INVESTIGATION OF SCIENCE AND TECHNOLOGY TEACHERS’ ATTITUDES TOWARDS TECHNOLOGY IN TERMS OF GENDER AND YEARS OF TEACHING EXPERIENCE

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Abstract
In this study, it is aimed to determine science and technology teachers’ attitudes towards technology in terms of their gender and years of teaching experience. In 2009-2010 academic year, 64 science and technology teachers attended the study from the province of Burdur (in Turkey). Teachers’ attitudes towards science were investigated by using “The scale of attitude towards technology” which adapted the Turkish by Akbaba (2002). The data were analyzed by using “SPSS 16 Statistical Package Program”. According to the results of the analysis, science and technology teachers’ general points of attitudes towards technology are in medium level. In terms of gender variable, there is no significant difference between teachers’ attitudes towards technology. Besides, teachers who have worked over 20 years have low points of attitudes towards technology as compared with other teachers.

Key Words: Science and Technology Teacher, Attitude towards Technology, Science and Technology Literacy

INTRODUCTION

Domination of technology is an undeniable fact in our lives. This domination shows itself in many areas. Technology has made a rapid entrance at health, agriculture, industry and social life, in parallel with educational environment. So technology is increasingly becoming a part of the educational environment and integration is a relatively recent demand (Wood et al., 2005). As for the growing needs of the education sector, many technological materials related to instructional technologies and facilitating educational process and improving the quality entered the system with this demand. With causes like students’ being satisfied in accordance with their age, meeting their needs in educational process and increasing the effectiveness of teaching, everyone is in accord with the need of use of technology in the process of education (Sakalli, Bakay & Hüssein, 2008; Rohaan, Taconis & Jochems, 2010). In that respect, teachers will have to prepare and equip themselves with the relevant knowledge and skills in the educational technology-related area (Beşoluk, Kurbanoğlu & Önder, 2010).

It became obligatory for especially the teacher to learn new information technologies. The most indispensable element in technological modern education is multimedia. Multimedia (Multi-media applications) consists of using a combination of audio, video, images, and written texts to explain a subject. Multi-media application is using the different data types to explain an event, place or topic in computer environment (İspir, Furkan & Çitil, 2007). Besides, the materials such as copiers, projectors, fax and printer devices take their place as the materials that improve the quality of the education and training. A teacher should know how to use technology in education, how to provide more active environments for students and how to provide a meaningful learning. For that reason, teachers should be in a self-development effort (Çepni, Ayvacı & Bacanak, and 2009:71). In the Turkish new curriculum, constructivist learning approach is taken to the centre, student-centered education is defended, the curriculum’s vision is determined as science and technology literacy, also science process skills and the Science-Technology-Society-Environment relationship is brought to the fore. Consequently, education needs to adapt to this increasing importance of technology, and educational programs should be aimed at developing pupils’ technological literacy (Rohaan, Taconis & Jochems, 2010).
The effective use of technology enables teachers to facilitate and adjust their instructional strategies to optimize students' learning (Teo, Lee & Chai, 2008). In this respect, when teachers' role and activity in the process is taken into account; it is important to know teachers' interest in technology and their attitudes, affective features towards technology (Erkan, 2004; Rohaan, Taconis & Jochems, 2010). Kagan (1992) noted that teachers' beliefs appear to lie at the heart of teaching and tend to be associated with a congruent style of teaching. Teachers' beliefs, attitudes and emotions also build the meanings they bring to innovations such as technology integration. Hence, changes to teaching style, as might be required by working with technology, may necessitate changes to teachers' beliefs (Albion, 2002).

