

APPLICATION OF INDUCTIVE APPROACH TO IMPROVE MATHEMATICAL COMMUNICATION CAPABILITIES AND STUDENT SELF EFFICACY JUNIOR HIGH SCHOOL

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Abstract

Background of this research is still low ability of communication of mathematics and self efficacy of first middle school student. The purpose of this study is to improve the ability of mathematical communication and self efficacy of junior high school students whose learning using inductive approach in comparison with using ordinary learning in review of the student's early mathematical ability. The research method that is taken is quasi experiment. Data collection techniques in this study using quantitative techniques in the form of pretest, postes and n-gain of mathematical communication skills and self efficacy. The result of the research is that there is a difference in the improvement of mathematical communication ability of junior high school students whose learning using inductive approach with the learning using conventional approach and, there is no difference of self efficacy of junior high school students whose learning using inductive approach with the learning using conventional approach. Based on the results obtained then the inductive approach can be used as an alternative to improve the ability of mathematical communication and less suitable for self efficacy.

Keywords: The Inductive Approach, Mathematical Communication, Self Efficacy

Abstrak

Latar belakang penelitian ini yaitu masih rendahnya kemampuan komunikasi matematik dan *self efficacy* siswa SMP. Tujuan penelitian ini untuk meningkatkan kemampuan komunikasi matematik dan *self efficacy* siswa SMP yang pembelajarannya menggunakan pendekatan induktif di bandingkan dengan yang menggunakan pembelajaran biasa di tinjau dari kemampuan awal matematik siswa. Metode penelitian yang di ambil yaitu kuasi eksperimen. Teknik pengumpulan data dalam penelitian ini menggunakan teknik kuantitatif yaitu berupa pretes, postes dan n-gain dari kemampuan komunikasi matematik dan *self efficacy*. Hasil penelitian adalah terdapat perbedaan peningkatan kemampuan komunikasi matematik siswa SMP yang pembelajarannya menggunakan pendekatan induktif dengan yang pembelajaran menggunakan pendekatan konvensional serta, tidak terdapat perbedaan kemampuan diri siswa SMP yang pembelajarannya menggunakan pendekatan induktif dengan yang pembelajaran menggunakan pendekatan konvensional. Berdasarkan hasil yang diperoleh maka pendekatan induktif dapat digunakan sebagai alternative untuk meningkatkan kemampuan komunikasi matematik dan kurang sesuai untuk kemampuan diri.

Kata Kunci: Pendekatan Induktif, Komunikasi Matematik, *Self Efficacy*

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INTRODUCTION

One of the mathematical skills that must be possessed by students is the ability of mathematical communication. Every student needs to learn math because mathematics is a powerful, systematic, and appropriate communication aid. Mathematics is closely related to our daily life. Communicating can help students improve their vocabulary, expand their speaking skills, write systematic ideas, and have better learning skills (Zakiah, Saomi, Syara, Hidayat, & Hendriana, 2018)

As for things that can be possessed by students in the presence of communication skills in is (Purnama & Afriansyah, 2016) through communication, mathematical ideas can be exploited in various perspectives such as student thinking can be sharpened, the growth of understanding can be measured, students' thinking can be consolidated and organized knowledge of mathematics, the development of student problems can be improved and mathematics communication can be formed according to the level or level of education, the level of mathematical communication ability becomes diverse.

Based on the analysis of the opinion of some experts, Sumarmo (Hidayat & Sumarmo, 2013) reveals that the ability of mathematical communication includes the ability to declare a situation, image, diagram or real-world situation into mathematical language, symbols, ideas and mathematical models, explaining and reading meaningfully, states, comprehends, interprets, and evaluates mathematical ideas and mathematical presentation orally, in writing or visually.

In addition to communication skills, there are affective aspects that contribute to the success of students in completing the task well. In line with (Sukanti, 2011) states that affective issues are important, but implementation is still lacking, because designing the achievement of affective learning goals is not as easy as cognitive learning.

