Frontiers in Physiology*, *8*(JUL). https://doi.org/10.3389/fpsyg.2017.01196

Riyanto, S., & Nugrahanti, F. (2018). Pengembangan Pembelajaran Statistika Berbasis Praktikum Aplikasi Software SPSS dengan Bantuan Multimedia untuk Mempermudah Pemahaman Mahasiswa terhadap Ilmu Statistika. *DoubleClick: Journal of Computer and Information Technology*, *1*(2). https://doi.org/10.25273/doubleclick.v1i2.1590

Woolfitt, Z. (2015). The effective use of video in higher education. *Lectoraat Teaching, Learning and Technology. Inholland University of Applied Sciences*, *October*.

Ziden, A. A., & Abdul Rahman, M. F. (2013). The effectiveness of web-based multimedia applications simulation in teaching and learning. *International Journal of Instruction*, *6*(2).