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The Influence Of Student Perceptions Of The Use Of Youtube On Learning Outcomes In Linear Algebra Courses

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Abstract:
YouTube can be a learning media to be used in lectures. This research examines whether using YouTube in the linear algebra course affects the learning outcomes of Mathematics Education students at the Faculty of Teacher Training and Education (FKIP), Nusa Cendana University (UNDANA). This research is quantitative and descriptive. The population in this study were all students taking the linear algebra course for the first time in the even semester of 2023. The number of samples in this study was 52. Research data was obtained in two ways, namely, (1) by distributing valid and reliable questionnaires regarding student perceptions of YouTube-assisted lectures and (2) by providing tests on material related to the linear algebra Course, such as systems of linear equations and matrices, determinants, vector spaces, linear transformations and eigenvalues and eigenvectors. The data analysis technique used in this research is simple linear regression. The data analysis results show that using YouTube in the linear algebra course has a positive and significant effect on the learning outcomes of mathematics education students at FKIP UNDANA.

Key Word*: linear algebra, YouTube*

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I. Introduction

Learning media is a tool teachers use to assist learning activities to be more effective [1]. Three types of learning media are (1) teaching aids, (2) teaching props, and (3) learning resources [2]. One learning media that can assist the teaching-learning process today is YouTube [3]. The video-sharing service provided by Google allows users to load, watch, and share video clips for free. The platform marks the shift in internet technology (World Wide Web) from 'read-only web' to 'read-write web'[4].

Mujianto [5] shows that YouTube significantly increases student learning motivation. Anisa [6] shows that YouTube can be an alternative media to help the learning process and information source at the tertiary level, with 89.74% of students agreeing that lecturers need to use YouTube as an alternative media in their lectures. In addition, 83.33% agreed that YouTube can provide a platform for discussion, 79.92% agreed that it is highly accessible and can be a source of information for lecture-related matters, 64.1% agreed that it can help with assignments, and 51.28% agreed that can be an additional learning media and provide an opportunity to expand a network of friends. Indriyati [7] also found that YouTube is effective as a distance learning medium in Civics subjects. Likewise, a study by Samosir et al. [8] shows that YouTube can effectively assist social and political science students learning, considering its usefulness, accuracy and scope.

Considering the positive development of YouTube as a learning medium, as described above, this study aims to discover whether using YouTube in the linear algebra course affects the learning outcomes among students in the Mathematics Education Program at FKIP UNDANA. In previous research, Rimo and Garak [9] have shown student perceptions regarding the use of YouTube by the linear algebra lecturers in the Mathematics Education Program at FKIP UNDANA. The results showed that students' responses were positive. However, this research did not examine the influence of YouTube on student learning outcomes. Linear algebra is compulsory for mathematics education students because this course trains students to think systematically and thoroughly and is a prerequisite of advanced mathematics courses [10]. Linear algebra is one of the subjects that mathematics education students need to master well because it is the foundation for teaching mathematics in secondary schools [11].

This course discusses (1) systems of linear equations and matrices, (2) determinants, (3) vectors in second-dimensional space and third-dimensional space, (4) Euclidean vector spaces, (5) general vector spaces [12], (6) inner product spaces, (7) eigenvalues and eigenvectors, and (8) linear transformation [13]. The material of linear algebra consists of two categories: technical and abstract mathematics. Students need to use their higher-order thinking skills (HOTS) for the material's theoretical and applicability, such as finding a solution to linear

equation systems. In addition, they need to utilize their skills in proving abstract problems such as general vector spaces, linear free, spanning, basis, and dimensions [14].

II. Material And Methods

This research is quantitative and descriptive. The population in this study were all students taking the linear algebra course for the first time in the even semester of 2023. Only students taking this course for the first time were included in this study so that the learning outcomes were not influenced by other factors. The sample was 52 students. Data was obtained through (1) questionnaires regarding student perceptions of linear algebra course material assisted by YouTube videos and (2) tests on the linear algebra course material. Therefore, the independent variable in this research is students' perceptions of YouTube-assisted linear algebra lectures, and the dependent variable is the learning outcomes. Data was collected in May 2023.

The student perceptions questionnaire is valid and reliable and has been used in previous research [9]. The aspects covered in the questionnaire are (1) interest in learning, (2) affordability, (3) independence in learning, and (4) lecture effectiveness. The questionnaire consists of 12 statements, with nine positive and three negative. This questionnaire was distributed online using Google Forms. Meanwhile, learning outcome data was obtained from the average mid-term and final term scores for the linear algebra course, covering all the material in the linear algebra course, such as systems of linear equations and matrices, determinants, vector spaces, linear transformations, as well as eigenvalues and eigenvectors.

