Full Length Research Paper

The effect of letter-writing activities for learning purposes on the students’ learning of the science course and scientific attitude

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The aim of this study is to examine the impact of writing tasks on the 5th grade students’ academic achievement and scientific attitude in science and technology course. The research is a quasi-experimental research including pre-test and post-test designs. These tests were administered as pre-test and post test to the groups. A total of sixty-two 5th grade students studying in the center of Erzurum in the 2012-2013 academic year have created the sample of the study. In the study, the groups were determined as to form purposive sampling. The study is carried out by using two different teaching methods. The first of these methods is writing-supported student-centered teaching method (experimental group) and the other is student-centered teaching method (control group). There are 32 students in the experimental group and 30 students in the control group. But immediately after the end of the application, the experiment group was provided to tell in a letter to one of their 4th grade friends what they have learned about the unit. The data of the research were evaluated by t-test. After the completion of the application, the results of the achievement test and the scientific attitudes scale have revealed that there is a statistically significant difference in favor of the experimental group.

Key words: Writing letters for learning purposes, science achievement test, scientific attitude scale

INTRODUCTION

Science is not only a set of accuracy proven information that scientists obtained as a result of various investigations. But also it is human endeavor which is shown for better understanding of the natural world; it requires imagination and creativity and it is affected by the structure of the society they live in (Çeşni and Çil, 2009; Çeşni and Çil, 2012).

For a meaningful learning in the science lessons; there are needs of such learning environments where the validity of students' prior knowledge is checked, the events they come across in real life are based on, the students are always active mentally, mostly active physically and the conceptual change is achieved. These learning environments must offer opportunities to the students in order to reinforce newly learned concepts (MEB, 2007). In order to realize this better, science education in schools has been revised; drastic changes have been made in the science curriculum. The science
The research has been applied in a central secondary school of Erzurum in 2012-2013 academic year. There is no difference

and technology course teaching program has been arranged according to the constructivism approach and a student-centered education mentality has been adopted (MEB, 2006). Along with the understanding of constructivism approach, the idea that the students can be offered better learning environments has become dominant in the educational environments (Elen et al., 2007; Wang, 2011).

In the constructivist learning environment, various strategies which can provide learning of the students may be considered. The common features of these strategies are that they activate the students, help their thinking, allow them to configure new information on their old information, make students active and help their learning in the usage of writing activities for learning purposes (Uzoğlu, 2012; Yildiz, 2012; Mason and Boscolo, 2000). Teachers are required to acquire a series of knowledge and competence such as use of effective pedagogy, belief in the benefits of the activity, and the things required to be done during the implementation process in order to use writing to learn activities effectively in the classroom environment. However, very little time is spared especially for writing in classrooms in Turkey. The main reasons listed are that the teachers perceive writing only as a tool to take notes, and an engagement which takes time because writing requires spending time.

In the teaching-learning process many different methods are used to make the students active and responsible for their own learning. The animation-supported teaching method, cooperative learning method, discussion method, computer-assisted teaching method, and writing activities for learning purposes are among the significant methods used to assist learning. The effect of these methods on the students’ achievement and attitudes has been investigated, and positive results were obtained. Of these methods, the use of writing activities for learning purposes in the teaching-learning process has become widely in our country recently and has been the subject of many studies and research (Uzoğlu, 2012; Yazıcı and Uzoğlu, 2012; Yildiz, 2012; Demirbağ, 2011; Yildiz and Büyükkasap, 2011; Atilla et al., 2010; Günel et al., 2009c; Uzoğlu et al., 2008).

Writing for learning purposes is not only a tool used in the process of knowledge construction but also it is a communication and querying tool which enables the transmission of ideas to different readers (Prain and Hand, 1999). The writing for learning purposes (Holiday et al., 1994; Hand and Prain, 2002; Mason and Boscola, 2000) which is a learning tool rather than an assessment tool can be considered as a powerful tool that helps the students to learn science (Levin and Wagner, 2006). When viewed from this perspective, the writing activities for learning purposes must be used effectively in the classroom settings.

When literature was analysed, four basic benefits of writing to learn activities can be summarized. The benefits can be listed as follows (Uzoğlu, 2010):

1. Writing to learn enables the conceptual change of the individuals. Moreover, it develops the communication and study skills of the students.
2. Writing to learn converts the immature thoughts of the individuals to more consistent and more permanent knowledge.
3. Writing to learn enables retention of knowledge for a long time and also helps the individuals to reinforce the new information they have learned.
4. Writing to learn helps the difficult concepts to be learned by providing an opportunity for the individuals to process the knowledge in their minds.

When analyzing the literature, especially the national literature, it is noteworthy that the studies about how effectively writing activity contributes to the learning are insufficient. Therefore, it is aimed to overcome this deficiency through this work.

The purpose of the study

The purpose of this study is to determine the effect of the letter writing activities for learning purposes on the learning of the science course and scientific attitudes of students. For this purpose, the answers to the following questions have been sought.