As related to the research topic, Zammit (1992) found that a major obstacle to successful technology integration was the lack of teacher confidence and skill when using technology. Supporting this result, in the study of Akpinar (2003) where he studied the level of primary and secondary school teachers’ using the technological opportunities, it is concluded that half of teachers do not use computers for educational purposes in activities outside the classroom and almost half of them never use computer software in educational activities. Again in another study (Erdemir, Bakır & Eyduran, 2009), pre-service teachers state that they do not feel themselves adequate for using internet and computer for the purpose of teaching, while they feel that they are adequate for using search engines; they can prepare basic materials for teaching but not complex and multi-purpose educational devices. In a study made about pre-service education specialists by Akkoyunlu (1996), it appears that experience of the computer reduces computer anxiety and positively effects computer love, confidence in the computer and believes in the benefits of computer. For instance, Yılmaz (2010), regarding the attitudes toward technology, has found that technology-supported project works of pre-service teachers develop attitudes towards technology positively. Pre-service teacher, depending on positive attitudes, share the idea of necessity to use technological tools such as computer, overhead projector, projection equipment, TV, DVD, slides, radio equipment in education process. In parallel, Sakalli, Bakay and Hüssein (2008) has discovered that most of the primary school teachers who work in TRNC on the new educational technologies use educational technologies and that they do not experience any problem in using.

Taking the studies examined into account, it is found that teachers’ using the developing technology in the field of education is based on their adopting the technology and showing positive attitudes towards technology. In education, showing teachers’ and pre-service teachers’ attitudes towards educational technologies is important and required in terms of provision of necessary conditions for the use of new technologies more efficiently and effectively (Pala, 2006; Çelik, 2007).

**Purpose of the Study**

In benefiting from new technologies in educational activities, teachers' attitudes towards technology are also very effective as equipping the educational institutions with technological facilities. It is the teachers that will provide extension of the use of educational technology and make the students get used to it. With this respect, in this study, it is aimed to determine science and technology teachers’ attitudes towards technology in terms of their gender and years of teaching experience.

**METHOD**

**Model of the Study**

The study is a survey study looking at whether there are differences in science and technology teachers’ attitudes towards technology based on gender and years of teaching experience. In this regard, teachers' attitudes towards technology are investigated by using the attitude towards technology scale.
Participants

In 2009-2010 academic year, 64 science and technology teachers attended the study from the province of Burdur (in Turkey). The participants are determined according to the “criterion sampling method” (Patton, 2002: 238) which is in purposed sampling method. The criteria determined for this sampling is the science and technology teachers' teaching the course of science and technology in 6th, 7th and 8th grades and their being volunteers. 27 teachers are male and 37 teachers are female of 64 teachers who the study is applied to. In addition, the teachers’ experience range is between 0-31 years. Teachers' years of experience in the profession are grouped as; 0-5 years (26 teachers), 6-10 years (10 teachers), 11-15 years (12 teachers), 16-20 years (7 teachers), 20-31 years (9 teachers).

Data Collection Tool

Teachers’ attitudes towards science were investigated by using “The scale of attitude towards technology” which is adapted to Turkish by Akbaba (2002). This scale is a five likert-type and consists of 37 items. In the reliability study of the scale conducted by Akbaba (2002), “Cronbach alpha coefficient” is found to be .91 for the total scale. Original of this scale has been prepared for managers and this scale is used in different searches for teachers, pre-service teachers and academicians (Kisa & Kaya, 2006; Ekici, 2008; Yilmaz, 2008).

Data Analysis

Science and technology teachers’ responses to the questionnaire items were assigned scores ranging from 5 to 1. The data obtained in this way were analyzed through “Statistical Package for Social Sciences (SPSS) 16.0 software”. An independent t-test was carried out to determine the impact of gender on teacher’ attitude towards technology, and One Way ANOVA was employed to find the effects of years of teaching experience on the attitudes towards technology. Also in order to determine differences between the groups “the Post Hoc Tukey HSD” test was used. The significance level was decided as .05 in all analysis.

FINDINGS

Science and technology teachers’ general attitudes towards technology and also the issue whether teachers’ attitudes differ according to gender and years of teaching experience or not have been investigated in the study. The maximum score that teachers can achieve in the survey of attitudes towards technology is 185 and the minimum score is 37. Science and technology teachers’ mean attitude scores towards technology and other descriptive statistics results have been given in Table 1.

