THE EFFECT OF PROBLEM BASED LEARNING ON STUDENTS’ ACHIEVEMENTS AND BEHAVIORS IN MATHEMATICAL SETS OF ANATOLIAN HIGH SCHOOLS

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Abstract

This study about to examine efficiency of Problem Based Learning of the 9th grade students in Anatolian High schools in secondary education their academic achievements and attitudes in Mathematics lesson about mathematical sets subject was carried out according to Pre-Test –Post Test Control Group Pattern. Two groups as control and experimental were formed according to Pre And Post Test Experimental Pattern, in both groups before and after the experiment measurements were done. Attending students of 9 B and 9 C classes of Yedikule Anatolian High School were chosen as subjects in the first term of 2012-2013 academic year. The researcher is mathematics teacher of these classes and counseling teacher of 9-B. Before this experiment Behavior Scale Test as Pre Test and Achievement Tests were all carried out to these groups. At the end of this experiment both groups were conducted to Behavior Scale Test and Achievement Tests as final measurement. As a result Problem Based Learning according to the Traditional Teacher-Centered Learning methods has been found to have a significantly positive effect in academic achievements and attitudes of 9th grade students in Secondary Education in Anatolian High schools in Mathematics lesson about mathematical sets subject.

Keywords: 9th grade math lessons in anatolian high schools, problem based learning, mathematical sets, students’ behaviors to math lessons, students' academic achievements
1. Introduction

The main purpose of this study is to investigate about the effect of problem based learning on students’ achievements and behaviors in mathematical sets of Anatolian high schools. Two hypotheses were used in this study. First of them is "Secondary Anatolian high schools 9th grade in math class, problem-based learning approach applied to the experimental group and the teacher-centered learning approach applied in the control group students' mathematics concerning the behavior of a significant difference." The second is "Secondary Anatolian high schools 9th grade in mathematical sets in the problem-based learning approach applied to the experimental group and the teacher-centered learning approach in the control group students' academic achievement among a significant difference." Implementation of the research subjects participating in the study of measurement tools are assumed to reflect the fact that in answering sincerely. Comprises means for determining the validity of measurement of expert opinion is assumed to be valid. Uncontrolled variables experimental and control group were assumed to the same effect. Research, secondary 9th grade math lesson "mathematical sets" unit is limited. The findings obtained in this study, in the 2012-2013 academic year Yedikule 9-B and 9-C Anatolian High School students attending class was limited. The universe, in Turkey Anatolian high school 9th grade students are studying at. The determination of the experimental and control groups is adopted according to randomly assignment method. 9-B and 9-C classes are designated as the experimental group and the control group, respectively. A total of 20 people in each class of 40 students has been cleared. In this study, subjects initially mathematics achievement test behavior scale pre-test was administered. Then the subjects were randomly assigned experimental and control groups were formed. The experimental group, problem-based learning, the teacher-centered learning methods in the control group was administered using the materials. Finally, the behavior of the students’ mathematics