1. Does the letter writing activity have any effect on the academic achievement of students in science lessons?
2. Does the letter writing activity have any effect on the scientific attitudes of students in science lessons?
3. What are the opinions of the students about writing letters?

METHOD

The research is a quasi-experimental research; it was carried out with a total of 62 fifth grade students from a secondary school in Erzurum. In the quasi-experimental method, while there is an intervention to the experiment group from the experimental and control groups, there is not any intervention in the control group. At the end of the research the data obtained from the experimental and the control groups have been compared (Pektaş et al., 2009). The experimental and control groups were determined randomly by the researcher. In this study, when carrying out letter-writing activity to the experiment group in addition to the model of constructivist approach in the science teacher guidebooks, the constructivist approach model situated also in the teacher guidebooks has been applied to the control group (Table 1).

Sampling of the study

The sample of the study consisted of 62 students. The students were assigned to experimental group (32) and control group (30) via purposeful sampling method. Purposive sampling, also known as judgmental sampling, is based on the judgment of the researcher for the selection of a sample of individuals with a particular purpose in mind (Balci, 2005).

The research has been applied in a central secondary school of Erzurum in 2012-2013 academic year. There is no difference
between the academic knowledge/achievements and backgrounds of the students in the selected application groups because the notes of the 4th grade students and the trial exam results which were conducted by different publishing houses are quite similar to each other. In addition, students economically, socially and culturally come from similar environments.

Data collection tools

The Science Achievement Test (SAT) and the Scientific Attitude Scale (SAS) have been used as the data collection tool in the research. The SAT was formed according to different publishing houses’ questions that are appropriate to the unit gains of the teacher guidebooks. In order to ensure the reliability and validity of these questions, the opinions and suggestions of an assistant professors and two science and technology teachers who are experts in their field have been taken into consideration. In the light of their opinions, the number of questions was determined as 25. The reliability coefficient of these questions was determined as 0.80 by applying to the 57 students who have the necessary knowledge in this unit.

The Scientific Attitude Scale used in the study was developed by Moore and Foy (1997) and its Turkish adaptation was made by Demirbaş (2005). The scale was formed by forty items. The Cronbach's alpha reliability coefficient of the scale was 0.76 and the correlation of Spearman Brown two half test has been found as 0.84 (Afacan, 2008). The scoring in the face of the attitude sentences of the scale which is improved as 5-point Likert-type is given in the following way: "Strongly Disagree (1)", "Disagree (2)", "Undecided (3)", "Agree (4)" and "Strongly Agree (5)". The scoring in the negative items is its inverse. The scientific attitude scale was administered as pre-test - post-test to the experimental and control group students. While the minimum score a student can get is 40 points as a result of Scientific Attitude Scale, the maximum score is 200. The high scores obtained from the scales represent that the students show positive attitudes toward science and technology lesson.

Application

This study was carried out in relation to the subjects Earth, the Sun and the Moon's shape and size, our world is frisky and say and say grandfather month what's the secret of these changes which are in the light unit of 5th grade science lesson of the secondary school. The application has been completed in accordance with the annual plan for 16 lesson hours. Before the beginning of the light unit, the scientific attitude scale was applied to the experimental and control groups as a pre-test. A letter-writing activity was carried out with the students in the experiment group in addition to the model of constructivist approach in the science teacher guidebooks. In this activity, immediately after completion of the unit the description of the subject is provided in a letter to a friend of 4th grade by the students in the experimental group. The letters written by the students were read in the class according to their wishes. The constructivist approach model which is still in the teacher guidebooks was applied to the control group. At the end of the application the science achievement test was applied to both groups. Furthermore, the attitude scale applied as pre-test was applied as a final test after the completion of study.

Analysis of data

The SPSS 16.0 software package was used for the analysis of the data obtained from the attitude scale and academic achievement test. The meaningfulness of the differences between academic achievement and attitudes of the secondary school 5th grade students was resolved by the independent t test, arithmetic mean (X̄). The level of statistical significance was taken as p < 0.05 for all the tests and comparative studies.

FINDINGS

The data obtained in this study, the SAS and SAT results are given in Tables 2 and Table 3.

According to the results of the post SAT test analysis given in Table 2, the arithmetic average score of the experimental group is 69.75 and the arithmetic average score of the control group is 60.71. According to the independent t-test analysis, there is a statistically difference between test average scores (t(60)= 2,184; p=0,033; p<0,05). According to these results, it can be said that the use of letter writing activity in the light unit of 5th grade science lesson of secondary school makes a positive impact on the students' academic success.

According to the results of SAS pre-test analysis in Table 3, the arithmetic average score of the experimental group is 138.59 and arithmetic average score of the control group is 137.39. There is no statistically difference between the pre-test average scores of the experimental and control groups according to the independent t-test analysis (t(60)= 0,399 ; p=0,692; p >0,05). According to this result it can be concluded that scientific attitude and skills of students who have received the same education in the same school may be the same. When we look at the SAS last test analysis applied after the completion of the process, the arithmetic average score of the experimental group is 144.92 and the arithmetic average score of the control group is 136.94. According to the independent t-test analysis there is a statistically significant difference between the mean scores of SAS recent tests of the experimental and control groups in favor of the experimental group (t(60)= 2,722 ; p=0,008; p <0,05). Based on this result, it can be concluded that the letter writing activities for learning purposes in the secondary school science course help the development of students' scientific attitudes.

