GENDER DIFFERENCES IN TERMS OF TEST ANXIETY AND ATTITUDE TOWARDS SCIENCE

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ABSTRACT

This study was conducted to evaluate gender differences in terms of test anxiety and attitude towards science. Test Anxiety Inventory was used to measure test anxiety of the science students while Test of Science-Related Attitudes was used to measure their attitude. Both the instruments were administered on 1,885 secondary school science students in the Punjab province of Pakistan. ANOVA was used to find the gender differences. For the strength of ANOVA, Eta square values were also included. The results of the study indicated that females had higher test anxiety and more positive attitude towards science than males.

KEYWORDS: Gender, Test Anxiety, Attitude towards Science

INTRODUCTION

Many students face different situations of anxiety during their examinations. According to Sarason and Stoops (1978), anxiety has negative effects during their examinations. Duesek (1980) has defined test anxiety as “An emotional state that has psychological and behavioral concomitants, and that is experienced in formal testing or other evaluative situations” (p. 88). According to Sarason (1984) test anxiety is “A widely studied personality variable in part because it provides a measure of the personal salience of one important definable class of threatening situations in which people are evaluated” (p. 292).

According to Liebert and Morris (1969), worry and emotionality are two major components of test anxiety. But according to Unruh and Lowe (2010), there are four components of test anxiety which are: worry, cognitive interference, emotionality and lack of self-confidence. But worry and emotionality are major components. Lufi, Okasha, and Cohen (2004) have stated that worry is cognitive distress. On the other hand, emotionality is the effective distress.

Like test anxiety, attitude also has effect on the students in the subjects of science. The term attitude is often used in the daily life of the students. Similarly, the term attitude towards science is very important in the field of science education (Osborne, Simon, and Collins, 2003).

Gardner (1975) has defined attitude towards science as “a learned disposition to evaluate in certain ways, objects, people, actions, situations or dispositions involved in learning science” (p. 2). Similarly, Osborne et al. (2003) gave the definition of attitude as “the feelings, beliefs and values held about an object that may be the enterprise of science, school science, the impact of science on society or scientists themselves” (p. 1053).

Osborne et al. (2003) have described that there are different components of attitude towards science. Some of these are anxiety towards science, self-esteem, motivation, enjoyment of science, attitude of peers towards science, classroom environment, and achievement in science.
OBJECTIVES OF THE STUDY

The objectives of the study were:

• To investigate the differences of students’ test anxiety on the basis of gender.
• To evaluate the differences of students’ attitudes toward science on the basis of gender.

RESEARCH QUESTIONS

Following research questions were formulated on the basis of above mentioned objectives:

• Are there differences in students’ test anxiety on the basis of gender?
• Are there differences in students’ attitude towards science on the basis of gender?

METHODOLOGY

Population

The population of the study consisted of all 10th grade male and female science students studying in public secondary and higher secondary schools in all the districts of Punjab province. These students were studying Physics, Chemistry, Biology and Mathematics as science subjects at secondary level. Some of the students were studying Electrical Wiring and some Computer Science instead of Biology. But the number of students studying Electrical Wiring or Computer Science was very low. So, these students were ignored due to their very low number.

Sample

There are 36 districts of Punjab province and 4,482 public secondary schools are present in these 36 districts (Shami, 2005). It was very difficult to collect data from such a large population. So, sample was selected from this population. For the purpose of sample selection, multistage technique was used. Tashakkori and Teddlie (2003) have described that this technique is widely used in the world because it involves “selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion of every member of the population is determinable” (p. 713).

The data was collected, in the present study, from four districts of Punjab province in Pakistan. These four districts are Okara, Faisalabad, Sargodha, and Pakpattan. Total number of students selected for the sample were 1,885 studying science subjects at secondary level. Among these 1,885 students, 998 were male students and 887 were female students.

Research Instruments

Students’ test anxiety was measured by using Test Anxiety Inventory (TAI: Spielberger, 1980). This instrument consists of 20 items with 3 subscales. These subscales are: Test Anxiety Worry, Test Anxiety Emotionality, and Test Anxiety Total. According to Chapell, Blanding, Silverstein, Takahashi, Newman, Gubi, and McCann (2005), “Test Anxiety Inventory is the most important and widely used instrument for the measurement of high school and college students’ test anxiety”.

On the other hand, Test of Science–Related Attitudes (Fraser, 1981) was used to measure students’ attitude towards science. According to Fraser (1981), TOSRA is designed to measure the secondary school students’ attitude towards science. There are seven scales of TOSRA given by Fraser. These seven scales are, “Social Implications of Science, Normality of Scientists, Attitude to scientific Inquiry, Adoption of Scientific Attitudes, Enjoyment of Science

Both the instruments were translated into Urdu language under the supervision of language and content experts. These translated versions were pilot tested on 200 science students selected from five different schools in Okara district of Punjab province. After pilot testing, factor analyses were conducted for the examination of internal structures of translated versions of Test of Science-Related Attitudes (TOSRA) and Test Anxiety Inventory (TAI). After factor analysis, all the three scales of Test Anxiety Inventory were merged into a single scale and two subscales of TOSRA: Enjoyment of Science Lessons and Leisure Interest in Science were merged into a single subscale named Classroom Enjoyment and Leisure Interest in Science.

