Student’s Achievement and Attitude in Mathematics of Grade 11 Students by Using Cooperative Learning (TGT)

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ABSTRACT
This action research aimed to investigate student’s achievement by using Teams Games Tournaments (TGT) and to evaluate student’s attitude toward Mathematics by using TGT. The participants in this study were 43 grade 11 students in the second semester, academic year 2014 at one school, Bangkok Thailand. The instruments used in this research were seven lesson plans in the topic of Vector in three dimensions, mathematics achievement test (IOC = 0.96, K.R.20 = 0.72) and questionnaire (IOC = 0.91). Lesson plans and mathematics achievement test were used to investigate student’s achievement. Questionnaire was used to evaluate student’s attitude toward Mathematics. The statistics used for data analysis were mean, t-test and standard deviation. The results of this study showed that mathematics learning achievement after being provided TGT technique was statistically higher than before learning at the .01 level of significance. Student’s attitude towards Mathematics was at high level with the mean scores of 3.58 out of 5.00.

Keyword: Attitude, Learning Achievement, Mathematics, Teams Games Tournaments (TGT)

1. Introduction

Mathematics is important for self-development as it deploys logical thinking, systematic thinking, calculation, and inspires creativity (Ministry of Education, 2008). Mathematical concepts and fundamentals are also necessary for studying in related fields such as science, engineering, and technology. However, many students considered that mathematics is too abstract and difficult to understand since most of classroom activities involved with understanding theorems and equation solving. This made students lack of interested in learning mathematics and they might not have realized the importance of the subject they learned. An alternative technique is required to enhance student attention.

Teams-Games-Tournament (TGT) is one of the effective techniques employed in teaching and learning especially in mathematics addressed that TGT strategy was Slavin’s original version of co-operative learning (DeVries and Slavin, 1978 as cited in Roy Killen, 1996). It is similar to Student Teams Achievement Divisions (STAD) in that the teacher presents information to students and have them help one another to learn. The difference is that quizzes are replaced by tournaments in which students compete with members of other teams in order to gain points for their home team. Team members are chosen from student prior achievements in which each team has equivalent competitive abilities. Tournaments are consisted of a set of prepared questions and each team will attempt to be the first to answer. The winner in each round earns the same number of points for his/her team regardless of the difficulty of the questions. Students do not have to compete against the same people every time, particularly if some students have made rapid progress in the subject while the others made slower progresses. The teacher decides who will compete in each round of the tournament.

There are many studies exploring student’s achievement and motivation after using TGT. Syahrir (2011) studied effects of the Jigsaw and Teams Game Tournament (TGT)Cooperative Learning on the Learning Motivation and Mathematical Skills of Junior High School Students and found that TGT cooperative learning is effective for the JHS students’ mathematical skills and mathematics learning motivation. In Thailand, Thikulwong (2009) compared achievement in mathematics using cooperative learning – TGT technique and the traditional approach. The result found that the achievement in mathematics taught by using...
cooperative learning - TGT technique and the traditional approach was different; meanwhile, the students who were taught by using cooperative learning TGT technique got higher scores than students who were taught by traditional approach.

As teaching in the second semester, academic year 2014, the researcher realized that traditional methods used in teaching mathematics (lecture, quiz, and homework) was not effective enough to gain student attention and improve their learning outcomes. The prior feedback collecting showed that traditional classroom activity was not attractive, therefore the researcher was interested in applying the TGT technique to enhance student achievement in mathematics. The chosen topic is the “Vector in Three Dimensions” as it has many useful applications in real life and future work/study.

1.1 Research Objectives
This research aims to investigate student’s achievement by using Teams Games Tournaments (TGT) and to evaluate student’s attitude toward Mathematics by using TGT.

2. Methodology

2.1 Participants
The participants in this study were 43 grade-11 students who were studying in the second semester, academic year 2014, one school, Bangkok, Thailand.

2.2 Instruments
The following instruments were used in this research:
1. Lesson plans in the topic of “Vector in Three Dimensions”
2. Mathematics achievement test including a pre-test and a post-test
3. Questionnaire about student’s attitude towards mathematics

2.3 Data Collection
The duration of this study was from December 2014 to February 2015. The research study was performed as follows:
1. The researcher prepared lesson plans, contents, and measurement tools. All research instruments had been verified by three experts for content validity. Achievement tests have the index of congruence (IOC) at 0.96, K.R.20 at 0.72 and a questionnaire has the IOC at 0.91.
2. Students were asked to complete a mathematics achievement test (Pre-test).
3. Students were divided into eight groups. Each group was consisted of students with high-achieving, average-achieving, and low-achieving at the ratio of 1:2:1 according to the achievement test scores.
4. The researcher followed the designed lesson plans till the end of the topic. During the instruction students were assigned to complete group tasks as follows:
   - Students in the same group review given contents together.
   - Students compete in the tournament with members from other groups. The criteria for scoring are as follows (Moonkam & Moonkam, 2002):
     • 2 points for the first correct answer
     • 1 point for next correct answers
     • No point for wrong answers
   and there were bonus scores at the end of each round:
     • 10 points for the first rank
     • 8 points for the 2nd rank
     • 6 points for the 3rd rank
     • 4 points for the 4th rank
     • 2 points for the 5th rank
   The winner of each round will be moved to the next level which has increasing of difficulties.
5. The research assigned the mathematics achievement test (Post-test).
6. Students filled in the attitude questionnaire.
7. The researcher analyzed the data.
2.4 Data Analysis

Descriptive statistics including mean, t-test, and standard deviation were used to analyze the achievement test scores to determine the learning effectiveness and levels of attitude.