Table 1. Descriptive statistics results of the scores of science and technology teachers’ attitudes towards technology

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>( \bar{X} )</th>
<th>Min.</th>
<th>Max.</th>
<th>SD</th>
<th>Med.</th>
<th>Mod.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>64</td>
<td>161,92</td>
<td>130,00</td>
<td>182,00</td>
<td>11,38</td>
<td>163,50</td>
<td>163,00</td>
</tr>
</tbody>
</table>

According to descriptive statistics results, teachers' mean attitude scores were calculated as 161.92. In this context, science and technology teachers’ attitudes towards technology were found to be in positive level. When the standard deviation value (11.38) is considered, it is seen that teachers’ attitude scores are in a wide range. Besides that, mean, median and mode values are close to each
other in values and that shows attitude scores of teachers are in a “normal distribution” (Köklü, Büyüköztürk & Bökeoğlu, 2007: 63).

Whether the attitudes of 37 female, 27 male science and technology teachers, participated the study, towards technology differ according to gender factor or not is analyzed with “independent t-test” and the results of the analysis is given in Table 2.

**Table 2. Results of the Independent t-test on the mean attitudes scores of teachers according to gender factor**

<table>
<thead>
<tr>
<th>Gender</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>37</td>
<td>163,59</td>
<td>9,46766</td>
<td>1,387</td>
<td>.171</td>
</tr>
<tr>
<td>Male</td>
<td>27</td>
<td>159,63</td>
<td>13,42543</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Considering the mean scores of attitude towards technology of science and technology teachers, it is seen that females have a \( \bar{X} = 163,59 \) and males have a \( \bar{X} = 159,63 \) score. According to Independent t-test results, a significant difference was not found between the scores of female and male science and technology teachers’ attitudes towards technology (t (62) = 1,378, p > .05). In this context, it can be said that gender does not create difference in teachers’ attitudes towards technology.

Whether science and technology teachers’ attitudes towards technology differ according to years of teaching experience or not is analyzed by One Way ANOVA test. Teachers’ years of teaching experience are examined in 5 groups (0-5, 6-10, 11-15, 16-20, 21-31) and the results are given in Table 3.

**Table 3. Results of One Way ANOVA on the mean attitudes scores of teachers according to teachers’ experience years**

<table>
<thead>
<tr>
<th>Class Level</th>
<th>N</th>
<th>( \bar{X} )</th>
<th>SD</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 years</td>
<td>26</td>
<td>167,58</td>
<td>8,1789</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10 years</td>
<td>10</td>
<td>168,50</td>
<td>6,1147</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-15 years</td>
<td>12</td>
<td>160,17</td>
<td>5,5569</td>
<td>18,96</td>
<td>.000</td>
</tr>
<tr>
<td>16-20 years</td>
<td>7</td>
<td>158,86</td>
<td>9,2993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-31 years</td>
<td>9</td>
<td>143,00</td>
<td>9,3675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>161,92</td>
<td>11,3799</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 3., when attitude scores are compared, science and technology teachers with 6-10 years of teaching experience have the highest mean scores of attitude (\( \bar{X} = 168,50 \)), and teachers with 21-31 years of teaching experience are found to have the lowest mean scores of
attitude ($\bar{x}=143.00$). According to One way ANOVA test results, it is found that teachers’ attitudes towards technology differ in terms of years of teaching experience ($F(4,59)=18.96$, $p<.00$).

Because of the fact that the teachers’ attitudes towards technology show a normal distribution, the groups in which there are significant differences are evaluated using the "Post hoc Tukey HSD" test. The results of the group of teachers that significant difference is found between are shown in Table 4.

**Table 4. Results of Post hoc Tukey HSD test on the mean attitudes scores of teachers according to years of teaching experience**

<table>
<thead>
<tr>
<th>(J)</th>
<th>(I)</th>
<th>Mean difference (I-J)</th>
<th>SE</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 years</td>
<td>21-31 years</td>
<td>24,577</td>
<td>3,008</td>
<td>,000</td>
</tr>
<tr>
<td>6-10 years</td>
<td>21-31 years</td>
<td>25,500</td>
<td>3,574</td>
<td>,000</td>
</tr>
<tr>
<td>11-15 years</td>
<td></td>
<td>17,167</td>
<td>3,430</td>
<td>,000</td>
</tr>
<tr>
<td>16-20 years</td>
<td></td>
<td>15,857</td>
<td>3,920</td>
<td>,001</td>
</tr>
</tbody>
</table>

As shown in Table 4., significant differences are found between attitude scores of teachers who have 21-31 years of teaching experience and mean attitude scores of groups formed according to other all teaching years of experience ($p<.05$). In this regard, attitudes towards technology of science and technology teachers with over 20 years of teaching experience can be said to be lower than other teachers’ attitudes towards technology.

