The influence of constructivism with family and instructor support on students’ success and conceptual learning capabilities in science lessons

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Abstract

The purpose of this study is to investigate “the effects of constructivism with family and primary school teachers’ support on conceptual learning capabilities and accomplishment of 5. class students attending sound unit in Science Lessons.” For this purpose, the influence of education with family support—and/or elementary teacher support—on academic achievement and conceptual learning is investigated. Model of the research can be classified as pre-test – post-test experimental model.

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1. Introduction

Students’ academic success is affected greatly by the families’ influence. Parents can contribute significantly to their children’s academic success by obtaining a steadfast communication and by cooperating with the school (Aslanargun, 2007).

Family is influential to the child for the whole period of his/her life. And teacher is one of the most crucial individuals; the child comes across, while his perceptional capabilities are at their highest potential. According to Artur (2007), “Education is an art” (www.zaman.com.tr) and this art can only be learned from teachers—and when student is out of the confines of the school, by parents.

The teaching bestowed by parents can be classified as primary education and its absence is unthinkable. Parental education is known as a typical public education. It lacks plan and coordination. Therefore it may be taken as social education. However, the education that takes place in school environment is thoroughly planned, coordinated and achieved (Çelikkaya,1995).

Education is the most important factor that unfolds the innate abilities of individuals and that makes them more advanced, creative and constructive. The things learned with education is applied and used with the help of
technology (Halis, 2002). Education starts on the day of birth and it goes on till the last day of individual’s life. According to Gürdal (1998), Science education starts with the birth. When the infant emerges from the womb, he/she discovers the richness of light. Thus, he discovers Science. Light hurts his eyes and so he closes as a reaction to this stimulus. He learns Science. Children can become acquainted with science even in the womb with the help of the ultrasonography.

Families, teachers and other distinctive figures play a great role on the students’ academic success (Geroge, Kaplan, 1998). Family education and school education can not be taken separately. According to Özdogan (2000), one of the duties of a teacher is discovering and correcting the educational errors occurred at home.

Teacher is there to drive the course of education and to make it possible in the first place. Learning is self-achieved by students, while the main duty of a teacher is to plow that rich learning environment with certain methods and techniques (Fidan and Erden 1990). Teachers play the biggest role in every student’s academic lives. The well-being of the dialogue between teacher and student affects the student’s overall attitude towards the lesson. If a teacher is widely accepted and loved, then the lesson itself is liked and students tend to study harder to achieve the affection of the teacher. Thus it affects the overall performance of the student’s academic life positively. According to Şahin, student’s general attitude towards science starts with the teacher who gets them acquainted with science in student’s early ages (Şahin, 1998).

Ersin (1981) also supported this, by saying who makes the student successful is a successful teacher himself. And he defines the successful teacher notion as “A successful teacher is the one who has attained social development, who has a perfect dialogue with students and who is open to improvement. The individual with these certain qualifications takes an active role in student’s academic success.”

It can be stated that student-teacher relationship is the key for other parameters. If a teacher’s relationship with students is satisfactory, then in the presence of violation of school rules and procedures, the disciplinary punishment is better accepted. If that relationship doesn’t exist, students are known to have resistance towards rules, procedures and disciplinary penalties following these (Marzano, Marzano and Pickering, 2001).

As Wubbels, Brekelmans, Tartwijk and Admiral (1999) states, teacher must be friendly, helpful, adorable and efficient. He/she must be able to establish an empathic relationship, which leads to the fact that he must also able to understand their inner world and most importantly must listen carefully. Good teachers are not hesitant, unstable and they don’t have puzzling behavior. They are not nervous, uneasy, dissatisfied, aggressive, cynic or short-tempered either. While he must establish certain standards and maintain control, he must also give responsibilities to students to learn the topics freely.

According Yıldırı (2001), “As an infant is born, he explores the world through the window his mother has opened for him” (www.zaman.com.tr). The openness of that window to real world defines the success of the child’s development.