3. Results

According to the results of this study showed that learning achievement in mathematics after being provided a TGT technique was statistically higher than before the learning at the 0.01 level of significance, as shown in Table 1. Student attitude toward mathematics was at high level with the mean scores of 3.58 out of 5.00, as shown in Table 2.

Table 1
Comparison of Pre-test and Post-test scores

<table>
<thead>
<tr>
<th>N</th>
<th>Score</th>
<th>Pre-test</th>
<th>Mean</th>
<th>SD</th>
<th>Post-test</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>20</td>
<td>8.42</td>
<td>15.12</td>
<td>3.13</td>
<td>2.50</td>
<td></td>
<td>12.49</td>
<td>42</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 2
Attitude test results

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>√x</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mathematics is important for self-development.</td>
<td>34.88</td>
<td>48.84</td>
<td>13.95</td>
<td>0</td>
<td>2.33</td>
<td>4.13</td>
</tr>
<tr>
<td>2. I feel frustrated when studying mathematics.</td>
<td>4.65</td>
<td>23.26</td>
<td>44.18</td>
<td>23.26</td>
<td>4.65</td>
<td>3.00</td>
</tr>
<tr>
<td>3. Mathematics is boring.</td>
<td>16.28</td>
<td>18.60</td>
<td>32.56</td>
<td>23.26</td>
<td>9.30</td>
<td>3.09</td>
</tr>
<tr>
<td>4. I enjoy learning mathematics.</td>
<td>4.65</td>
<td>30.23</td>
<td>34.88</td>
<td>23.26</td>
<td>6.98</td>
<td>3.02</td>
</tr>
<tr>
<td>5. I feel uncomfortable to learn mathematics.</td>
<td>9.30</td>
<td>41.87</td>
<td>34.88</td>
<td>4.65</td>
<td>9.30</td>
<td>3.37</td>
</tr>
<tr>
<td>6. Mathematics is a subject that supports systematic thinking.</td>
<td>32.56</td>
<td>48.83</td>
<td>16.28</td>
<td>0</td>
<td>2.33</td>
<td>4.09</td>
</tr>
<tr>
<td>7. Mathematics is a subject that requires critical thinking.</td>
<td>67.43</td>
<td>23.26</td>
<td>6.98</td>
<td>0</td>
<td>2.33</td>
<td>4.53</td>
</tr>
<tr>
<td>8. Mathematics does not help solving real-life problem.</td>
<td>46.51</td>
<td>25.58</td>
<td>18.60</td>
<td>6.98</td>
<td>2.33</td>
<td>4.06</td>
</tr>
<tr>
<td>9. I feel happy when I can solve math problems.</td>
<td>58.14</td>
<td>20.92</td>
<td>11.63</td>
<td>2.33</td>
<td>6.98</td>
<td>4.20</td>
</tr>
<tr>
<td>10. Mathematics is difficult to learn.</td>
<td>2.33</td>
<td>20.92</td>
<td>39.53</td>
<td>18.61</td>
<td>18.61</td>
<td>2.69</td>
</tr>
<tr>
<td>11. Mathematics encourages logical thinking.</td>
<td>37.21</td>
<td>37.21</td>
<td>23.25</td>
<td>0</td>
<td>2.33</td>
<td>4.06</td>
</tr>
<tr>
<td>12. It is easy to practice mathematics.</td>
<td>6.98</td>
<td>34.88</td>
<td>32.56</td>
<td>20.93</td>
<td>4.65</td>
<td>3.18</td>
</tr>
<tr>
<td>13. Mathematics contributes to everyday life.</td>
<td>16.26</td>
<td>41.87</td>
<td>30.24</td>
<td>6.98</td>
<td>4.65</td>
<td>3.58</td>
</tr>
</tbody>
</table>
Student attitudes measured as percentages

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>( \sqrt{X} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. I'm very happy to learn Mathematics</td>
<td>6.98</td>
<td>30.23</td>
<td>44.19</td>
<td>9.30</td>
<td>9.30</td>
<td>3.16</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.58</td>
</tr>
</tbody>
</table>

Remarks:
- Criteria used for questions number 1, 4, 6, 9, 11, 12, 13 and 15
  - Strongly agree = 5
  - Agree = 4
  - Undecided = 3
  - Disagree = 2
  - Strongly Disagree = 1

- Criteria of attitude used for questions number 2, 3, 5, 7, 8, 10 and 14
  - Strongly agree = 1
  - Agree = 2
  - Undecided = 3
  - Disagree = 4
  - Strongly Disagree = 5

4. Conclusion and Discussion

The research findings showed that the Teams Games Tournaments (TGT) technique assists in improving student achievement in mathematics which can be concluded from the increasing of learning achievement with the significance level at 0.01. The study also showed that student attitudes towards the application of TGT in learning mathematics are at high level.

According to the experimental results it can be concluded that achievement in mathematics taught by using cooperative learning - TGT technique and the traditional approach was different; meanwhile, the students who were taught by using cooperative learning TGT technique got higher scores than students who were taught by traditional approach. This study supports the contention of Thikulwong (2009).

References


