The Effects of Teaching Geometry on The Academic Achievement by Using Puppet Method

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Abstract

The alternating education system are effective on many departments and so on mathematic. First step is that the courses are not teacher centered but learner centered. The system are changed by passing from the behaviourist education system to the constructivist education which focus on the learner and learning with real life. So, a new material about geometrical objects is developed for 8th grade students at primary school. The material is a puppet every part of body made from a geometrical object. The purpose of this research is to observe the effects of the geometry teaching by using this puppet. In our research, the method is applied on the 8th grade students. The sample of research included 50 student from 8th grade of a primary school of Sivas Ministry of Education in 2013-2014 education year. The Controlled Group Pre-test and Final-Test model is used in research. This model includes two groups developed by neutral posting. One of these groups is called test group and the other is control group. The pre-test and after test measurements are applied on the groups. The Achievement Test of geometrical objects is used to collect data. At the end of the research it is observed that the test group that the puppet model is used, is more successful than the group that traditional education model is used. Report shows that the learner-centered model rises the academic achievement in schools.

Keywords: Puppet, Geometry, Academic Achievement, Geometrical Objects

1. Introduction

Changing pedagogical perspectives have also been influential over mathematics instruction as well as on many

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other teaching fields. A great majority of the founding values of the new perspectives are reflections of those already existing in mathematics instruction. The most striking difference in the new perspectives is that the focus of instruction has moved from teacher-centered education to student-centered one. The fact that mathematical problems complexify and become more and more abstract impedes some students either from finding or spotting the solution although they have the same knowledge levels with their peers. Since it is not possible to teach and learn all the possible solutions to all the mathematical problems in a mathematics course, the primary aim of math instruction has become to furnish students with mathematical reasoning and problem solving skills. It is necessary to employ student-centered approach in order to achieve this goal. Therefore, it is of paramount significance to utilize activity and game based cooperative learning methods and techniques (Yılmazer & Keklikci, 2014). Use of educational activities as a tool does not only provide the required settings in order to test the entire skill portfolio of students and to improve their psychomotor characteristics, but also determines their levels (Araci, 2001, p.380). Use of games in math and especially geometry instruction matters tremendously in terms of turning abstract concepts into concrete for students. What enhances the status and importance of games in geometry instruction is the fact that the subjects, shapes, and objects in it are more abstract and they entail visualization more than other topics and concepts in mathematics (Yılmazer, 2013). In a study by Karabacak (1996), use of educational games in Social Studies course for 4th graders in primary education was evaluated in terms of their effect on learning. According to the findings, the extent of knowledge, comprehension, and total learning of the students in the experimental group was identified to be significantly higher than that of those in the control group. Teker (1990) compared the effect of student-centered and traditional instructional approaches over students’ success. The findings revealed that there was a statistically significant difference between the post-test scores of the students in the experimental and control groups favoring those in the experimental one. So, the study showed that students learning through student-centered approach were more successful than their peers trained through the traditional method. Ercanlı (1997) investigated the impact of games and models over students’ learning of the Unit “Our World and the Sky” in the Science course of 4th graders in primary education. Following are two of the conclusions drawn based on the research findings:

1. Instruction through use of games and models has a positive effect on success.
2. Success increases as new methods are employed during instruction.

The aim of this study is to examine if geometry instruction through use of puppets and through traditional methods has different effects over the learning of geometric shapes included in the curricula of 8th graders in primary education.

2. Method

This study has employed pre-test/post-test control group model. Research universe consists of 8th graders studying at secondary schools located in the province of Sivas and run by the Ministry of National Education. On the other hand, research sample includes 50 students studying at 8th grade during the academic year of 2013-2014. Of all the subjects, 25 were included in the experimental group and other 25 were put in the control group through random assignment. Geometric Shapes Achievement Test has been used as the data collection tool. The process included two stages as pre-test and post-test. All calculations within the research have been completed through “SPSS 15.0 for Windows”. Research data has been analyzed through descriptive analysis and dependent groups t-test procedure. The puppet manipulated was developed for this study, and it can be regarded as an example of string-puppet whose all body parts are in geometric shapes; hat is conical, head is cylindrical, neck is cubic, torso is rectangular prism, arms are triangular pyramid and triangular prism, and legs are square pyramid and square prism.

3. Findings and Results

The aim of this study is to examine if geometry instruction through use of puppets and through traditional methods has different effects over the learning of geometric shapes included in the curricula of 8th graders in primary education. Accordingly, the experimental and control groups were administered the Geometric Shapes Achievement Test both before and after the procedure. Table 1 depicts the pre-test descriptive statistics of both groups.
Table 1: Pre-Test Descriptive Statistics of both Control and Experimental Groups

<table>
<thead>
<tr>
<th>Grup</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>25</td>
<td>47.80</td>
<td>11.50</td>
</tr>
<tr>
<td>Experimental</td>
<td>25</td>
<td>61.48</td>
<td>11.76</td>
</tr>
</tbody>
</table>

Table 2 shows the results of dependent groups t-test for the control group, which was carried out to check the significance of the difference of the mean scores obtained from both pre-test and post-test.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>S</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>25</td>
<td>47.80</td>
<td>11.50</td>
<td>24</td>
<td>-1.45</td>
<td>.160</td>
</tr>
<tr>
<td>Post-Test</td>
<td>25</td>
<td>49.88</td>
<td>12.20</td>
<td></td>
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</tr>
</tbody>
</table>

A closer examination of Table 2 indicates that there is no statistically significant difference between the pre-test and post-test scores of the control group instructed through traditional methods ($t_{(24)} = -1.45, p < .05$). This finding implies that traditional methods do not have a positive influence over success in geometry instruction.

Table 2: Dependent Groups t-Test Results of the Mean Scores Obtained by the Control Group in Pre-Test and Post-Test

Table 3 displays the results of dependent groups t-test conducted to check if the difference between pre-test and post-test scores obtained by the experimental group were significant or not.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>S</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>25</td>
<td>61.48</td>
<td>11.76</td>
<td>24</td>
<td>-5.52</td>
<td>.000</td>
</tr>
<tr>
<td>Post-Test</td>
<td>25</td>
<td>74.64</td>
<td>13.61</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Table 3 indicates that pre-test and post-test scores of the experimental group instructed through use of puppet model are significantly different ($t_{(24)} = -5.22, p < .01$). Based on this finding, it is possible to conclude that geometry instruction through use of puppet model has a positive effect over success.

Table 3: Dependent Groups t-Test Results of the Mean Scores Obtained by the Experimental Group in Pre-Test and Post-Test

4. Discussion and Conclusion

Research results have pointed that geometry instruction through traditional methods does not have a positive influence over students’ success in learning 8th grade geometric shapes topic. On the contrary, geometry instruction via use of a puppet built by the researcher has been determined to positively affect students’ success in learning geometric shapes and to lead towards a statistically significant difference in terms of students’ success. Accordingly, it would not be wrong to conclude that use of educational games where students participate more actively and employing methods and techniques that enable students to learn through real experience are highly influential over students’ learning subjects that are more abstract and difficult to process as compared to other topics. Furthermore, considering the efficacy of the present study, it is suggested that similar studies may be conducted for other topics and branches, and this method can be effective in terms of improving academic success. Findings of this study are compatible with those of many other studies in the literature (Seeler, Turnwald & Bull, 1994; Newmann & Wehlage, 1996; Belcheir, 2003).
References