

Effect Of Students Creativity In Wolfram Mathematica Assisted On Learning Achievement In Linear Algebra Course

Noviana Dini Rahmawati¹, Aryo Andri Nugroho², Lukman Harun³
Tri Atmojo Kusmayadi⁴, Budi Usodo⁵

Mathematics Education, Universitas PGRI Semarang
Mathematics Education, Universitas Sebelas Maret Surakarta

¹fadinis.iz@gmail.com, ²ndrie024mp@gmail.com, ³Lukmath1909@gmail.com
⁴tri.atmojo.kusmayadi@gmail.com, ⁵budi_usodo@yahoo.com

Abstract. Good and innovative teaching materials are able to increase the creativity of learners. Utilization of wolfram mathematica assisted linear algebra instructional materials in learning can help students in solving linear algebra problems and bring the creativity of students thus increasing the achievement of students in the subject of linear algebra. This study aims to look at the effect on the student creativity againts learning achievement of students in linear algebra course. This type of research is Quasy Experimental. Population in this study is the second semester students 2015/2016 majoring in mathematics education FPMIPATI University PGRI of Semarang. This research subject is class 2A and class 2B. Selection and determination of research subjects is taken by purposive sampling. The variables of this research are the creativity of students as independent variables and learning achievement as the dependent variable. Data collection is through observation and learning achievement test. Data analysis is using the effect test. From the research results it can be concluded that learning by utilizing wolfram mathematica assisted linear algebra- instructional materials have a positive effect of students' creativity on student achievement that is demonstrated by its influence contributions on the class 2A of 16% and the class 2B of 27.6%.

Keywords: Subjects, Wolfram Mathematica, Creativity, Learning Achievement

A. INTRODUCTION

Learning purpose both in high school and in college was to maximize the potential of the learners. Generally the potential of learners is reflected in learning outcomes that are achieved. Especially for cognitive, learning outcomes can be specified in learning achievement owned. Many things can affect the achievement of learning

outcomes that are owned, one of which is the use of instructional media. Computer is one technology product that is often used in various fields; one of them is in learning by leveraging the required software. One of softwares that can be applied to create teaching materials is Wolfram Mathematica. Wolfram Mathematica is a computer algebra system (CAS) that integrates computing capabilities (Symbolic, numeric), visualization (graph), programming languages, and word processing into an environment that is easy to use. The concept of teaching materials prepared using Wolfram Mathematica software is packaged in the form of books and online maerial that allow each student to make their independent learning.

Based on the experience of teaching in the classroom, Linear Algebra learning at the University PGRI of Semarang that is running now is quite good but is still less effective in applying learning technologies. This has an impact on student achievement outcomes that are less than the maximum. As shown by the average of the learning achievement in Linear Algebra class taught during the year 2014/2015 and 2015/2016, namely 73 and 72 with the level of classical completeness achievement 70%. It is still below the minimum standard of classical completeness performance 80% (Clark, Guskey, & Benninga, 1983).

Another critical success factor in learning is individual creativity of learners. According to Alexander (2007), the success of the individual's life is largely determined by its ability to creatively solve problems, both in large and small scale. Creative people can look at a problem from many different perspectives. The perspective thus allows individuals to obtain various alternative solutions appropriate to resolve the issue. The importance of creativity is also expressed by DeBono (McGregor, 2007). According to him, individuals require creativity to improve their quality of life, to design something, to solve problems, to create change, and to improve the efficiency and effectiveness of the system. Creativity is a product of one's creative thinking. Creative thinking is a process that is used when we bring up a new idea. It combines previous ideas that have not been done. Besemer and Treffinger (in Besemer, 2005) suggest that creative products are classified into three categories, namely: novelty, resolution, and elaboration and synthesis.

Learning by using innovative teaching materials can bring creativity so as to improve learning achievement. This study is using wolfram Mathematica assisted linear

algebra instructional materials that can bring creativity of students. Based on the description of the background there should be a further review of the "How to influence of the students creativity in the wolfram mathematica assisted learning against learning achievement in the subject of Linear Algebra?".

B. Research Method

1. Research Kind

This research is experimental type of Quasi Experimental (Samsudi, 2006: 75), which aims to determine the influence of students creativity in wolfram mathematica-assisted learning against the learning achievement in the subject of Linear Algebra. For the purposes of meeting the influential criteria, it is required research instruments namely observation sheets of students creativity. The research was conducted in two classes of students of the second semester 2015/2016.

