The Implementation of Learning Tournament Strategy on Linear Equation in One Variable

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Abstract

The fact that is often found in schools so far, the learning process of mathematics still uses conventional methods. This study aimed to see the effect of applying the learning tournament strategy on student learning outcomes on the linear equation in one variable in VII grade at SMP N 11 Pontianak. The method used in this research was quasi-experimental. The research sample was students of VII A grade as the experimental class and VII C grade as the control class. The experimental group learning outcomes obtained an average score of 28.525, with a percentage of 63.39, while the learning outcomes in the control group obtained an average score of 22.625 with a percentage of 50.28. The results of the t-test with independent samples test obtained a Sig score. (2-tailed) = 0.000 <½ 0.025, then H₀ is rejected, so it can be concluded that there is a significant difference in student learning outcomes between the class given the learning tournament learning and the class given conventional learning on the linear equation in one variable.

Keywords: Learning Tournament, Learning Strategy, Linear Equation of One Variable

INTRODUCTION

Algebra is a branch of mathematics taught in schools. One of the materials covered in algebra is linear equation in one variable. This material is a sub-subject that is taught in the odd semester of VII grade. The purpose of teaching the material on the sub-topic of linear equation in one variable is "students can determine the set of solutions to linear equation in one variable, make models of a problem and use them further."

Based on the research results by Febriandri (2008: 42), 58% of class I junior high school students could not understand the linear equation questions of one variable in the form of a story. It shows that students have difficulty dealing with applied mathematics in daily life or the real world. Then the results of Widiyati's (2001: 39) research on 35 students of VII A grade at SMPN 17 Pontianak found that the difficulties experienced by students in solving linear equation in one variable problems included:
1. Lack of understanding of the concept of integer count operations.
2. Not mastering the concept of counting like terms.
3. Lack of understanding in simplifying algebraic forms.
4. Lack of understanding in determining the set of solutions.

Some several sources or factors are thought to be the main cause of student difficulties in solving linear equation in one variable problems. The source can come from within the student or outside the student. From within students, it can be caused by biological or psychological factors. From outside the student, learning difficulties can come from a family (parental education, relationships with family, family modeling, etc.), environmental conditions, and society. In addition, students' difficulties in solving linear equation in one variable problems can be caused by learning factors that are carried out in school. It can be studied according to pedagogical aspects and didactic-methodical aspects in the learning process. Pedagogically according to Sugiatno (2010), learning strategies or models are used in presenting the material, while the didactic-methodical aspects are related to the order of delivery in presenting material to students in learning.

The fact that is often found in schools so far, the learning process of mathematics still uses learning that is usually used by teachers, namely following a routine pattern where the learning carried out by the teacher tends to use conventional methods. The tendency, according to Seodjadi (2008: 3), follows the following presentation pattern: (1) theory or definition or theorem is taught first, (2) examples related to the theory are given, (3) exercises are provided in accordance with examples. With this presentation pattern, when students do practice questions related to applied mathematics or daily life, they generally experience difficulties. Even though the practice questions are similar to the examples of completion given by the teacher.

With such a teaching pattern, the teacher's learning activities cause students to be passive (listening and copying). The learning is meaningless, or the students' memory cannot last long with the material presented. The results in low student learning outcomes. Learning tournaments are a learning method that can encourage students to participate in learning mathematics actively. This strategy is a teaching and learning method that emphasizes understanding the teacher's material by solving problems.

In its application, learning with the Learning tournament strategy does not only want students to learn academic skills and content. Learning with a learning tournament strategy also trains students to achieve social relationship goals, affecting student learning outcomes. Learning through this method is characterized by a cooperative task structure, goals, and rewards that give birth to a positive dependency attitude among fellow students, accept individual differences, and develop collaboration skills. Conditions like this will make a significant contribution to help students who have difficulty in learning mathematics concepts. In the end, each student in the class can achieve maximum learning outcomes.

In learning with the learning tournament strategy, learning activities are more centered on students. In this case, the teacher only acts as an information carrier, facilitator, and guide in the learning process. The learning atmosphere and pleasant interactions make students enjoy the lesson more so that they don't easily study. It can foster student interest and attention in learning mathematics, which can positively affect student learning outcomes. In connection with the description that has been stated, the researcher intends to study the implementation of a contextual story-based tournament learning strategy on the material of linear equation in one variable in VII grade at SMP N 11 Pontianak.