Sometimes the ability to communicate well is hindered by low self-esteem. Self-confidence is commonly known as self efficacy (Hernawati & Amin, 2017). Self-efficacy is one of the most influential aspects of self-knowledge in human life. (Ormod, 2008) states that the ability of self is the judgment of a person about his own ability to run a particular behavior or menacapai certain goals. This is due to the ability of self-owned influential individuals in determining the actions that will be done to achieve a goal including the estimation of various events to be faced.

One approach that can be used to improve the ability of mathematical communication and self-ability of students is with an interesting learning approach. The learning approach is the inductive approach. According to Yamin (Ammase S, Hidayat, & A.Jusriana, 2015) An inductive learning approach is an approach that begins with the giving of facts, cases, examples, or causes that reflect a concept or principle. Then learners are guided to strive to synthesize, discover and summarize the basic principles of the alignment.

In order to lower the problem of the ability of mathematical communication and self efficacy is still low then needed a mathematics learning approach that can make learning become meaningful. Therefore, an inductive approach is chosen.

METHOD

This research method is quasi experiment, where the research is done on two groups of sample that is experiment group and control group. The experimental group is a group of students who acquired learning with an inductive approach, while the control group was a group of students who received ordinary learning. The population in this study were students from one of the State Junior High Schools in Cimahi City. While the sample in this study selected two classes VIII in one of the State Junior High School in the city of Cimahi.

RESULTS AND DISCUSSION

Results

If Sig. > 0.05 then the sample comes from a normally distributed population

If Sig. ≤ 0.05 then the sample based on the population that is not normally distributed

Table 1. Normality Test Data n-gain Mathematical Communication Skill

	Pem.	Shapiro-Wilk			Ket.
		Statistic	df	Sig.	
n_Gain	Eks	0.941	36	0.056	Normal
	Kon	0.880	36	0.269	Normal

If sig. > 0.05 then there is no difference in variance between the experimental class and the control class.

If sig. ≤ 0.05 then there is a difference of variance between the experimental class and the control class.

Table 2. Homogeneity Test of Variance of n-Gain

	Levene Statistic	df1	df2	Sig.	
n-Gain	Based on Mean	1.634	1	40	.208
	Based on Median	1.832	1	40	.184
	Based on Median and with adjusted df	1.832	1	37.537	.184
	Based on trimmed mean	1.700	1	40	.200

Based on data normality test and homogeneity test of variance that the sample came from normally distributed population and there was no difference of variance between the experimental class and the control class, the two t test were tested using t test.

The statistical hypothesis is formulated as follows:

H0: $\mu_1 = \mu_2$

(There is no difference in the improvement of mathematical communication ability of junior high school students whose learning using inductive approach with the learning using conventional approach)

Ha: $\mu_1 > \mu_2$

(There is a difference in the improvement of mathematical communication skills of junior high school students whose learning uses an inductive approach with those using conventional approach)

Tabel 3. Test of Two Mean Data of n-Gain

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	f	df	Sig. (2-tailed)	Ket
Postest	Equal variances assumed	1.634	.208	4.910	40	.000	H ₀ ditolak
	Equal variances not assumed			7.884	13.315	.000	

The value meets the Sig criteria. (1-tailed) ≤ 0.05 then H₀ is rejected which means there are differences in the improvement of mathematical communication ability of junior high school students whose learning using inductive approach with the learning using conventional approach.

N-Gain Data Postes Analysis Mathematical Communication Ability Based on TKAS and Learning Approach

Tabel 4. Output Test Anova Two Path n-Gain Mathematical Communication Skills Based on Learning Approach and TKAS Discussion

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.708 ^a	5	.142	4.662	.002
Intercept	1.738	1	1.738	57.184	.000
Met.pem	.564	1	.564	18.548	.000
TKAS	.002	2	.001	.027	.973
Met.pem * TKAS	.023	2	.011	.371	.693
Error	1.094	36	.030		
Total	10.479	42			
Corrected Total	1.802	41			

If Sig. > 0,05 then the mean of mathematic communication ability between TKAS (low, medium and high) is the same (there is no significant difference)

If Sig. ≤ 0.05 then the mean mathematical communication ability between TKAS (low, medium and high) is not the same (there are significant differences)

Based on the data in Table 4 it can be seen that Sig. is 0.973. The value meets Sig criteria. > 0,05 then the mean of mathematic communication ability between TKAS (low, medium and high) is the same (there is no significant difference)

Then proceed with the attitude scale of self efficacy.

