THE RELATIONSHIP BETWEEN PRIMARY SCHOOL STUDENTS’ ATTITUDES TOWARDS SCIENCE AND THEIR SCIENCE ACHIEVEMENT (SAMPLING:IZMIR)

İLKOKUL ÖĞRENCİLERİNİN FEN VE FEN BAŞARILARI VE TUTUMLARI ARASINDAKİ İLİŞKİ (İZMİR ÖRNEKLEMİ)

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ABSTRACT: This study examines the relationship between primary school students’ attitudes towards science and their science achievement. The sampling of the study encompasses 330 subjects of whom % 64.2 (n=212) are female and % 35.8 (n=118) are male. Participants are from primary school students of eight graders in Izmir, Turkey. The research has applied the “Science Attitude Scale” developed by Baykul (1990) which has an alpha reliability coefficient of .92, and a questionnaire was administered to the sample. The data were analyzed by ANOVA, t and Scheffe’s tests, and correlation coefficients. The results of the study indicated that students’ gender, socio-economic of their families, their perceptions of their parents' attitudes and their perceptions of science achievements have a significant effects on their attitudes towards science. The results of the study also depicted a meaningful relationship between the primary school students’ attitudes towards science and their science achievement (r=.238, p<.001).

Keywords: Attitudes towards Science, Science Achievement, Primary School Students.

ÖZET: Bu çalışma, İlkokul öğrencilerin Fen başarları ve fen bilimine yönelik tutumları arasındaki ilişkiyi incelemektedir. Bu çalışma tamamen 330 deneği içeren %64.2 (n=212) kadın olup, %35.8 (n=118) erkekten oluşmaktadır. Katılımcılar İzmir, Türkiye ilköğretim öğrencilerinden sekizinci sınıftan oluşuyor. Araştırma, Baykul (1990) tarafından oluşturululan “Fen Tutum Ölçeği” Alpha .92 güvenirliği göstermektedir. Toplanan bilgiler Anova tarafından analiz edilmiştir, t ve Scheffe test ve aradaki ilişkilerin katsayısı toplandı. Araştırmanın sonucunda, öğrencilerin cinsiyeti, aileleri sosyo-ekonomi durumu, ailelerinin algılamalarına göre fene yönelik tutumları arasında anlamlı ilişki bulunmuştur. Bununla birlikte, çalışmanın sonuçları arasında ilköğretim öğrencilerin fen başarları ile fene yönelik tutumları arasındaki ilişkinin anlamlı olduğu görülmektedir (r=.238, p<.001).

Anahtar kelimeler: Fene yönelik tutum, fen başarısı, ilköğretim öğrencileri.

1. INTRODUCTION

In today’s world, science encompasses many ways of gaining information which help individuals know themselves and their environment better and develop and renew this information frequently. Teaching science and technology to individuals help them to learn how adopt and adapt an inclination which enforces them to think objectively and make the right decision confronting different events and situations. This inclination provides a comfortable life for them as well as for their family and their environment (Akgün, 2001). If students learn science using a scientific procedure and skill, they would be able to use these procedures and skills in their daily life. In this procedure, while students’ attitudes towards science increase, they develop their creativity skills. During the primary educational period, courses on science and technology achieve a great importance comparing to the other courses since these courses teach students the environment, natural events and the scientific developments as well as critical thinking and problem solving. (Kaptan, 1999).

An attitude is an inclination to gaining a skill and is identified as an individual characteristic that provide a background for accepting a positive subject or denying a negative one. Thus, by improving a positive attitude among students towards science, while we can increase students’ attitudes towards science and led them to choose employment related to professional careers. Studies concerning the effects of the attitudes on learning the science depict a significant role (Altınok, 2004) among students resulting in their success (Martinez, 2002), (Dieck, 1997), and also motivates them to continue to work in fields related to science (Parker & Gerber, 2000; Mattern & Schau, 2002). Some studies have proved that positive attitudes towards science have affected the learning process (Simpson ve ark., * International Cyprus University, oserin@ciu.edu.tr, North Cyprus
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1994; Weiss, 1987; Koballa, Crawley ve Shrigley, 1990, IAEP, 1992; Linn, 1992; Çakır ve ark., 2000; Saracoğlu, Serin ve Bozkurt, 2001; Altınok, 2004; Sünbül ve ark., 2004; Karaer, 2005; Şenol, Bal ve Yıldırım, 2007). As a result, it is necessity to examine the second level of primary students’ attitudes towards science and their science achievements, since they are going to be effective in the life of the next generation. Thus, this study inspired by this necessity, is going to examine the second level of primary students’, the 8th graders’ attitudes towards science and their science achievements in Izmir city’s primary schools by applying many different variables and the research questions of this study is posed as the followings.

