EFFECT OF CONTEXT-BASED QUESTIONS ON SECONDARY SCHOOL STUDENTS' TEST ANXIETY AND SCIENCE ATTITUDE

Abstract. *The context-based questions have promise and potential to reduce the test anxiety of students and improve their attitudes towards science. The purpose of this research was to investigate the effect of context-based questions on test anxiety and science attitude of students. The research design employed was a quasi-experimental equivalent control group with a pre-test and post-test design. Samples were 70 secondary school students, selected from the 185 seventh grade students at a public school in Turkey. Test Anxiety and Science Attitude Scales were used to measure their test anxiety and attitude towards science, respectively. The results of the data analysis indicated that the context-based questions significantly reduced the test anxiety of the students in the experimental group and improved their attitudes towards science. In contrast, the conventional questions increased the test anxiety of the control group students, but no significant effect in science attitude was found among them. Further, the results showed that there was a relationship between the pre- and post-test scores of the test anxiety and science attitude of both the experimental and control groups.*

Key words: *attitudes, context-based questions, conventional questions, secondary school students, test anxiety.*

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Introduction

In the education systems of Turkey as well as many countries in the world, the outcomes of students are generally evaluated by using standardized tests. Tests and examinations at all stages of education, especially at the secondary and higher levels, have been considered powerful decision-making tools in assessing skills and abilities in competitive societies such as ours (Rana & Mahmood, 2010). Research has demonstrated, though, that high-stakes testing has adverse effects on students, such as illness, anxiety, and heightened stress (Colwell, 2013; Miller, Linn, & Gronlund, 2009; Triplett, Barksdale, & Leftwich, 2003). Moreover, many parents and educators believe that standardized tests create anxiety and tension in students (Mulvenon, Stegman, & Ritter, 2005).

Anxiety, as a concept, is commonly referred to as an unpleasant emotional state characterized by excessive degrees of fear, worry, and apprehension without a specific object or cause; it is initiated by feelings as a response to a perceived threat (Casbarro, 2005; Putwain, 2008). Skinner, Furrer, Marhcund, and Kindermann (2008) indicated that anxiety is strongly related to perceived control, so that students who are low in perceived control are more at risk of escalating anxiety (Colwell, 2013). During tests and examinations, many students are exposed to different kinds of anxieties. One of these, test anxiety, is considered a special case of anxiety that occurs in an assessment context or evaluative situation. Two very important definitions of test anxiety were given by Wine (1971) and Zeidner (1998). Wine (1971) defined it as a person's response to the nervousness induced by the testing situation, characterized by negative self-centered thoughts and statements. Meanwhile, Zeidner (1998) defined test anxiety as phenomenological, physiological, and behavioral responses that accompany concern about negative consequences or failure in an evaluative situation. Similarly, Hong (1998) regards test anxiety as a complex, multidimensional construct involving cognitive, physiological, and behavioral reactions to

evaluative situations (Ali & Mohsin, 2013). According to Olatoye and Afuwape (2003), test anxiety is a psychological condition in which a person experiences distress before, during, or after an exam or other assessment, to such an extent that the anxiety causes poor performance or interferes with normal learning (Olatoye, 2009). Mitchell (2002) identifies two causes of test anxiety: *(a)* the lack of preparation due to time mismanagement, the failure to learn the text material, and poor study habits; and *(b)* students' worries about their performance in previous examinations, the performance of friends, and the negative consequences of failure.

Obviously, test anxiety can be considered a major cause of students' low academic achievement and negative attitudes in science education. Sarason and Stoops (1978) have shown that test anxiety has a negative effect on students, in different degrees, during an examination. Low achievement does not necessarily mean that the student is not intelligent; it may simply be the result of test anxiety (Ali & Mohsin, 2013). Attitude has also been shown, experimentally, to influence students' achievement in the teaching and learning processes. Attitude is a hypothetical construct and it is generally regarded as having been acquired. Several definitions of the concept have been suggested. Triandis (1971) defined attitude as an idea charged with emotion, which predisposes a class of actions to a particular class of social actions. According to Eagly and Chaiken (1993), attitude is the expression of a psychological tendency that measures the degree of "like" or "dislike" of a particular entity. Furthermore, Oskamp and Schultz (2004) regard attitude as a predisposition to respond in a positive or negative manner to a particular object or class of objects.

Students' attitudes towards science have been known to dictate their interest in, or feeling about studying it, thus influencing their achievement in the field. Attitude refers to a student's liking or disliking science, as well as the scientific approach he or she assumes in solving problems, assessing ideas, and making decisions (Yara, 2009). Koballa and Crawley (1985) define attitude towards science as the liking or disliking of science, or the negative versus positive feelings towards it. Similarly, Osborne et al. (2003) argue that attitude comprises the feelings, beliefs, and values held about an object that may be the enterprise of science, school science, impact of science on society, or scientists themselves.