**CONCLUSION AND DISCUSSION**

Considering the overall mean scores of science and technology teachers towards technology, it is seen that teachers develop a positive attitude towards technology in a middle level. When we consider the studies on the subject, it has been revealed that teachers, pre-service teachers and the teaching staff have positive attitudes towards technology (Volman & van Eck, 2001; Ekici, 2008; Yılmaz, 2010). In a similar study, Erkan (2004) has observed that educators have highly positive attitudes towards computer and besides, young teachers have higher attitudes. Also Erkan (2004) has stated that teachers, who have computer experience, have more positive attitudes towards computer. There are also many studies revealing that technology experience positively affects the attitudes of teachers and pre-service teachers (Eastin & La Rose, 2000; Tsai, Lin and Tsai, 2001; Wood et al., 2005; Pala, 2006; Aral et al., 2007).

Also in the study, it is found that the teachers’ attitudes towards technology change depending on years of teaching experience. Science and technology teachers who have over the 20 years of teaching experience have attitudes at a lower level towards technology than other teachers. Because of the fact that technology is newly developing and used actively in education, science and technology teachers cannot develop themselves by getting benefit from a variety of opportunities and this situation is thought to affect the attitudes of teachers towards technology. Parallel to the study, it is seen in many studies that young teachers who have less years of teaching experience develop more
positive attitudes towards technology. While Ekici (2008) has found that teachers with seniority of 10 years and under have more positive attitudes, Beşoluk, Kurbanoğlu and Önder (2010) found that teachers with over 15 years of experience scored significantly lower than teachers with 0-15 years of experience. Teachers that have less than 15 years experience and pre-service science teachers are more familiar to these technologies due to the new curriculum change in the education faculties and in service training. Also in service teachers’ perceptions about the use of technology were consistently higher than the pre-service teachers’ perceptions. Besides that, some researchers (Pala 2006; Aral et al., 2007; İspir, Furkan & Çitil, 2007) have concluded that teachers’ attitudes towards educational technologies do not change according to variables such as age, type of school, branches and schools they work at.

Another conclusion of the study is that gender does not make difference in science and technology teachers’ attitudes towards technology. With the start of the increasingly use of technology in our country by men and women equally, gender gap in technology-related issues began to disappear and in this regard, it may be considered that gender does not make a difference in attitudes towards technology. Parallel to the study, Yılmaz (2008) has concluded that there is a difference between attitude scores according to the age variable but not according to the gender. Similarly, many studies also concluded that the gender variable does not make a difference in attitude towards technology (Pala, 2006; İspir, Furkan & Çitil, 2007; Gök & Erdoğan, 2010). Besides that, contrary to conclusions of these studies, Ekici (2008) has revealed that both male teachers’ and male pre-service teachers’ attitudes are more positive than female teachers’ if we evaluate teachers’ attitudes towards technology in terms of gender.

Suggestions

Taking into account that attitudes of science and technology teachers with many years of teaching experience towards technology are low, it is thought to be necessary to introduce the technological applications to teachers in class meetings, in-service training and seminars and give support for the effective use of tools related to educational technology, increase levels of technology application and attitudes towards technology.

By providing information on new technological developments and opportunity of application periodically to science and technology teachers and pre-service teachers can make them develop more positive attitudes towards technology and thus increase the quality of education through more active and effective use of technologies concerning education and training.

Science and technology teachers can be supplied with a variety of technological tools and computer especially that they can get benefit in times of school and out of school with the condition of taking them back in each term. In this context, the teachers can follow technology and develop their attitudes towards technology; and in parallel, the removal of at least one of the obstacles in the use of technology and education may be provided. Besides, it will be easier this way for teachers to reach online systems through which they can get support on internet.

References


