The Effect of Active Learning Approach in Science Teaching on Cognitive Level of Student Achievement

Meryem Nur AYDEDE1, Fatih MATYAR2

1 Res. Assist., Çukurova University, Faculty of Education, Dept. of Primary Education, Adana-TURKEY
2 Assist.Prof.Dr., Çukurova University, Faculty of Education, Dept. of Primary Education, Adana-TURKEY

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SYNOPSIS

INTRODUCTION

Primary education students are very energetic and tend to participate classroom activities actively because of their age (Gökçe, 2004). Active participation of students in the learning process is directly related to the selection of appropriate teaching methods and techniques (Bonwel & Eison, 1991).

Literature shows that there is no common agreement about definition of active learning. According to the Prosser and Trigwel (1999) active learning is a student-centered approach and the most effective way for students to learn (Healey & Robberts, 2004). In addition Meyers and Jones (1993) have described that active learning includes three factors. These are: basic elements; learning strategies; and teaching resources. As asserted Sivan et al. (2000) beyond the increase of students’ success, active learning helps students to create sense of curiosity, have ability to apply knowledge, develop independent learning skills and prepare them for their future careers.

Many researchers in Turkey and abroad have carried out studies on the effect of active learning approach on student learning progress (Aydede, 2006; Zavrak, 2003; Wilke, 2003; Sivan & et al, 2000). However, we couldn’t find any research on sixth grade science course which includes the subjects of "cell, What is there on the plant cells?, let us to recognize animal cell, plant tissue, roots, plant structures". Thus, we described to do a research on this grade and unit.

PURPOSE OF THE STUDY

The purpose of this study is to investigate the effectiveness of active learning approach in science teaching on cognitive level of student achievement and determine the ideas of students about active learning approach.
• Is there a difference in the sixth grade science course students’ cognitive level of achievement between an experimental group, for which active learning approach is applied, and a control group, for which a teacher centered traditional teaching approach is applied?
• Is there a difference in the sixth grade science course students’ cognitive level of achievement between an experimental group, for which active learning approach is applied, and a control group, for which teacher centered traditional teaching approach is applied in terms of gender?
• What are the opinions of the experimental group about active learning based activities?

METHODOLOGY

The study is organized according to a quasi-experimental design. Quasi-experimental design is mostly used when it is impossible to control all the variables especially in the studies carried out in education (Cohen, Manion & Marrison, 2000). In the study, active learning approach was used in the experimental group and, a teacher-centered traditional instruction was used in the control group. The study was carried out on the ‘what is there on the cells, plant cells’, ‘Let us to recognize animal cells, plant tissues, roots, plants in the different body structures’ subjects of science teaching program.

a- Research Group

The sample consisted of 51 students from sixth grade students from a public school in Seyhan, Adana. Among the sixth grade classes, two classes having equal performance on pre-test results were chosen. Students were randomly assigned by classes to the experimental group (n = 24) and to the control group (n = 27).

b- Data Collection Tools

In order to determine students’ cognitive level of achievement in science education, a 'Science Course Achievement Test' developed by Aydede (2006) was applied before and after application as a pre and post-tests.

While developing the scale, local and foreign literature was reviewed and the students’ opinions were taken. While developing the test, the questions were prepared in the levels of knowledge, comprehension, application, according to the attainments in 2005 Science and Technology course national teaching program. The pilot application of the items revised according to experts’ opinions. The test was composed of 29 items regarding in four point likert type. The KR-20 value of ‘Science Course Achievement Test’ was found as .85.

In the research, interviews was used to find out the opinions of the experimental group students about active learning approach at the end of the research. The interviews was carried out in the context of 'active learning approach is effective for you and why? 'questions.

c- Data Analysis

Variance analysis with two factor technique was used to determine whether there was any difference between the pretest and posttest points of experimental group and control group in terms of Science Course Achievement Test. For the analysis of the data, SPSS computer programme was used. Content analysis was used to analyse the students’ interviews.
FINDINGS

Table 1 shows that there is a meaningful difference between experimental and control group regarding their students’ cognitive level of achievement in favour of experimental group at the end of the instruction.

**Table 1: Comparison of Post-Test Scores of Science course Achievement Test Experimental and Control Group**

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>X</th>
<th>Sd</th>
<th>Df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>24</td>
<td>22.04</td>
<td>7.65</td>
<td>49</td>
<td>2.17</td>
<td>0.035</td>
</tr>
<tr>
<td>Control Group</td>
<td>27</td>
<td>17.92</td>
<td>5.85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows that there is no meaningful difference in the sixth grade science course students’ cognitive level of achievement between experimental group and control group in terms of gender.

**Table 2: Comparison of Post-Test Scores of Science Course Achievement Test Experimental and Control Group in Terms of Gender**

<table>
<thead>
<tr>
<th>Tip III</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science achievement</td>
<td>1</td>
<td>184.848</td>
<td>4.64</td>
<td>.036</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>0.762</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science achievement * gender</td>
<td>46</td>
<td>39.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td>1.414</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>22575.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After the instruction experimental group students’ opinions about active learning approach were taken. Related answers with this interviews are shown as follows:

**Opinions of the Experimental Group Students About Active Learning Approach**

D1: I did not like science courses in the past but now I love and want to work more…
D2: At the beginning, I got bored in class but after, my thinking has changed. I found lesson very good …
D3: At the beginning I thought the course was ridiculous, but then I did not want to end…
D4: now this course is coming me very enjoyable…
D6: At the beginning of the course I thought I can not study with my friends. But later I changed my mind. I learnt the science with my friends better …
D7: When I was in primary school, I did not like Science at all. But active learning activities helped me overcome my fear…

**DISCUSSION and SUGGESTION**

According to the results of t-test analyses of 'Science Course Achievement Test' questionnaire showed that there was a significant difference between the experimental group ($M = 22.04, SD = 7.65$) and the control group ($M = 17.92, SD = 8.85$), $t(51)= 2.17$, $p= .035$. Thus, it is concluded that the use of active learning approach in Science Course affected cognitive level of student achievement meaningfully. The results of variance analysis with two factor technique showed that scores of students’ science course achievement posttest didn't have significant differences ($p>.05$) in terms of genders.
Analysis of the qualitative data showed that experimental group students had positive opinions for active learning approach after the instruction.

To develop the usability of active learning approach, we advise that;
- Learning environments in which active learning approach will be implemented should be designed according to individual and group classes
- Teachers and students should be trained and force to use student-centred teaching
- This study investigated the effects of active learning activities on students’ cognitive level of achievement. This teaching program should be used for other different topics and grades.
- This study investigated the effects of active learning activities on students’ opinions. It should be expanded to the teachers' opinions about implementing and encountered difficulties about active learning approach.
REFERENCES