Family education is more important than school education especially for the change of students’ behavior and their maturity (MEB, 2002).

Baltaçoğlu (1916), states that education in family environment is very crucial. He thinks that the most important factor for education is family. Family affects individual both consciously and unconsciously. Family blends and shapes the individual with all those aspects (Tozlu, 1989).

Child’s life view, success and self development are formed majorly by the parents’ approach (Özdogan, 2000).

The conclusions of a study performed by Kasatura in 1991, are quite extraordinary. In the study, most of the unsuccessful students blamed their parents for the failure of attaining educational success. And successful students stated that a large part of the successful achievement of them is based on their own work. Yet they also added that if a peaceful environment at home is always established, then they would be more successful (Kasatura, 1991).

Kepçeoglu states that family’s positive approach to the child affects his educational success in a positive manner (2002).

The leading factors which cause the students to alienate from the lessons are their parents’ wrong attitude, indifference, pressure, hardness, dispassionate behavior or excessive interest (Küçükahmet, 2001).

For the children who are the protectors of our future, family’s interest is not sufficient. According to the studies made on the matter, it is found out that if the school education is supported by the family, the success improves significantly (Gürdal, Şahin, Çağlar, 2001).

The studies on the scientific behavior are focused on parameters based on teacher aspects or learning circumstances. Studies based on both teacher and family parameters are quite limited. In this study, the influence of
parent and teacher on the student is investigated. The crucial question here in this study can be stated as “Does constructivism in elementary school 5. Class science lessons with family and instructor support; play an important role in students’ success and conceptual learning capabilities?”

Science and technology have significant effects on our daily life. Without scientific studies, technological prowess can not exist. For years, it has been sought to make students have more interest in the scientific lessons. However, the latest studies indicate that students’ interest in the scientific lessons is on a decline. The interest we are talking about can only be achieved by the teacher and family working in a steadfast manner. And that brings success and conceptual learning. Moving from this notion, we can classify the aim of this study as investigating the effects of constructivism with family and primary school teachers’ support on conceptual learning capabilities and accomplishment of 5. Class students attending sound unit in Science lessons. For this purpose, answers are sought for the following problems:

1. Does family supported teaching have any effect on academic success and conceptual learning?
2. Does teacher supported teaching have any effect on academic success and conceptual learning?
3. Does family and teacher supported teaching have any effect on academic success and conceptual learning?

2. Method

This study is made to investigate the influence of family and teacher on the student’s success and conceptual learning. Our study involves a pre-test – post-test grouped experimental work. In this study, the influence of family and teacher on Elementary School 5th grade students’ success in Science lessons’ Sound units is investigated. 4 classes are chosen from the 5th grade classes of a public school which is located in Istanbul. One of these classes is chosen as the test group, while other classes are taken as Experimental 1 and Experimental 2 groups. And integration class is chosen as Experimental 3 group. While in test group, the lessons are done normally, in Experimental 1 group, they are done with family support, in Experimental 2 group, they are done with teacher support, in Experimental 3 group, it is done with both family and teacher support. In order to cancel the influence of the instructor, lessons are carried out by the researcher. Sound unit is explained to the test and experimental groups for 6 weeks.

76 of the 160 students are females (%47,5) and 84 of them are males (%52,5). In test group, 22 of them are females (%55), 18 of them are males (%45); in Experimental 1 group, 17 of them are females (%42,5), 23 of them are males, Experimental 3 group is taken as integration class and there are two handicapped students who need special education. These students were also included in the study.

In the test group, lessons are done normally; while in Experimental 1 group, they are done with family support, in Experimental 2 group it is pursued with instructor supported lessons enriched with certain techniques and consequently in Experimental 3 group, lessons are enriched with certain techniques and are done with family and instructor support.