1.1. RESEARCH QUESTION

Is there any significant relationship between the primary school students’ attitudes towards science and their science achievement?

1.1.2. SUB-QUESTION

The following sub-questions has been provided to develop solutions to the above mentioned research question.

Sub-questions related to the primary school students’ attitudes towards science are:
   a. Whether there is a change concerning the sex of the subjects.
   b. Whether there is a significant change regarding the socio-economic level of students’ parents
   c. Whether there is a change considering the perception of their teachers
   d. Whether there is a change considering the perception of achievement of science
   e. Whether there is a significant relationship between the primary school students’ attitudes towards science and their science achievement

2. METHODOLOGY

2.1 POPULATION AND SAMPLING

The population of the research encompasses the students of primary school students and the population of this study includes the primary school students of Izmir city. The sampling of the study is consisted of 330 subjects of whom % 64.2 (n=212) are female and % 35.8 (n=118) are male chosen by applying random sampling method.

2.2 DATA COLLECTION DEVICES

The study has applied ‘The Scale of Attitudes towards Science’ developed by Baykul (1990). The Cronbach Alpha validity of the scale is 0, 92. The scale consisting of 30 positive and negative sentences is scored totally by reversing the negative sentences. The highest and lowest score are 150 and 30, respectively, and the highest scores show the positive attitudes. On the other hand, 6 questions about participants’ individual characteristics have been incorporated in the scale.

2.3. DATA ANALYSIS AND INTERPRETATION

We have achieved the percentage of the data on the bases of the aims of the study and a one-way ANOAV, t and Schaffer significant tests, and also Pearson correlation coefficient have been measured. In the study, the significant level has been scored as .05.

3. FINDINGS AND INTERPRETATION

This section encompasses the findings and the analysis considering the research question and sub-questions.

3.1. FINDINGS CONSIDERING THE FIRST SUB-QUESTION:
The first sub-question of the study has been posed as “whether there is a change in the second level of primary school student’s attitudes towards science and their science achievement considering their sex.

Table 1: The distribution of the mean score of students’ attitudes on science considering their sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>n</th>
<th>( \bar{X} )</th>
<th>sd</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>212</td>
<td>99,14</td>
<td>22,77</td>
<td>3,31</td>
<td>.001*</td>
</tr>
<tr>
<td>Male</td>
<td>118</td>
<td>107,89</td>
<td>23,39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*\( p<.01 \)

Analyzing the mean scores of the second primary school students’ attitudes towards science considering the sex variable depicted a significant change \( t=3,31, p<.01 \). According to this analysis, the attitudes of male students’ attitudes are more positive than female students.

3.2. THE FINDINGS CONCERNING THE SECOND SUB-QUESTION

The second sub-question of the study has been posed as “whether there is a change in the second level of primary school student’s attitudes towards science and their science achievement considering the socio-economic status of their parents.

Table 2: The distribution of the mean score of students’ attitudes on science considering their parents’ socio-economic status

<table>
<thead>
<tr>
<th>SES</th>
<th>n</th>
<th>( \bar{X} )</th>
<th>sd</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>74</td>
<td>103,91</td>
<td>24,84</td>
<td>6,43</td>
<td>.002*</td>
</tr>
<tr>
<td>Middle</td>
<td>222</td>
<td>99,82</td>
<td>22,79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>34</td>
<td>114,70</td>
<td>19,50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>330</td>
<td>102,27</td>
<td>23,33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*\( p<.01 \)

Analyzing the mean scores of the second primary school students’ attitudes towards science considering the socio-economic status of their parents (SES), the results showed in Table 2 depicted a meaningful change. In order to determine the group made this change, the Scheffe’s tests has been implemented and it has been proved that this groups were from middle to low of SED group students.