If Sig > 0.05 then the sample comes from a normally distributed population.

If Sig ≤ 0.05 then the sample comes from a population that is not normally distributed

Tabel 5. Test the normality of attitude scale

Pem.	Shapiro-Wilk			Ket.
	Statistic	df	Sig	
Eks.	.979	36	.706	Normal
Kon.	.983	36	.837	Normal

If sig. > 0.05 then there is no difference in variance between the experimental class and the control class.

If sig. ≤ 0.05 then there is a difference of variance between the experimental class and the control class

Tabel 6. Homogeneity Test of Variance of Attitude Scale

	Levene Statistic	df1	df2	Sig.	
Self efficacy	Based on Mean	3.557	1	70	.063
	Based on Median	3.498	1	70	.066
	Based on Median and with adjusted df	3.498	1	57.471	.067
	Based on trimmed mean	3.554	1	70	.064

Based on data normality test and homogeneity test of variance that the sample came from normally distributed population and there was no difference of variance between the experimental class and the control class, the two t test were tested using t test.

The statistical hypothesis is formulated as follows:

H0: $\mu_1 = \mu_2$

(There is no difference in self-skill attitude scale of junior high school students whose learning using inductive approach with the learning using conventional approach)

Ha: $\mu_1 > \mu_2$

(There is a difference in self-skill attitude scale of junior high school students whose learning uses inductive approach with those using conventional approach)

Tabel 7. Test Two Mean Data Attitude Scale Data.

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	F	Df	Sig. (2- tailed)	Ket
Data	Equal variances assumed	3.557	.063	-.050	70	.960	H ₀ accept
	Equal variances not assumed			-.050	59.559	.960	

Meaning there is no difference in self-ability of junior high school students whose learning using inductive approach with the learning using conventional approach.

Tabel 8. Analysis of Self Efficacy Attitude Scale Based on TKAS and Learning Approach

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	138.749 ^a	5	27.750	.541	.745
Intercept	443386.375	1	443386.375	8639.626	.000
Met.pem	.540	1	.540	.011	.919
TKAS	134.865	2	67.433	1.314	.276
Met.pem * TKAS	4.933	2	2.466	.048	.953
Error	3387.126	66	51.320		
Total	629047.000	72			
Corrected Total	3525.875	71			

Criteria for testing the average data of self-capacity attitudes based on TKAS, namely:
If Sig. > 0,05 then the mean self skill attitude scale between TKAS (low, medium and high) is the same (there is no significant difference)

If Sig. ≤ 0.05 then the mean self-skill score scale between the TKAS (low, medium and high) is not the same (there are significant differences)

Based on the data in Table 4:36 seen that Sig. is 0.276. The value meets Sig criteria. > 0,05 then the mean self skill attitude scale between TKAS (low, medium and high) is the same (there is no significant difference)

Discussion

Based on data analysis, there are differences in the improvement of mathematical communication ability of junior high school students whose learning using inductive approach with the learning using conventional approach and the mean of mathematic communication ability between TKAS (low, medium and high) is the same. While for self efficacy attitude scale, there is no difference of self ability of junior high school students whose learning is using inductive approach with the learning using conventional approach and the mean self skill attitude scale between the TKAS (low, medium and high) is the same.

CONCLUSION

It can be concluded that "Application of inductive approach to improve the ability of mathematical communication and self efficacy of junior high school students." seen through the analysis. Those who get learning using an inductive approach are better than using conventional learning approaches

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