The analysis technique uses simple linear regression analysis, which aims to measure the strength of the relationship between two variables and show the direction of the relationship between the dependent and the independent variables. According to Sugiyono [15], the equation is formulated as follows.

$$Y = aX+b$$

where:

Y : Student learning outcomes in the linear algebra course
a : Simple regression constant
b : Regression coefficient
X : Student perceptions regarding YouTube-assisted lectures

Before carrying out the regression analysis, the classical assumption test was carried out, namely (1) normality test, aimed at testing whether the dependent variable, independent variable or both have a normal distribution in the regression model, (2) linearity test, aimed at testing whether there is a linear relationship between the dependent variable and each independent variable, and (3) heteroscedasticity test, aims to test whether there is inequality of variance in the residuals from one observation to another in the regression model.

III. Results

Based on the questionnaire results for each aspect of perceptions, we obtained an average score of 36.65, a median of 37, a mode of 34, a standard deviation of 4.23, a minimum value of 24, and a maximum value of 47. The average value of the questionnaire assessment score is greater than 36 (see Table 1), indicating that students' perceptions of the linear algebra lecture's YouTube material are highly positive.

Table 1. Converting Scores into Student Perception Categories

No.	Perception Category	Score (X)
1	Very Positive	X > 36
2	Positive	30 < X <= 36
3	Less Positive	24 < X < =30
4	Negative	X<= 24

Source : [9]

This is also supported by the percentage of students in each perceptions category, as shown in Figure 1, with 53.85% of students giving a very positive response about the YouTube-assisted lectures, 40.38% giving a positive response, and 1.9% giving a slightly positive response. Only 1.9% of students gave negative responses.

These results were then tested to determine whether they influenced student learning outcomes. Before testing the influence between variables, the normality test was conducted using the Kolmogorov-Smirnov Normality Test. The SPSS output results showed that the research data was normally distributed.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
learning outcomes	.119	52	.065	.968	52	.176
Perception	.092	52	.200*	.964	52	.113

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 1. The normality test results of the student perceptions and learning outcomes data using SPSS

The following classical assumption test also showed a significant linear relationship between the Student Perception variable regarding the YouTube-assisted lectures (X) and the learning outcome of the linear algebra course (Y), as shown in Figure 2.

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes * Preception	Between Groups	(Combined)	3388.141	16	211.759	3.091	.003
		Linearity	2821.147	1	2821.147	41.177	.000
		Deviation from Linearity	566.994	15	37.800	.552	.891
	Within Groups		2397.917	35	68.512		
	Total		5786.058	51			

Figure 2. The SPSS results testing the linearity of the research data

The following classical assumption test was the heteroscedasticity test. The SPSS output results, sig. =0.532 > 0.05, showed no heteroscedasticity in the regression model. In other words, the variance of the error was constant.

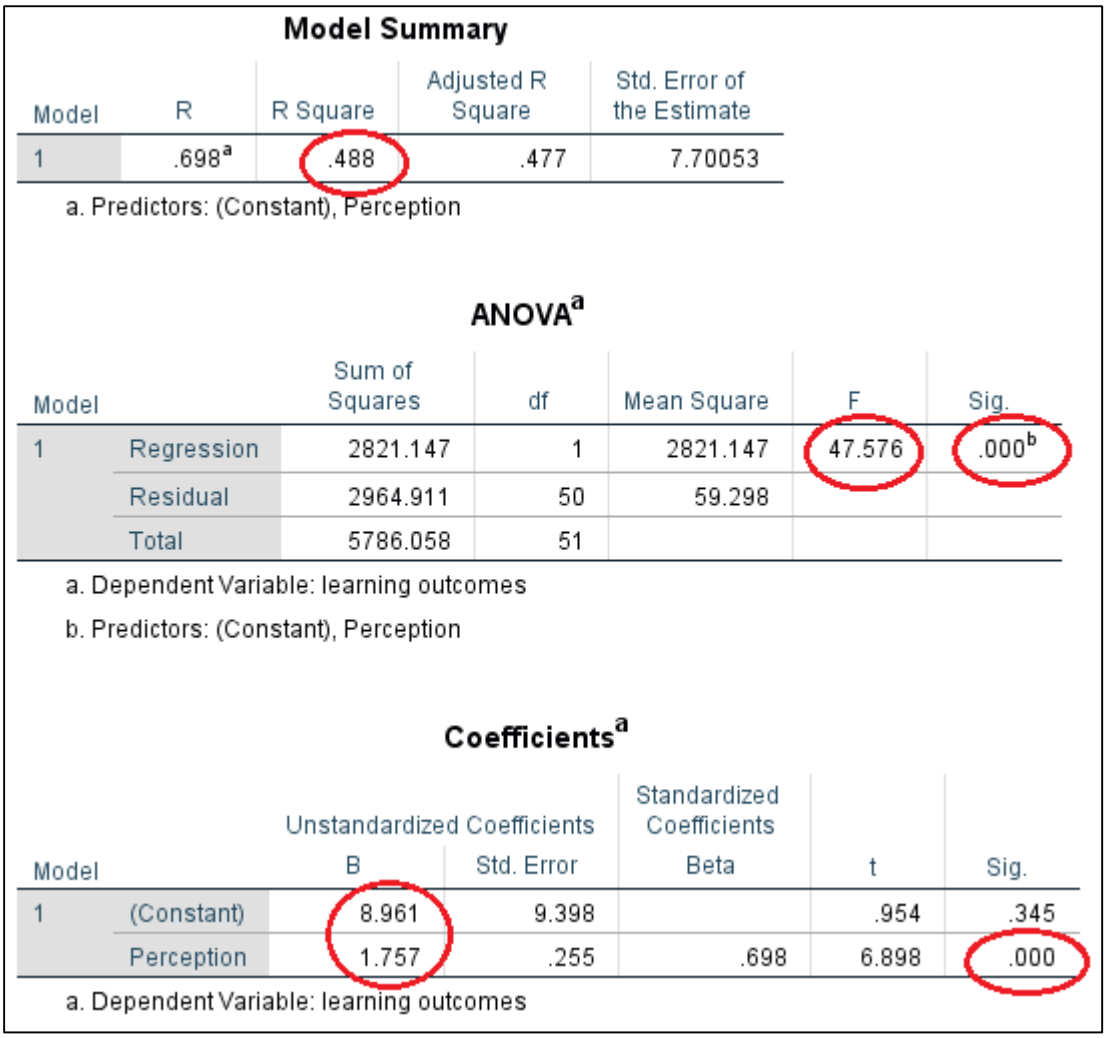
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	9.549	5.905		1.617	.112
	Preception	-.101	.160	-.089	-.629	.532