2. Method

Problem-based learning in secondary education Anatolian high schools 9th grade in mathematical sets in the academic success of students and math lessons related to influence the behavior of the research for this study, trial model of the "pre-test-post-test control group" experimental designs were performed according to. "Pre-test-post-test control group" in experimental design, try one of the other control groups randomly, including the method of assigning the two groups were formed; experiments in both groups before and after the measurement is made (Özdemar, 2011). In this study sample, the first semester of the 2012-2013 academic year Yedikule 9-B and 9-C Anatolian High School students attending class were selected. The universe, in Turkey Anatolian high school 9th grade students are studying at. The determination of the experimental and control groups is adopted according to randomly assignment method. 9-B and 9-C classes are designated as the experimental group and the control group, respectively. A total of 20 people in each class of 40 students has been cleared. In this study, subjects initially mathematics achievement test behavior scale pre-test was administered. Then the subjects were randomly assigned experimental and control groups were formed. The experimental group, problem-based learning, the teacher-centered learning methods in the control group was administered using the materials. Finally, the behavior of the students’ mathematics
achievement test and post-test was administered scale. Achievement test that is used as a data collection tool with the lesson materials, the Ministry of Education and approved by the Board of Education and by the researcher from textbooks; behavior scale has been prepared by other researchers. Students to measure their behavior towards mathematics lesson "Mathematical Behavior Scale" is used. The scale consists of 70 items and reliability for the entire scale was 0.93. This proves the internal consistency coefficient of the scale. In the study, problem-based learning in secondary education Anatolian high schools 9th grade in math class clusters in the students’ academic achievement effects for measuring "mathematical sets" issues related to the 25-question, five-choice multiple-choice test was prepared (Altın, 2012). Problem-based learning materials associated with the first objective, real-life situations facing problems is presented. Then the students into groups; each group to produce solutions for problem situations, solutions with group members discussing problems and solutions on the situation reaching a solution that enables them to write questions were asked. Students pre-test and post-test applied mathematics behavior scale items in the average value of the find, the "completely agree" answers 4, "agree" response to the third, "undecided" answer to the second, "disagree" response 1 point is given. The data obtained were transferred to the computer environment. Scale behavior of the experimental and control groups received from the findings regarding pre-test scores are shown in Table 1.

3. Findings

In this study, it is firstly tested “There is a significant difference between students’ behaviors to math lessons of the experimental group students who are the problem-based learning approach applied to and students’ behaviors to math lessons of the control group students who are the teacher-centered learning approach applied to in Anatolian high schools 9th grade in mathematical sets subject." Therefore, the experimental and control groups regarding the behavior of the subjects in mathematics arithmetic average of the scores obtained from the scale and standard deviations were calculated. The difference between the arithmetic averages has been tested by t test. Mathematics scale behavior of the experimental and control groups received from the findings regarding pre-test scores are shown in Table 1.
As can be seen from Table 1, the mean of the experimental group was calculated as 165.35 and the mean of the control group was calculated as 169.90. There is a difference with the students in the experimental group than in the control group students' pre-test scores between the control groups gained an average of 4.55 points in favor. To test the significance of this difference, t test was applied to the average scores and t-value -0.956; p value was found to be 0.345.

Found p-value is greater than 0.05. This result shows that the difference between arithmetic means of the two groups was not statistically significant. Of the students in the experimental and control groups, before the experiment related to mathematics there is no significant difference between the behaviors.
As seen in Figure 1, the behavior of the experimental group average of the scores from the scale is 165.35; controls the behavior of the average of the scores from the scale is 169.90. Then, try to observe the effectiveness of subjects in both groups, the arithmetic average of the last test scores there is a significant difference between were investigated. Experimental and control groups for the behavior of the mathematics lessons taken from scale findings on post-test scores are shown in Table 2.

As can be seen from Table 2 with the students in the experimental group than in the control group students' post-test mean scores between the experimental groups gained favor there is a difference of 10.10 points. To test the significance of this difference t test was applied to the average scores and t-value 2.177; p-value was found to be 0.036. Significant p-value less than 0.05 was found. These results applied to the experimental and control groups of two different teaching methods, students' mathematics related to a significantly different effect on the behavior indicates that they have. This research related to mathematics students in problem-based learning in developing positive behaviors, teacher-centered learning is more effective than reveal. According to the findings of this research, the first hypothesis was confirmed. Scale behavior of the experimental and control groups receive their scores from the last test are shown in Figure 2.
In Figure 2, the average of the control group post-test scores is 170.80 and the average of the experimental group post-test scores is 180.90. Thus, problem-based learning approach according to teacher-centered learning approach on students' mathematics has been confirmed to be more effective in their behavior. Scale behavior of the experimental and control groups taken from mathematics post-test scores of the students in the experimental group examined the scores of the control group students according to their scores more were to be seen in Figure 3.