METHOD

The research method used in this research was quasi-experimental. Suryabrata (1983: 93) said, "quasi-experimental research is typical of practical situations, in which it is impossible to control
all relevant variables except for a few of them." The quasi-experimental research objective was to obtain information that estimates the actual experiment data in situations where it is impossible to control and manipulate all relevant variables. The research design is Posttest-Only Control Group Design with the following pattern:

<table>
<thead>
<tr>
<th>Group</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (A)</td>
<td>X1</td>
<td>T1</td>
</tr>
<tr>
<td>Control (C)</td>
<td>X2</td>
<td>T1</td>
</tr>
</tbody>
</table>

Information:
T1 = Posttest
X1 = learning uses a learning tournament strategy
X2 = conventional learning
(Sugiyono, 2008: 112)

According to Sugiyono (2007: 297), the population is a generalization area consisting of objects or subjects with specific qualities and characteristics determined by researchers to be studied and then conclude. The population in this study were students of VII grade at SMPN 11 Pontianak. It consist of five classes, namely VII A, VII B, VII C, VII D, VII E. The sample was part of the number and characteristics of the population. Based on a population that has been determined from 5 classes, two classes will be selected as samples using cluster sampling technique, obtained a sample of 2 classes, namely VII A grade and VII C grade. Furthermore, to determine the experimental group and control group using random sampling technique. It was obtained VII A grade as the experimental group and VII C grade as the control group. The procedure used in this study consisted of three stages, namely: the preparation stage, the implementation stage, and the data analysis stage.

The data collection technique used in this research was the measurement technique. The measurement referred to in this study was to determine the learning outcomes of students who were taught using learning with a learning tournament strategy. Students who were taught using conventional learning were done by scoring the learning outcomes of these students. The data collection tool used in this study was a test. The test used in this study was a written test in the form of an essay. According to Arikunto (1988: 161), an essay test which was also known as a subjective test was a learning progress test that required an answer consisted of a discussion or description of words. The essay form questions are usually not many questions, namely around 5-10 items in about 80 to 120 minutes. The essay form questions required students to be able to organize, interpret, and connect the meanings they already have. In short, it can be said that the essay test requires students to be able to remember and recognize again, and especially they must have high creativity (Arikunto, 1988: 162). In the study, the questions given were three questions for the post-test. The use of the essay test was easy for students to understand so that the students' answers can be seen immediately by the student's ability to solve a problem correctly. Students must also fill in answers according to student understanding because it could reduce pressure in answering questions.

For the test made to be suitable for use, the test must be valid, as Djaali's opinion (2008: 49) "A test or measurement instrument is said to have high validity if the tool performs its measuring function, or provides measurement results that are in accordance with the purpose of the measurement. It means that the measurement results of these measurements are quantities that accurately reflect the facts or circumstances of what is being measured.

The content validity of a test items was how far a test measures the level of mastery of the content of a certain material that should be mastered for teaching. In other words, a test that has
good content validity was a test that measures the mastery of material that should be learned in accordance with the teaching content listed in the Teaching Program Outlines (GBPP) (Djaali, 2008: 50).

To determine whether the test was valid or not, it must be done by examining the test items to ensure that the test items represent or reflect the entire content or material that should be proportionally mastered. Therefore, the content validity of a test does not have a certain amount calculated statistically, but it is understood that the test is valid based on the test items analysis. Therefore, Wiersma and Jurs (1990) stated that the actual content validity is based on logical analysis, so it is not a statistically calculated validity coefficient.

The validity of the items (internal validity) was shown by the extent to which the results of measuring the items were consistent with measuring the instrument as a whole. Therefore, the item validity was reflected in the correlation coefficient's magnitude between the item score and the total instrument score. If the correlation coefficient between the item score and the total instrument score is positive and significant, then it can be considered valid based on the internal validity measure (Djaali, 2008: 53).

To calculate the correlation coefficient between the item score and the total instrument score, the product-moment correlation coefficient (r) used the formula:

$$r_{xy} = \frac{N \sum xy - \sum x \sum y}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}}$$  (1)

Information:
- $r_{xy}$ = correlation coefficient for each item
- $N$ = number of test subjects
- $\sum x$ = total item score
- $\sum y$ = total score
- $\sum x^2$ = sum of squares of item score
- $\sum y^2$ = the sum of squares of the total score
- $\sum xy$ = the sum of the item's score multiplied by the total score

The criteria for the validity of the test being sought are as follows:
- 0.800 - 1.000: very high
- 0.600 - 0.799: high
- 0.400 - 0.599: medium
- 0.200 - 0.399: low
- 0.000 - 0.199: very low