a. Dependent Variable: Abs_RES

Figure 3. The SPSS results testing the heteroscedasticity of research data

Because the research data met the classical assumption test, the simple linear regression analysis test was carried out. Figure 4 shows the SPSS output from the simple linear regression analysis test, with student perceptions as the independent variable and student learning outcomes as the dependent variable.



Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698[a]	.488	.477	7.70053

a. Predictors: (Constant), Perception

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2821.147	1	2821.147	47.576	.000[b]
	Residual	2964.911	50	59.298		
	Total	5786.058	51			

a. Dependent Variable: learning outcomes

b. Predictors: (Constant), Perception

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	8.961	9.398		.954	.345
	Perception	1.757	.255	.698	6.898	.000

a. Dependent Variable: learning outcomes

Figure 4. The SPSS results of the simple linear regression test

Figure 4 in the ANOVA section shows that the F-value obtained was 47.576 with sig. = 0.000 < 0.05. This means that students' perceptions of the YouTube-assisted lectures significantly affected student learning outcomes. Additionally, the SPSS output of the coefficients section in Figure 4 could be used to generate a regression equation for the model and predict student learning outcomes in the linear algebra course.

$$Y = 8.961 + 1.757X$$

In this case, the constant number of the unstandardized coefficient is 8.961. This number is a constant number, which means that without the perceptions of the YouTube-assisted lectures (X), the consistent value of student learning outcomes in the linear algebra course (Y) is 8,961. The regression coefficient figure is 1,757, which means that for every 1% increase in student perceptions of YouTube-assisted lectures, the learning outcomes (Y) will increase by 1,757. It can be seen that the regression coefficient value is positive (+), so the student perceptions of YouTube-assisted lectures (X) have a positive effect on learning outcomes (Y). Next, the hypothesis testing or influence testing functions aim to determine whether the regression coefficient is significant with the following hypotheses.

H0: Student perceptions of YouTube-assisted lectures (X) do not influence student learning outcomes (Y)
Ha: Student perceptions of YouTube-assisted lectures (X) influence student learning outcomes (Y)

Meanwhile, to ascertain whether the regression coefficient is significant (in the sense that variable X affects variable Y), the hypothesis is tested by comparing the significance value (sig.) with a probability of 0.05. The basis for regression analysis decision-making is looking at the significance value (sig). The significance value (sig.) less than a probability of 0.05 means that there is an influence of student perceptions (X) on learning outcomes (Y). Conversely, the significance value (sig.) greater than a probability of 0.05 means that there is no

influence of student perceptions (X) on learning outcomes (Y). The results show that the significance value (sig.) of 0.000 is smaller than < probability 0.05, so Ha is accepted, and H0 is rejected. Therefore, it can be concluded that student perceptions of YouTube-assisted lectures (X) influence student learning outcomes (Y).

IV. Discussion

Based on the analysis results, it can be concluded that the students' perceptions of the YouTube-assisted lectures in the linear algebra course positively affected learning outcomes. Previous research [9] on online linear algebra lectures assisted by YouTube shows that (1) students had a high interest in learning, (2) students did not feel anxious if there was Internet network disruption because the lecture material can be accessed anywhere and at a relatively low cost, (3) students could study independently, and (4) the lecture was effective, with a direct influence on student learning outcomes. This research is also in line with Juitania's research [16], showing that the use of YouTube content as a teaching medium has a positive and significant influence on students' interest in learning English at the Bachelor of Accounting Study Program at Pamulang University, Indonesia. In addition, research by Wulandari et al. [17] shows the influence of YouTube-based learning media on the learning outcomes of fifth-grade elementary school students studying various heat materials.

V. Conclusion

Based on the research results and discussions, it can be concluded that student perceptions of YouTube-assisted lectures in a linear algebra course significantly affect learning outcomes.

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