3.3. THE FINDINGS CONCERNING THE THIRD SUB-QUESTION

The third sub-question of the study has been posed as “Whether there is a meaningful relationship between the scores of primary school students’ attitudes towards science and their science achievement considering their perception of their teachers’ attitudes towards themselves.

Table 3: The distribution of the mean score of students’ attitudes on science considering their teacher’s attitudes

<table>
<thead>
<tr>
<th>Teacher A.</th>
<th>n</th>
<th>( \bar{X} )</th>
<th>sd</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorizer</td>
<td>111</td>
<td>102,33</td>
<td>17,57</td>
<td>28,78</td>
<td>.000*</td>
</tr>
<tr>
<td>inattentive</td>
<td>42</td>
<td>79,52</td>
<td>18,49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Democratic</td>
<td>177</td>
<td>107,63</td>
<td>24,35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>330</td>
<td>102,27</td>
<td>23,33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*\( p<.001 \)

Analyzing the mean scores of the attitudes in order to measure the students’ perception of their teachers’ attitudes towards themselves the one-way variance is examined and the results showed that
there is a meaningful change in the perception level of students’ attitudes towards their teachers (F=28.78, p<.001).

In order to determine the groups making the change, the Scheffe’s test has been implemented. Therefore, the changes are between the groups perceiving their teachers’ attitudes as democratic with students who perceive their teachers’ attitudes as authorizer and careless. This change was in the favor of students perceiving their teacher’s attitudes as democratic.

3.4. THE FINDINGS CONCERNING THE FOURTH SUB-QUESTION

The 4th sub-question of the study has been posed as “whether there is a relationship between the second level of primary school students’ attitude scores and their science achievement and whether there is a change in the perception level of science achievement.

Table 4: The distribution of the mean score of students’ attitudes on science and their science achievement

<table>
<thead>
<tr>
<th>Success</th>
<th>n</th>
<th>X</th>
<th>sd</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good</td>
<td>154</td>
<td>110.68</td>
<td>23.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>122</td>
<td>100.63</td>
<td>21.11</td>
<td>37.54</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Week</td>
<td>54</td>
<td>81.98</td>
<td>13.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>330</td>
<td>102.27</td>
<td>23.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In order to measure students’ attitudes towards their science achievement, the students’ overall score has been analyzed according the one-way variance and the analysis depict a meaningful change among student’s attitudes toward science and mathematic (F=37.54, p<.001). The Schefe’s test was implemented in order to determine the group making the change. Therefore, it is understood that the change is between the week group considering the achievement level and this is in the favor of the group having a positive perception.

3.5. THE FINDINGS CONCERNING THE FIFTH SUB-QUESTION

The fourth sub-question of the study has been posed as “whether there is a relationship between the second level of primary school student’s attitude scores and their science achievement. The mean scores of the whole sampling considering their science attitudes and their science achievement is analyzed and the correlation coefficient of r=.238 (p<.001) was measured.

4. DISCUSSION

The positive findings related to students’ science attitudes considering the sex of the subjects, in which the male attitudes was more than the female ones, showed a change which is supported by other research findings (Simpson & Oliver, 1985; Schibeci & Riley, 1986; Kurth, 1987; Mullis & Jenkins, 1988; Breakwell & Beardsell, 1992; Simpson & al, 1994; Weinburgh, 1995; Kanai & Norman, 1997; Francis & Greer, 1999; Yaman & Öner, 2006; Türkmen, 2008). Moreover, the researches conducted by Berrington & Hendricks (1988), Shepardson & Pizzini (1990), Stables (1990), Germann (1995), Houtz (1995), Boone (1997), Neathery (1997), Türkmen (2002), Bilgin & Geban (2004), İpek & Bayraktar (2004), Altunok (2004) proved that the attitudes towards science has not been changed considering the sex of the subjects. Many research conducted by Baker (1983), Hofstein, Maoz & Rishpon (1990), AAUW (1992), Greenfield (1996), Kanai & Norman (1997), Francis & Greer (1999) proved that the attitudes toward science was higher among the first level of the primary students and the changes is observed in the second level of primary students’ attitudes considering the sex of the subjects which begins in this period and is seen very frequently.