Reliability that comes from the word reliability means the extent to which a measurement can be trusted. A measurement result can only be trusted if several times the implementation of measurements on the same subject group, relatively the same measurement results are obtained, as long as the aspects measured in the subject have not changed (Djaali, 2008: 55).
The Alpha formula is as follows:

\[
\rho_{11} = \left( \frac{n}{n-1} \right) \left( 1 - \frac{\sum \sigma_i^2}{\sigma^2} \right)
\]  

(2)

Where:

\( r_{11} \) = reliability sought

\( n \) = number of questions

\( \sum \sigma_i^2 \) = the amount of variance for each question

\( \sum \sigma_t^2 \) = total variance

The variant formulas used in calculating test reliability are:

\[
\sigma^2 = \frac{\sum X^2 - \left( \frac{\sum X}{N} \right)^2}{N}
\]  

(3)

Information:

\( \sigma^2 \) = variance

\( \sum X^2 \) = the squared number of scores obtained by students

\( (\sum X)^2 \) = the square of the total score obtained by students

\( N \) = many students / subjects

(Arikunto, 1988: 105)

The test reliability criteria are as follows:

- 0.800 - 1,000: very high
- 0.600 - 0.799: high
- 0.400 - 0.599: medium
- 0.200 - 0.399: low
- 0.000 - 0.199: very low

In accordance with the research objectives, the data obtained from the written test results in the form of essays were analyzed in the following way:

1. To determine how the learning outcomes of students who were given learning with a learning tournament strategy on linear equation in one variable in VII grade at SMP N 11 Pontianak used the post-test average score in the experimental class.

2. To determine the learning outcomes of students who were given conventional learning on the material of linear equation in one variable in VII grade at SMP N 11 Pontianak used the post-test average score in the control class.

3. To find out whether there was a significant difference in student learning outcomes which were given learning with the learning tournament strategy with students given conventional learning on the material of linear equation in one variable in VII grade at SMP N 11 Pontianak, the data
obtained from the written test results are analyzed using the SPSS version program. 17 for normality test, homogeneity test (one way ANOVA), Mann Whitney test, and t-test (independent samples t-test).

RESULTS AND DISCUSSIONS

Based on the results of the test items conducted at SMP N 6 Pontianak, the efficiency and validity criteria were obtained for each item, which can be written in the following table

<table>
<thead>
<tr>
<th>No.</th>
<th>Validity Coefficient</th>
<th>Validity Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.81</td>
<td>Very High</td>
</tr>
<tr>
<td>2</td>
<td>0.78</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>0.64</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>0.49</td>
<td>Medium</td>
</tr>
<tr>
<td>5</td>
<td>0.33</td>
<td>Low</td>
</tr>
</tbody>
</table>

Based on the table above for item number 1, the validity criterion is very high. In contrast, items number 2 and 3 have high validity criteria, so it is feasible to use. For item number 4, the validity criterion is medium. So it is feasible to use, but in research, it is not used due to the limited time available in learning, and question number 4 has been represented in the learning objectives. For item number 5, the validity criterion is low. The item is not suitable for use. Furthermore, the question reliability coefficient was calculated to determine whether the questions used provide fixed results if used repeatedly. Based on calculations using the alpha formula, the value of the reliability coefficient (r11) was 0.62, so that it can be said that the question has a high level of reliability.

<table>
<thead>
<tr>
<th>Group</th>
<th>Score Average</th>
<th>Score Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>28,525</td>
<td>63,39</td>
</tr>
<tr>
<td>Control</td>
<td>22,625</td>
<td>50,28</td>
</tr>
</tbody>
</table>

The table above shows the experimental class average score of 28.525 from a total score of 45 with a percentage of 63.39. While the control class average score is 22.625 out of 45 with a percentage of 50.28. So it shows that learning with the learning tournament strategy on the one-variable linear equation material carried out in the experimental class is higher than using conventional learning in the control class. Based on the post-test results that have been done, it is then tested whether the data is normally distributed or not. For this reason, researcher used facilities in the form of the SPSS version 17 program. The following are the results of the normality test using SPSS:
Table 4. Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic Df Sig.</td>
<td>Statistic Df Sig.</td>
<td></td>
</tr>
<tr>
<td>Experimental Group</td>
<td>.111 40 .200</td>
<td>.970 40 .354</td>
</tr>
<tr>
<td>Control Group</td>
<td>.137 40 .056</td>
<td>.952 40 .086</td>
</tr>
</tbody>
</table>

In the Kolmogorov-Smirnov column, the Sig, the experimental class score was 0.200, and the control class was 0.056. Because of the Sig. > α = 0.05, then based on data processing procedures, the experimental class and control class's post-test scores were normally distributed (Trihendradi, 2008: 109).