The homework assignments done by students with the help of their parents from Experimental 1 (family supported) and Experimental 3 (family and teacher supported) groups are also collected and contributed to the assessment. Homework assignments are created for two goals which are “getting the students ready for the next lesson” and “reinforcing the topics covered.” In order to understand whether the students have done the homework deliberately or not, they are asked some questions about the subject for the first 10 minutes of the lesson. And no homework assignment is given to the students of Experimental 2 (teacher supported). All activities are made in the class.

In this study, all activities, assignments and lectures notes are prepared by the researchers themselves, according to constructivism and multiple intelligences theory working in parallel with that.

Two methods of data gathering are used which are, knowledge test and open ended questions. After validity and reliability study is performed, knowledge test and open ended questions are applied to the students as pre-test (before the application) and post-test (after the application).

Knowledge test is formed according to the National Education Elementary Science Curriculum 5th class "voice" unit's objectives and achievements. There are at least two questions for each achievement. 60 multiple-choice questions are prepared by the researcher, from 5th grade study books, question banks, the Ministry of Education textbooks in Science.
With an expert opinion and two Science Teachers’ opinion, the number of questions was reduced to 40 so that it is validity is maintained. These 40 questions were chosen as pilot application for the senior class (6th grade) and $\alpha=0.7213$ is found. To improve reliability, 5 of them with the least difficulty and least distinguishing properties were thrown away, number of questions were reduced to 35 and $\alpha=0.8969$ is found. As a result, the pilot study had sufficient security. So the number of questions is left as 35.

For data collection purposes, 9 questions of open-ended questions were used with test and experimental groups. Open-ended questions were prepared by the researcher and chosen from 5th Grade Science Curriculum appropriate to the subjects and in parallel with “Voice” unit. A total of 20 questions were chosen. In accordance with opinions of an expert and 2 Science Teachers, the number of questions was reduced to 9 and its validity is confirmed.

In resolving the data, SPSS 17.0 statistical package program has been used. Pre-test and post-test data obtained from control and experimental groups were evaluated and comparisons were made between.

3. Results

As shown as Table 1, relations between groups were found with the help of preliminary test and Sig. value was found to be 0.480 (Sig. > 0.05). So it is observed that 5th grade Science Class students attending the “Sound” unit has the same knowledge level prior to the training they will be given.

Table 1 Investigation of Experimental and Test Group Students’ Pre-Test Results with One-Way ANOVA

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Group</td>
<td>163,350</td>
<td>3</td>
<td>54,450</td>
<td>0,829</td>
</tr>
<tr>
<td>Within Groups</td>
<td>10246,250</td>
<td>156</td>
<td>65,681</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10409,600</td>
<td>159</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison of pre and post tests applied to the students is given in Table 2.

Table 2. Comparison of Experiment and Test Group Students’ Pre-Test and Post Test Results with Paired Sample t Test

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control - Control_1</td>
<td>14,95000</td>
<td>12,91580</td>
<td>2,04217</td>
<td>-7,321</td>
<td>39</td>
<td>.000</td>
</tr>
<tr>
<td>Experimental1 - Experimental1_1</td>
<td>27,35000</td>
<td>16,41536</td>
<td>2,59550</td>
<td>-10,537</td>
<td>39</td>
<td>.000</td>
</tr>
<tr>
<td>Experimental 2 - Experimental2_1</td>
<td>20,22500</td>
<td>13,51445</td>
<td>2,13682</td>
<td>-9,465</td>
<td>39</td>
<td>.000</td>
</tr>
<tr>
<td>Experimental3 - Experimental 3_1</td>
<td>56,32500</td>
<td>12,55427</td>
<td>1,98500</td>
<td>-28,375</td>
<td>39</td>
<td>.000</td>
</tr>
</tbody>
</table>

When we compared the pre-test and post-test results with paired sample t test, differences in test scores for each group—when compared to pre-test—(sig.<0.05) were found. This difference is statistically significant. That points to the fact that students scores raises after the period of education.

