Influence of Application of Learning Strategies Against Super Item Mathematical Reasoning Ability of Junior High School Students

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ABSTRACT

The problem in this research is the lack of mathematical reasoning skills of students of MTs Darul Hikmah Pekanbaru. This study aims to determine the effect of the application of Super Item learning strategies on mathematical reasoning skills in the context of teaching students of MTs Darul Hikmah Pekanbaru. This research is a *Quasi Experiment* with *Posttest Only Design Group* design. The population in this study is students of MTs Darul Hikmah Pekanbaru : 134 students consisting of four classes. Students of class VIII.B2 MTs Darul Hikmah Pekanbaru were taken as the samples in the experimental class and students of VIII.B5 were selected as the samples in control class. The findings show that result obtained were that value $t_{calculated}$ = 3,45, with a significant level of 5% and dk = 65 from the distribution list obtained t_{tabel} = 2. Therefore the value $t_{calculated} > t_{tabel}$ because 3,45 > 2, So that H_a accepted and H_o rejected. This means that there are influences of mathematical reasoning skills for the students who were taught using of learning strategies Super Item. It can be concluded that the application of Super Item learning srategiesdid have some influences onstudents' mathematical reasoning skills in MTs Darul Hikmah Pekanbaru.

***Keywords**: Influence Of Application, Learning Strategies Against Super Item*

Introduction

Mathematics is a basic science in human life that has an important role. Since childhood until now humans are not separated from mathematics and until whenever humans will always be associated with mathematics. The special features that mathematics possesses are those that emphasize deductive processes that require logical reasoning. Improving students' reasoning abilities during the learning process is necessary to achieve success. The higher the reasoning level possessed by learners, it will further accelerate the learning process in order to achieve learning indicators.

Reasoning according to the Wikipedia encyclopaedia is a thinking process that departs from the observation of the senses (empirical observation) that produces a number of concepts and understandings. Reasoning can also be defined as the way of thinking taken to manage statements and produce conclusions in solving problems.

Suhartoyo Hardjosatoto and Endang Daruni Asdi stated the difference between reasoning and thinking is reasoning or reasoning is one of thought or thinking, but not all thinking is reasoning.

According to Suherman and Winataputra (in Tina Sri Sumartini) argues that: reasoning is a thought process undertaken in a way to draw conclusions. The conclusions obtained from the results of reasoning, based on the

observation of data that existed before and has been tested the truth.

It has been explained in the document of Dirjen Dikdasmen Regulation through regulation no. 506 / C / PP / 2004, quoted from Ulul Azmi described that the indicators of students who have the ability in math reasoning are:

1. Filed allegations.
2. Doing math manipulation.
3. Drawing conclusions, compiling evidence, giving reasons or evidence to the truth of the solution.
4. Draw the conclusion of the statement.
5. Check the validity of an argument.
6. Find the pattern or nature of mathematical phenomena to make generalizations.

Some activities that belong to deductive reasoning are:

1. Carry out calculations based on certain rules or formulas.

2. Draw logical conclusions (logical reasoning): based on inference rules, based on appropriate proportions, by chance, correlation between two variables, assigning combinations of several variables.

3. Establish direct proof, indirect proof and proof by mathematical induction.

1) Prepare analysis and synthesis of some cases.

The quality of students' math skills in Indonesia is still low. This can be seen from the results of the Trends in International Mathematics and Science Study (TIMSS) survey. Based on the TIMMS survey in 2011 the percentage of students' math skills in Indonesia is 31%, appling is 23% and reasoning is 17%. The percentage is below the international average percentage of knowledge (knowing) is 49%, appling is 39% and reasoning is 30%. This percentage indicates that the knowledge, application and reasoning of student math in Indonesia is still low. This lack of reason makes it difficult for students to solve math problems.

The students' mathematical reasoning abilities in MTs are also low. The low math reasoning abilities of MTs Darul Hikmah students is based on observations by researchers at MTs Darul Hikmah Pekanbaru. Apparently there are still many students who are less able in mathematical reasoning. As for the cause of this happening because:

1. Students accustomed to spoiled in learning, such as not trying to think (reason) first in solving problems.

2. Students are accustomed to working on problems of training that are similar to the examples given.

3. Students are accustomed not to try their own, like cheating the work of one of his friends who to be able.

The solution offered is Superitem Learning which is a learning strategy that starts from a simple task and then increases in more complex tasks. Superitem strategy is designed to help students understand the relationship between concepts. It is also intended to spur students' maturity of reasoning.

Superitem strategy will make students more involved and make students think (reason) more deeply to solve existing problems. Because superitem is a matter that consists of several levels and each level can be done using the information contained in it. So that the learners are more required to reason actively to the stage of defining the hypothesis derived from the item.