This finding is considered very interesting since it showed that students with low socioeconomic situations have positive attitudes. This situation forces us to think that the subjects with week socioeconomic situations have not any choice but having positive attitudes towards the courses and school. The findings of this study are in consistency with the findings of the research done by Miller-Whitehead (1999), Serin & et al. (2003), but contradict with the findings of a research done by Hammrich (1998), Saracaloğlu, Serin & Bozkurt (2001). This is because of this fact is that these
researches have been done on different age, culture, and level of students. Moreover, these researches have been applied to the university students’.

Those group of students who comprehend a democratic attitudes towards themselves in had more positive attitudes comparing to those who comprehend an authorizer and carless, and this depicted that teachers attitudes in the primary schools influences students attitudes. The findings of this study contradict with the results of study done by Serin (2001) on university students’, and this contradiction resulted in Serin’s (2001) selection of university students’ as sampling. Researches on teacher trainee students (Hasan, 1985; Young & Kellogg, 1993; Talsma, 1996; Serin & et al., 2003) showed that they have been influenced by their primary and secondary school science teachers which confirm the results of this study.

Those students’ with science achievements of “average” and “good” have positive attitudes toward science. When we take into consideration the positive attitudes of students’ academic background, we will see that this finding is a sign of natural procedure. The findings of this study are in contradiction with a study done by Serin (2001), but confirm and are in parallel with results of the research done by Saracaloğlu & et al. (2002), on high school students’ attitudes.

The correlational coefficient of students participating in the sampling of the study is measured and the relationship between their attitudes on science and their science achievements is show as $r=.238$ ($p<.001$). Thus, it can be said that there is a meaningful relationship between the students’ attitudes towards science and their science achievements. Moreover, the results is confirmed by the other studies implemented by (Bloom, 1979; Schibeci & Riley, 1986; Baykul, 1990; Berberoğlu, 1990; IAEP, 1992; Simpson & et al., 1994; Soran & Oruç, 1994; Weinburgh, 1995; Neatherly, 1997; Simpson & et al., 1994; Çakır & et al., 2000; Saracaloğlu, Serin & Bozkurt, 2001; Saracaloğlu & et al., 2002; Altnok, 2004; Sünbül & et al., 2004; Karaer, 2005; Durmaz & Özyıldırım, 2005; Şenol, Bal & Yıldırım, 2007) as well as those studies showed that the attitudes affected the achievement and the achievement affecting the attitudes (Mdletshe & et al., 1995; NFER, 1996; ). In fact, studies depict that there is a proportionate relationship between students’ attitudes towards the course and their achievement (Koballa, 1988; Baykul, 1990). Moreover, the positive attitudes towards science affect students’ achievement.

4. CONCLUSION AND RECOMMENDATIONS

The main purpose of this study was based on the idea that there is a relationship between the second level of the primary school students’ attitudes on science and their science achievement, therefore, the results of the study showed that the subjects’ attitudes towards science had a meaningful change considering the sex, the parents’ sosyo-economic status, the perception level of students’ in understanding their teacher’s attitudes and their science achievement. Moreover, the findings of the study proved that there is a significant change, $r=.238$ ($p<.001$), between the students’ attitudes towards science and their science achievement.

To sum up, the attitudes of the second level of the primary students’ towards science, generally, was “highly positive “($\bar{X}=102.27$)” and their science achievement level was “very good ($\bar{X}=3.23$)”. Moreover, the existence of a meaningful positive correlation between the attitudes and achievement proves that the positive attitudes towards the science affected positively the science achievements of the students. Considering the findings of the study, the following recommendation has been developed:

- In class activities, the importance should be given to learning-teaching status in order to prove students to learn the subject completely, and giving more time to individual activities would help students to improve positive attitudes towards learning the science.
- Students should be provided a chance to see and visit the science and natural museums.
- Therefore, students will be interested in these activities and will improve positive attitudes.
- In order to improve positive attitudes towards science, aims concerning the perception and senses should be incorporated in the curriculum and tried to be transformed to behavior.
The studies examining the students’ attitudes and their science achievement should be implemented to other groups with different age, class and departments.

Studies determining the teacher’s attitudes towards students can be recommended.

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