Based on the description above, where the two data are normally distributed, we will test whether the two data are homogeneous. By using SPSS version 17, the two data were tested for homogeneity. The Sig. 0.542> α = 0.05 then the two data are homogeneous (Trihendradi, 2008: 154). Based on the normality test and homogeneity test, we will see a difference in the post-test results between the experimental and control classes. It is to answer one of the problems raised in this study, namely to see the difference in learning outcomes between students who are given learning with the learning tournament strategy, namely students in the experimental class and students given conventional learning, namely students in the control class on the material of one-variable linear equation.

The statistical hypothesis is constructed as follows:

H0: µ1 = µ2 (there is no difference in learning outcomes between students in experimental group and control group)

Ha: µ1 ≠ µ2 (there are differences in learning outcomes between class students experiment and control class students)

To test the above hypothesis, the researchers used the SPSS version 17 program, in which there is a t-test which can be used to process data from the post-test results between the experimental group and the control group as the result of processing the t-test based on processed SPSS version 17. The Sig. (2-tailed) = 0.000 <½ 0.025, then H0 is rejected (Trihendradi, 2008: 142), so it can be said that there are differences in student learning outcomes between classes that are given learning with a learning tournament strategy and those given conventional learning.

Table 5. Posttest Results Based on Student Completeness

<table>
<thead>
<tr>
<th>Group</th>
<th>The number of students</th>
<th>Students Completeness</th>
<th>Percentage of Completeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>40</td>
<td>28</td>
<td>70</td>
</tr>
<tr>
<td>Control</td>
<td>40</td>
<td>11</td>
<td>27.5</td>
</tr>
</tbody>
</table>

The table above shows the number of students who completed in VII A as many as 28 people with a completeness percentage of 70%. The number of students who completed in VII C was 11 people with a completeness percentage of 27.5%. So it shows that the level of learning completeness with the learning tournament strategy on the one-variable linear equation material carried out in the experimental class is higher than using conventional learning in the control class.

In this study, the control group was VII C. The control group learning process used conventional learning, usually done by SMPN 11 teachers. In the learning process, the implementation was according to what has been determined in the learning plan. The learning
activities from the introduction to the conclusion were attended by 40 students carefully. Students listen to the material presented by the teacher and ask questions if they have difficulties.

Based on the results of students who completed the post-test of 27.5%. In answering story questions, in making a mathematical model, the error rate is 70%. After all, many students don't understand and were still unfamiliar with students about making mathematical models. At the completion step, the error rate is 65%. It is due to the incompleteness of students in completing the completion steps. Students were not active in control group learning and only listen to and copy what the teacher says. So that it causes meaningless learning or students' memory cannot last long with the material presented.

In this study, the experimental class was VII A. The learning process in the experimental group used the Learning Tournament. In the learning process, the implementation was according to what has been determined in the learning plan. The learning activities from the introduction to the conclusion were attended by 40 students carefully. Students listened to the material presented by the teacher and asked questions if they have difficulties.

All phases in the learning with the learning tournament strategy were carried out well. But in phase 3 (organizing students into study groups) and phase 4 (guiding groups to work and study), there was a commotion. Student participation was very optimal when working on the given worksheets. At the second meeting in the experimental class, students were very interested and increasingly excited and motivated to learn because a learning tournament would be held.

Based on the results of the students who completed the post-test by 70%. In answering story questions, in the Step of making a mathematical model, the error rate is 35% because there are still many students who do not understand and are still foreign to students about making mathematical models. At the completion step, the error rate is 30%. It is due to the incompleteness of students in completing the completion steps.

Based on the post-test results, it was found that the average score of student learning outcomes on linear equation in one variable in the experimental group was 28.525, and the control group average score was 22.625. From the post-test results, the average learning outcomes of the experimental group given learning with the Learning Tournament strategy are higher than the average learning outcomes of the control group.

The results of the t-test with independent samples test obtained a Sig score. (2-tailed) = 0.000 <½ 0.025, then H₀ is rejected, so it can be said that there is a difference in student learning outcomes between classes that are given learning with the learning tournament strategy and those that are given conventional learning on one-variable linear equation material.

The post-test results were seen from the students' completeness in the experimental class and the control class with the completeness of more than or equal to 60%. In the experimental class, students completed 70%. Whereas in the control class, students completed 27.5%, so it can be said that learning with the Learning Tournament strategy is better than conventional learning.

CONCLUSIONS

Based on the discussion previously described, the conclusion can be conveyed is that there is a significant difference in learning outcomes between students who are given learning tournament learning and students who are given conventional learning on linear equation in one variable material. Students who learn using learning tournament learning are higher than the average post-test score of students who learn using conventional learning.

REFERENCES