Characteristics of super item matters, which contain the concepts and processes of the

higher cognitive level, provide opportunities for students in developing knowledge and understanding the relationship between concepts.

This learning by giving tasks to students in stages-gradually from simple to complex, in the form of problem solving. The syntax is:

1. Illustrate concrete concepts and use analogies,
2. Provide multi-level training,
3. Give a super form test item test, ie start from processing information-connection information,
4. Integration, and
5. Hypothesis.

According to Wilson and Chavarria to construct a superitem form, there are a few things to note:

1) Super item construction should begin by first determining the general principle that focuses on level four items. The principle will be the foundation for creating the previous three items. Each item will help the students in exploring problem situations.

2) The item should present a relevant problem and required the student.

3) The response to each item in a superitem does not depend on the correct response of the previous item.

RESEARCH METHOD AND DESIGN

This research uses Quasi Experimental research and the design used in this research is Postest Only Group Design. In detail the design of Postest Only Group Design can be seen in the following table:

Table 1 Postest Only Group Design

Group	Treatment	Postest
$\mathbf{K_E}$	**X**	O_1
$\mathbf{K_K}$	-	O_2

Source: Sugiono, (Quantitative Research Method, Qualitative, and R & D)

Implementation of this research has been completed dilkasanakan. The time of this research is in the second semester (even) of academic year 2015/2016 and the place of implementation of this research is MTs Darul Hikmah Pondok Pesantren Dar-El Hikmah Pekanbaru.

This research there are two variables of research that is free variable is application of super item learning strategy and dependent variable is student's mathematical reasoning ability. Population taken by researcher in student is MTs Darul Hikmah Pekanbaru academic year 2015/2016 consisting of 4 class, sampling that is using random sampling to obtain the sample, are: VIII B2 as experimental class and VIII B5 as control class.

Before performing the average equality test, firstly test the requirements analysis, are:

1) Conduct normality test for each data set. The test used is the Lillyfors test using Microsoft Excel help.

$T = | \varphi - \Sigma p |$

Information :

T = Maximum difference

Φ = Normal probability distribution

Σp = cumulative proportion

To determine Ttable with dk = n and 5% significant level. Decision rule:

If Lhitung> Ltabel then Distribution data is not normal.

If Thitung ≤ Ttable then the normal Distribution data.

2) The second stage is the homogeneity test of variance to find out whether the

population has a homogeneous variance or not. The test used to find the variance is by Bartlet test. The formula used as follows:

$$x^2_{count} = (lon\ 10)[B - \sum(db)\log S^2]$$

$$B = (\log S^2).\sum db$$

$$db = n_i - 1$$

$$S^2 = \frac{(n_1.s_1^2) + (n_2.s_2^2) + (n_3.s_3^2) + \cdots + (n_i.s_i^2)}{n_1 + n_2 + n_3 + \cdots + n_i}$$

Information:

S^2 = Combined variance

n_i = Number of samples per group

s_i^2 = Variance of each group

3) Determine x^2_{tblel} with dk = k - 1

4) with a significant level of 0.05 or 5%. Rules of decision; If $x^2_{count} > x^2_{table}$ means not homogeneous and If $x^2_{count} \leq x^2_{table}$ means homogeneous.

Third stage, after conducting homogeneity test, the researcher performs the equality test using Anova 1 direction test. Anava or analysis of variance is a comparative analysis of more than two variables or more than two averages. The goal is to test the Anava 1 direction to compare more than two averages. Its purpose is to test generalizability capability meaning sample data can represent population. Calculate anova value or F_{count} with formula:

$$F_{count} = \frac{Inter\ variance\ group}{Variance\ in\ group} = \frac{V_A}{V_D} = \frac{KR_A}{KR_D} = \frac{JK_{A:\,dk_A}}{JK_D : dk_A} =$$

Variance in a group can also be called an error variance. More can be formulated:

$$JK_A = \sum \frac{(\sum X_{Ai})^2}{n_{Ai}} - \frac{(\sum X_T)^2}{N} \text{ for } dk_A = A - 1$$

$$JK_D = \sum X_T^2 - \sum \frac{(\sum X_{Ai})^2}{n_{Ai}} \text{ for } dk_D = N - A$$

$\frac{(\sum X_T)^2}{N}$ = as a correlation factor

Information:

N = Total number of samples (number of cases in the study)

A = Total number of sample groups

Decision rule:

If F_count> F_tabel, then Ha accepted and H0 rejected means influential.

If F_count ≤ F_table, then Ha is rejected and H0 accepted means no effect.