2. Research Variable

The variables in this study are the creativity of students as independent variables and learning achievement as the dependent variable.

3. Research Instrument

Instruments in this study are consisted of observation sheet of student creativity and learning achievement test sheet. Observation sheet of student creativity is used to obtain data on the creativity of students during the learning process while the learning achievement test sheet is a test instrument that is intended to obtain a score or value of the achievements reached after intended people learn things that are in accordance with indicators of problems that will be tested.

4. Data Collection Method

Data collection method used in this research is data documentation, learning achievement data, the creativity of students data.

5. Data Analysis

Data analysis in this research is to look for the influence of the independent variables against the dependent variable that is tested using regression test.

C. Result and Discussion

1. Research Result

a. Observation Result

Student creativity is observed in five meetings to get a score of student creativity. Creativity consists of several indicators measured using Likert scale. The results of the analysis of these variables having taken a total score for each student receives a good average

b. Result of Influence Test

1) Class 2A

For the effect test, it would be used simple regression test with the hypothesis as follows.

Hypothesis $H_0 : \beta = 0$, (equation is non linear)

$H_1 : \beta \neq 0$, (equation is linear)

In this study, the independent variables are the creativity of students, while the dependent variable is the learning achievement. Data of students' creativity is drawn from the observations in observation sheet, while student achievement data is retrieved through the Final Exam. To analyze the effect of student creativity against the learning achievement is used simple linear regression and the results are shown in Table 1.

Table 1. ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	829,312	1	829,312	5,314	,029 ^a
	Residual	4369,655	28	156,059		
	Total	5198,967	29			

a. Predictors: (Constant), Creative_2A

b. Dependent Variable: Class_2A

From the analysis of the above data, it was obtained sig = 0.029 = 2.9% which means that H₀ is rejected, meaning that the equation is linear regression. To measure the level of influence of student creativity on the learning achievement can be seen from Table 2.

Tabel 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,399 ^a	,160	,129	12,492

a. Predictors: (Constant), Creative_2A

The amount of influence of students' creativity to the learning outcomes can be seen from the value of R square = 0.160, which means 16% of student achievement is influenced by factors of student creativity.

2) Class 2B

For the effect test would be used simple regression test with the hypothesis as follows.

Hypothesis H₀ : $\beta = 0$, (equation is non linear)

H₁ : $\beta \neq 0$, (equation is linear)

In this study, the independent variables are the creativity of students, while the dependent variable is the learning achievement. Data of students' creativity is drawn from the observations in observation sheet, while student achievement data is retrieved through the Final Exam. To analyze the effect of student creativity on the learning achievement is used simple linear regression and the results are shown in Table 3.

Table 3. ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1362,682	1	1362,682	12,930	,001 ^a
	Residual	3583,318	34	105,392		
	Total	4946,000	35			

a. Predictors: (Constant), Creative_2B

b. Dependent Variable: Class_2B

From the analysis of the above data, it was obtained $\text{sig} = 0.001 = 0.1\%$ which means that H_0 is rejected, meaning that the equation is linear regression. To measure the level of influence of student creativity on the learning achievement can be seen from Table 4.

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,525 ^a	,276	,254	10,266

a. Predictors: (Constant), Creative_2B

The amount of influence of student creativity on the learning achievement can be seen from the value of R square = 0.276, which means 27.6% of students achievement is influenced by the creativity of the students.

2. Discussion

a. Observation Result Discussion

Based on observations, student creativity began to emerge after the structure task because students are required to complete it. At the time of learning in class, the value of creativity emerged gradually at each meeting so that learning can be more meaningful.

b. Discussion of Effect Test

In this discussion, it will be seen the influence of independent variables in this study that is the creativity against the dependent variable that is the learning achievement. Creativity of students in the learning process is an attitude and skills acquired as a result of learning strategies steps thus resulting in a change in behavior.

Thus, the creativity of students in the learning process leads to the development of mental, physical, and social abilities fundamental as a driver of higher capability within the individual student. Therefore, increasing creativity in students is an important thing that should be always strived so as to the increase of student learning outcomes can be achieved optimally. Based on the analysis of the influence test, it can be demonstrated that the student creativity score linearly affect on student achievement.

D. Conclusion

Based on the research result that has been outlined, it could be concluded that there is positive effect of students' creativity against student achievement that can improve thinking ability of students. The positive influence of students' creativity against student achievement in class 2A is 16% and in class 2B is 27.6%.

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