Figure 2 Post-test Scores Findings Received From the Mathematics Lesson Behavior Scale by Experimental and Control Groups

Figure 3 The Comparison Between Pre-test and Post-test Scores Received From the Mathematics Lesson Behavior Scale by Experimental and Control Groups
In this study, it is secondly tested "There is a significant difference between academic achievements of the experimental group students who are the problem-based learning approach applied to and academic achievements of the control group students who are the teacher-centered learning approach applied to In Anatolian high schools 9th grade in mathematical sets subject." Therefore, it is applied to the experimental and control group students an academic achievement pre-test. Then, the arithmetic mean of the scores and standard deviations were calculated. The significance of the difference between the arithmetic averages has been tested by t test. The pre-test scores findings received from the academic achievement test by experimental and control groups are shown in Table 3.

<table>
<thead>
<tr>
<th>STUDENT GROUPS</th>
<th>NUMBER OF STUDEN.</th>
<th>ARITHMETIC MEAN</th>
<th>STANDARD DEVIA TI.</th>
<th>t VALUE</th>
<th>DEGREE OF FREEDOM</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL GROUP</td>
<td>20</td>
<td>59.60</td>
<td>4.358</td>
<td>-0.371</td>
<td>38</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>EXPERIMENTAL</td>
<td>20</td>
<td>59.05</td>
<td>4.989</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As seen in Table 3, students in the experimental group and control group in the achievement of students from pre-test mean scores of 0.55 percentage points in favor of the control group there is a difference. To test the statistical significance of this difference of t-test was applied to the average scores and t-value – 0.371; p-value of 0.712 was found. Found this p-value is greater than 0.05. This result shows that the difference between the arithmetic means of the two groups isn't statistically significant. Before the experiment, there is no significant difference between academic achievements of experimental and control groups in 9th grade Anatolian high school about "mathematical sets".
As shown in Figure 4, the difference is not significant between pre-test scores findings received from the academic achievement test by experimental and control groups. In Table 4, it is shown that post-test scores findings received from the academic achievement test by experimental and control groups.

Table 4 Post-test Scores Findings Received From the Academic Achievement Test by Experimental and Control Groups

<table>
<thead>
<tr>
<th>STUDENT GROUPS</th>
<th>NUMBER OF STUDENT</th>
<th>ARITHMETIC MEAN</th>
<th>STANDARD DEVIATION</th>
<th>t VALUE</th>
<th>DEGREE OF FREEDOM</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL GROUP</td>
<td>20</td>
<td>67.75</td>
<td>4.598</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPERIMENTAL GROUP</td>
<td>20</td>
<td>73.70</td>
<td>3.147</td>
<td>4.775</td>
<td>38</td>
<td>0.00&lt;0.05</td>
</tr>
</tbody>
</table>

In Table 4, as can be seen with the students in the experimental group than in the control group students' post-test mean scores between the experimental groups.
gained 5.95 points there is a difference in favor. To test the significance of this difference t-test was applied to the average scores and t-value 4.775; p-value 0.00 was found. Found this p-value is well below the 0.05 significance level. This result shows that two different teaching methods which are applied to experimental and control groups have a statistically significant effect. In other words, in increasing students' achievement in mathematics problem-based learning approach is more effective than teacher-centered approach to learning traditional reveals. Therefore, the second hypothesis is also confirmed.

Figure 5 Post-test Scores Findings Received From the Academic Achievement Test by Experimental and Control Groups

As shown in Figure 5, the experimental group is significantly different than the control group in the post-test scores findings received from the academic achievement test by experimental and control groups.
As seen in Figure 6, the average of pre-test scores of the control group is greater than the average of the experimental group, but no significant differences are found. However, the average of post-test scores of the experimental group is greater than the average of the control group and significant differences are found.

4. Discussion and Conclusion

In this study, the problem-based learning method which is student centered is compared to traditional learning method which is teacher centered. As a result, there is a significant difference between students’ behaviors to math lessons of the experimental group students who are the problem-based learning approach applied to and students’ behaviors to math lessons of the control group students who are the teacher-centered learning approach applied to in Anatolian high schools 9th grade in mathematical sets subject. This result is also in favor of the experimental group. Therefore, Problem-based learning method in accordance with the high school mathematics curriculum should be implemented urgently.

5. References