The two types of equation test are: If the data is normally distributed and homogeneous then the hypothesis testing using the test "t", namely:

$$t_0 = \frac{M_x - M_Y}{\sqrt{\left(\frac{SD_X}{\sqrt{N-1}}\right)^2 + \left(\frac{SD_y}{\sqrt{N-1}}\right)^2}}$$

Information:

M_x = Mean variable X

M_Y = Mean variable Y

SD_X = Standard deviation X

SD_y = Standard deviation Y

N = Number of samples

If the data is normally distributed but does not have a homogeneous variance then hypothesis testing uses the t-test :

$$t' = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Information:

$\bar{X}_1$ = Mean experiment class

$\bar{X}_2$ = Mean control class

S_1^2 = Experiment class variance

S_1^2 = Control class Variance

n_1 = Experiment class sample

n_2 = Control class sample

RESULTS AND DISCUSSION

The data obtained from the students' reasoning ability test obtained were average, median, mode, standard deviation, variance, maximum value and minimum value. The mean (mean), Standard Deviation and variance value of students 'experimental reasoning ability tests with Superitem learning is higher than the students' reasoning ability of control class with conventional learning. The standard deviation of the experimental class higher than that of the control class indicates that the students 'math experimental reasoning ability is more diffused than the students' mathematical reasoning scores. In this study the reasoning indicators used are mathematical manipulation, using patterns and relationships to analyze mathematical situations, finding patterns or properties of mathematical phenomena to make generalizations and provide explanations with models, facts, traits and relationships.

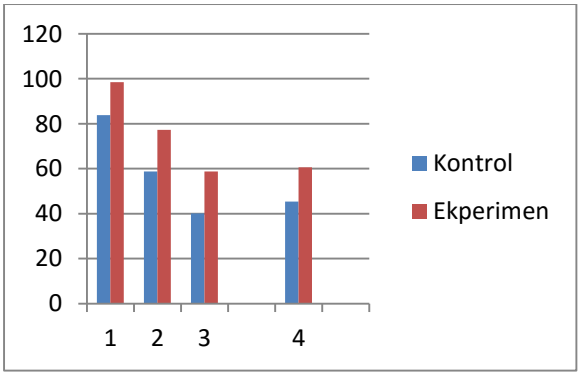
The percentage of students' mathematical reasoning abilities gained in the experimental and control classes is presented in the following table: the percentage in the experimental class with the highest percentage is in the indicator of mathematical manipulation with a score of 98.48% and the lowest percentage indicator finds the pattern or nature of mathematical symptoms to make generalizations with a score of 58.71%. In the highest percentage control class is also on the indicators of mathematical manipulation with a score of 83.82% and the lowest percentage of indicators to find the pattern or nature of mathematical symptoms to make a generalization with a score of 40.07%.

The greatest difference lies in the indicator Finding the pattern or the nature of the mathematical phenomenon to make a generalization with the difference of 18.64%. As for the percentage difference obtained in the experimental class and control class on the indicator to perform mathematical manipulation has a very small difference of 14.66%. Thus it can be concluded that students 'math reasoning ability in the experimental class is better than the students' mathematical reasoning ability in the control class.

The percentage of students' mathematical reasoning abilities of the experimental class and control classes is presented in the following graphs:

Figure 1

Percentage of Students' Math Class Ability Competence and Control Class



Information:

1:Doing math manipulation.

2:Using patterns and relationships to analyze mathematical situations

3:Find patterns or properties of mathematical phenomena to make generalizations.

4:Giving an explanation with models, facts, traits and relationships.

The results of normality test calculations in the experimental class and control class can be seen in the following table: normality test obtained results in the experimental class with T_{count} = 0.163 and T_{table} = 0.154. In the control class obtained value T_{count} = 0.174 and T_{table} = 0.152. Apparently $T_{count} > T_{table}$ in both experiment and control class can be concluded experimental data and controls normal distribution.

The hismogenity test results in both samples in this study were the largest variance was 420.165 in the control class and the smallest variance was 378.314 in the experimental class. So the value obtained $F_{\_count}$ = 1.11 and the value F_{table} = 1.80 and obtained that$F_{count} \leq F_{table}$, it can be concluded that variance is homogeneous.

Hypothesis testing using "t" test. The calculation result t_hcounted by $t_{\_table}$ at 5% significant level is 3.45> 2 or $t_{\_count} > t_{\_table}$, then Ha is accepted and H0 is rejected. This means that there is an influence on the ability of mathematical reasoning among students who use Superitem learning strategy with students who use conventional learning.

This study is a classroom action research that aims to determine whether there is influence or not on the students' reasoning using superitem learning strategy. There are four reasoning indicators, (1) performing mathematical manipulations, (2) using patterns and relationships to analyze mathematical situations, (3) finding patterns or properties of mathematical phenomena to make generalizations and (4) explaining with models, facts, traits and relationships.