Students at pre-test either didn’t answer the open-ended questions or answered incorrectly. For this reason, pre-test answers of open-ended questions were not included in the table. In Table 3, the points, experimental and test group students received from the open-ended questions were assessed over 100, 40 and lower was grouped as “does not know”, 41 and better was taken as “knows” and all the data obtained was given in the form of percentages.
Table 3. Data Obtained from the Answer Results Experimental and Test Groups Gave To the Open-Ended Questions as the Last Test

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Control Group (%)</th>
<th>Experimental 1 (%)</th>
<th>Experimental 2 (%)</th>
<th>Experimental 3 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Does Not Know</td>
<td>Knows</td>
<td>Does Not Know</td>
<td>Knows</td>
</tr>
<tr>
<td>1.</td>
<td>35</td>
<td>65</td>
<td>13</td>
<td>78</td>
</tr>
<tr>
<td>2.</td>
<td>40</td>
<td>60</td>
<td>22</td>
<td>87</td>
</tr>
<tr>
<td>3.</td>
<td>55</td>
<td>45</td>
<td>11</td>
<td>89</td>
</tr>
<tr>
<td>4.</td>
<td>38</td>
<td>62</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>5.</td>
<td>53</td>
<td>47</td>
<td>33</td>
<td>67</td>
</tr>
<tr>
<td>6.</td>
<td>59</td>
<td>41</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>7.</td>
<td>16</td>
<td>84</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>8.</td>
<td>24</td>
<td>76</td>
<td>18</td>
<td>82</td>
</tr>
<tr>
<td>9.</td>
<td>65</td>
<td>35</td>
<td>32</td>
<td>68</td>
</tr>
</tbody>
</table>

When Table 3 is examined, for, 3rd, 4th, 5th, 6th, 8th questions respectively, Experimental 3, Experimental 2, Experimental 1, Test group; for 2nd, 7th and 9th questions, Experimental 3, Experimental 1, Experimental 2 and Test group had more questions answered correctly.

3. Discussion

With family supported education, students’ academic success and conceptual learning abilities were found to have increased gradually. The results obtained from the study are mostly in parallel with the research of Swap (1993) and his colleagues (1981,1987,1994) on the subject of the factors improving student success(Ammon and his colleagues, 1998) and with quotation of Semenoglu (2002) from Woolfolk (1995)—that personal life affects the success significantly.

Academic success and the conceptual learning capability of students with teacher support were found to be in the increase. The results obtained from the study are mostly in parallel with the results of Ongan (2006) on the subject of relationship between 4th and 5th grade students’ perception of their own behavior and their teachers’ behavior, and the studies contributed by Bencuya (2003) on the subject where he explored the impact of the teachers’ communication skills on students, and the thesis of Bozkurt (2004) in which he investigates the factors affecting the student academic success, and the master’s thesis of Erbas (1998) in which he works on high school students and tries to find the personality traits of an ideal teacher, and the doctoral studies of Polat (2008) in which he evaluates students, teachers and parents, children concept with an understanding of constructivism.

Academic success and the conceptual learning capability of students with teacher and family support were found to be in the increase. The findings in this study are in parallel with the results of Ongan (2006) and with the study of Akinoglu (1995) in which the influence of teacher, student and parents on the students’ development of mathematical traits is investigated, and with the thesis of Ozturk (2007) where he researches the notion of conceptual learning, and consequently with the thesis of Kaplan (2006) in which the effect of homework assignments on the conceptual learning is investigated.

4. Conclusion and Recommendation

- Family supported education has a positive effect upon academic success and conceptual learning.
- Teacher supported teaching has a positive effect upon academic success and conceptual learning.
- Family and teacher supported education has a positive effect upon academic success and conceptual learning.
- Parents should help students more on their lessons and they should spend more time together.
- When teachers give assignments to students, they should choose those assignments accordingly in order to create a basis for the parents to interact with the students and to develop a relationship with them.
- The Ministry of Education should provide in-service trainings in which parents can be merged and where they can be instructed on the importance of parental cooperation.
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