In accordance with the data in Figure 1 students’
**Table 2.** The results of independent t-test points obtained from post test of SAT questions.

<table>
<thead>
<tr>
<th>Test</th>
<th>Groups</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last test</td>
<td>Experiment</td>
<td>32</td>
<td>69,75</td>
<td>12,273</td>
<td>2,184</td>
<td>0,033</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>30</td>
<td>60,71</td>
<td>21,983</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Max score: 100.

**Table 3.** The results of independent t-test points obtained from the pre-test and post test of SAT questions.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Groups</th>
<th>N</th>
<th>$\bar{X}$</th>
<th>Ss</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>Experiment</td>
<td>32</td>
<td>138,59</td>
<td>15,612</td>
<td>0,399</td>
<td>0,692</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>30</td>
<td>137,39</td>
<td>9,598</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last test</td>
<td>Experiment</td>
<td>32</td>
<td>144,92</td>
<td>12,818</td>
<td>2,722</td>
<td>0,008</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>30</td>
<td>136,94</td>
<td>10,908</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Max score: 200.

**Figure 1.** Some students’ opinions about letter writing activity.

DISCUSSION AND CONCLUSION

In this study, the determination of the effect of the realization of letter-writing activities for learning purposes in the light unit of the fifth class of the secondary school on the students’ learning of the science course and their scientific attitude is aimed. Before making research, assuming that the experimental and control groups are homogenous because of 4th grade science notes of the
students and the similarity of the trial results made by different publishing houses, the data of science achievement test has been obtained with the static group comparison (only the last test). The data of scientific attitude and skills were obtained with the classic experiment comparison (pre-test, post-test). Considering the static group comparison results (Table 2) the presence of statistically significant difference in favor of the experimental group is observed ([t(60)= 2.184 ; p=0.033; p<0.05]. Based on this result, it can be concluded that the realization of letter writing activity in the light unit of 5th grade science lesson of secondary school has provided the students’ learning the topics better (Tynjala, 1998; Hohenshell, 2004), better configurations of the knowledge (Yıldız and Büyükkasap, 2011; Uzoğlu, 2012), the development of their thinking skills, the consolidation of the learned topics and remembering of the concepts (Tynjala, 1998; Hume, 2009). The results obtained from this study are in concordance with the results of some researchers (Günel et al., 2007; Günel et al., 2009a; Günel et al., 2009b; Tynjala, 1998; Hand and Prain, 2002; Mason and Boscolo, 2000). Yıldız and Büyükkasap (2011) explore the opinion of students on Heisenberg uncertainty principle and the impact of writing activities for learning purposes on academic success. It mentions that many students cannot write any equation about the principle. It notes that writing activities about the principle enable the students to retain scientific knowledge. It also emphasizes that such activities facilitate the conceptual changes in students. Günel et al., (2007) in their study suggest that the usage of writing as a learning tool in science classes has drawn attention for the last ten years; and writing to learn activities, a learning tool rather than an assessment tool, is a very strong tool that helps students learn science. Writing to learn not only help individuals learn science but also it is very important for the individuals’ growth and it is a fact that it serves different functions. The study of Uzoğlu (2012) investigates the effect of journal keeping (journal writing), a writing to learn activity, on the student’s academic achievement and attitude in science and technology course. The results of research which were carried out at the end of the subject and topic-based revealed that the students of writing group were statistically more successful than the students control group in terms of total post-test points and total post-test concept points. Before the beginning of the work it is seen that there is not a statistically significant difference between the BTÖ pre-test average scores applied to the experimental and control groups (Table 3, t (60) = 0.399, p = 0.692, p> 0.05). Based on this result, it can be said that the scientific attitudes of the students in the experimental and control groups are similar. A statistically significant difference is seen between the average scores of BTÖ final test applied immediately after the application (Table 3, t (60) = 2.722, p = 0.008, p <0.05) Based on this result, it can be concluded that the use of letter writing activity for learning purposes in the science lessons helps the students to like the course and develop positive attitudes towards the course (Uzoğlu, 2010). The results obtained from this study are not compatible with the that of Uzoğlu (2012). The study of Uzoğlu (2012) showed that science and technology attitude scale revealed that there was not a statistically meaningful difference between the groups. Based on the results obtained in the study it is concluded that the realization of the writing activities for learning purposes in the science lesson of the secondary school contributes to the academic achievement and scientific attitudes of the students. Moreover, it is concluded that the writing activities for learning purposes help one remember learned information and develop comment, practice and communication skills (Cousin et al., 1999).

Conflict of Interests

The author has not declared any conflict of interests.

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