Administration of the Instruments

The Questionnaires of Test Anxiety Inventory (TAI) and Test of Science-Related Attitudes (TOSRA) along with Demographic Information Proforma were administered on 1,885 students selected from 64 schools of four districts (Okara, Faisalabad, Sargodha and Pakpattan). The data was collected by the researcher himself. The process of data collection started in November 2008 and completed in February 2009.

DATA ANALYSIS AND RESULTS

Descriptive statistics i.e. Mean, Standard Deviation and Frequency Distributions were used for the description of trends in the data. To examine the differences in test anxiety and attitude scales, the data were analyzed with one-way ANOVA. In order to measure the magnitudes of these differences, the effect sizes were calculated as recommended by Thompson (1998). The unit of analysis chosen was within-class subgroup mean in each case. In each category, the students were in disproportionate number in different classes, so separate means were calculated to differentiate between each category.

Table below shows the Item Mean, Item Standard Deviation for the differences in genders for four scales of TOSRA and single scale of test anxiety.

Table 1: Item Mean and Item Standard Deviation for Gender Differences (ANOVA Result and Effect Size) for Four TOSRA Scales and Single Test Anxiety Scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Item Mean</th>
<th>Item SD</th>
<th>Difference</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>F</td>
</tr>
<tr>
<td>Social Implications of Science</td>
<td>4.19</td>
<td>4.29</td>
<td>0.60</td>
<td>0.49</td>
</tr>
<tr>
<td>Attitude to Scientific Inquiry</td>
<td>3.53</td>
<td>3.76</td>
<td>0.75</td>
<td>0.73</td>
</tr>
<tr>
<td>Classroom Enjoyment and Leisure Interest in Science</td>
<td>4.09</td>
<td>4.27</td>
<td>0.63</td>
<td>0.55</td>
</tr>
<tr>
<td>Career Interest in Science</td>
<td>3.68</td>
<td>3.53</td>
<td>0.81</td>
<td>0.73</td>
</tr>
<tr>
<td>Test Anxiety</td>
<td>2.10</td>
<td>2.25</td>
<td>0.48</td>
<td>0.52</td>
</tr>
</tbody>
</table>

***p<0.01, males (n = 998); females (n = 887)

The above table shows that there was significant gender differences (p < 0.01) occurred for Test Anxiety scale and TOSRA scales (Social Implications of Science, Attitude to Scientific Inquiry, Classroom Enjoyment and Leisure Interest in Science, and Career Interest in Science). It is also clear from Table that females had more test anxiety than males. Similarly, females had more positive attitudes than males on three attitude scales i.e. Social Implications of Science, Attitude to Scientific Inquiry, and Classroom Enjoyment and Leisure Interest in Science. But in case of Career Interest in Science, males had more positive attitudes than females.
The results of the above Table also indicate that the effect size for four attitude scales and single test anxiety scale ranged from 0.18 to 0.30 standard deviations. According to Cohen (1988), effect sizes can be considered small (0.10), medium (0.25), or large (0.40). According to this criterion, the values of effect sizes for four attitude scales and single test anxiety scale ranged from medium to large suggesting that there were some important gender differences in attitudes of students towards science and their test anxiety.

From the above discussion, it is concluded that females had higher test anxiety and more positive attitude towards science than males.

DISCUSSIONS

The results of data analysis in the present study have shown that females had more test anxiety than males. There were significant differences between test anxiety of male and female students. The item means and standard deviations for males were 2.10 and 0.48 while for females were 2.25 and 0.52 respectively. The results of this study replicated the results of a previous study conducted by Putwain (2007). In his study, the item means and standard deviations for males were 26.33 and 8.27 and for females were 31.10 and 8.45 respectively. In some other studies (Unruh & Lowe, 2010; and Adigwe, 1997), it was concluded that females had higher test anxiety than males. Hembree (1988) meta-analyzed 562 studies from different states of America. The results of this meta-analysis were same that females had more test anxiety than males. Schwarzer (1980) conducted a longitudinal study on the students of grades 6 and 9. This study also favored the arguments that female students had more test anxiety than males.

Like test anxiety, gender differences in terms of attitude towards science were also a part of this study. Females had more positive attitudes towards science than males on three scales of TOSRA i.e., Social Implications of Science, Attitude to Scientific Inquiry, and Classroom Enjoyment and Leisure Interest in Science. But in case of Career Interest in Science, males had more positive attitudes than females. Similar results were also concluded by Rana (2002) in the same Pakistani context. According to him, the females had more mean scores than males on the scales of Social Implications of Science, Attitude to Scientific Inquiry, Adoption of Scientific Attitudes, and Enjoyment of Science Lessons. On the other hand, males had higher means than females for Normality of Scientists, Leisure Interest in Science, and Career Interest in Science. The present study is the replication of Rana’s study as it was also conducted in the same province of Punjab in Pakistani context. The meta-analysis of different studies by Weinburgh (1995) had shown that females had more positive attitudes towards science than males. But there were some contradictions with a study conducted by Simpson and Oliver (1990). According to them, male students had more positive attitudes towards science than females.

REFERENCES