There is a large volume of research on factors affecting students' attitude towards science, but a limited number of studies focusing on students' test anxiety and attitudes towards science. Some research has been conducted on the relationship between test anxiety and attitude towards science, and the findings indicate a negative relationship between the two. It has also been concluded that anxiety hinders the achievement of attitudinal aims (Fraser &Fisher, 1982; Kurbanoglu & Akin, 2010, 2012; Kurbanoğlu, 2013, 2014; Sağır, 2012). Similarly, Ali and Mohsin (2013) have indicated that test anxiety is negatively correlated with the attitude of students towards science. Therefore, developing positive attitudes among students regarding science as a school subject is a major responsibility of every science teacher. Cultivating a positive attitude towards science lessons is very important for two reasons: (a) attitudes and academic achievement are closely related and (b) attitude predicts behavior (Cheung, 2009; Glasman & Albarracín, 2006). Studies have shown that students exhibiting a positive attitude towards a subject area would endeavor to behave consistently with said attitude by investing more time and effort in that area or seeking additional learning opportunities (Lindquist, 1980). In this context, attitude conceived as an outcome of education is important because it may provide a complimentary or even alternative and more long-lasting effect than examination achievement. Thus, a positive attitude towards a subject may be a more enduring outcome than the knowledge gained in passing an examination. Researchers have suggested various means to minimize test anxiety by managing external factors such as the environment of the examination hall and behavior of the examiners; and internal factors such as the organization of questions in a test, sufficient description of the context, and clarity in the instructions. Despite these measures, it is generally agreed that test anxiety has nevertheless become a most upsetting and disruptive factor for students (Rana & Mahmood, 2010).

Being a rapidly developing country, Turkey tends to grasp all the available methods of teaching from abroad that can be adopted into its educational system. At the same time, in the teaching and learning processes, the assessment of students is an essential element (Gipps & Stobart, 2003). According to Popham (1999), assessment is an effort by classroom teachers to ascertain the status of students' knowledge, skills, and attitudes as variables of educational interest. Because assessment is considered formal and public, test anxiety among students is high. Since the students have varied backgrounds and experiences, their attitudes towards science are assumed to be varied as well. Therefore, every teacher engages in some form of assessment of the students' learning through formal or informal means, using different approaches. Thus, there is a need to conduct research in this area.

This research investigates the effects of context-based questions on the test anxiety and science attitudes

of Turkish lower secondary school students enrolled in a science course. Specifically, it attempts to determine whether context-based testing results in lower test anxiety and better attitudes towards science. Hence, the following questions were investigated: (a) Is there any effect of context based questions on test anxiety and attitudes toward science of experimental group students, (b) is there any effect of conventional based questions on test anxiety and attitudes toward science of control group students, and (c) is there any relationship between pre-post tests according to test anxiety and attitudes toward science of experimental and control group students?

Methodology of Research

Research Design

To identify the effectiveness of context-based versus conventional questions on the test anxiety and attitudes towards science of lower secondary school students, the research utilized a quasi-experimental "equivalent control group with pre-post test" design (Berg, & Latin, 1994). According to Leedy and Ormrod (2001), the equivalent control group refers to the elements of which no characteristics between two groups had a different expected value. Prior to the experimental treatment, the two groups should be similar in terms of many aspects, which is a standard assumption. The first control before treatment should confirm whether the two groups are at least similar in terms of the dependent variables under investigation. If one group receives the experimental treatment and group differences are found with respect to the dependent variable, and the research comes to the conclusion that the post treatment differences are the result of that treatment (Hossain at al., 2013). In this research, 70 full-time students from a co-educational lower secondary school in west part of Turkey constituted the sample; they were divided into two groups (control and experimental) of equal number (n=35). Initially, a test anxiety scale and attitude scale towards science were applied as a pre-test to the control and experimental groups. A quasi-experimental design was used in this research, which was shown in Table 1. The results revealed that prior to the treatment, both groups were equivalent in terms of the students' test anxiety and attitudes towards science; they started out equal before the treatment strategy was given (Table 2).

Table 1.   Pre-test and post-test control group design.

Group	Pre-test	Treatment	Post-test
EG (n=35)	$O_{1.1}$ and $O_{2.1}$	X	$O_{1.2}$ and $O_{2.2}$
CG (n=35)	$O_{1.1}$ and $O_{2.1}$	-	$O_{1.2}$ and $O_{2.2}$

Note. **EG**: *Experimental group;* **CG**: *Control group;* $O_{1.1}$ *and* $O_{1.2}$*: Test Anxiety;* $O_{2.1}$ *and* $O_{2.2}$*: Science Attitude; X: Group treatment (context-based questions); -: No treatment (conventional questions).*

Sample

The sample of the research was composed of seventh grade students enrolled in a science course (four hours per week, 16 weeks in a semester) at a state lower secondary school in the west part of Turkey for the first semester of academic year 2013-2014. Initially, a test anxiety scale was applied as a pre-test to all the 185 seventh grade students, from which a sample of 70 students with high levels of anxiety based on the test anxiety scale, expedient was selected. After dividing the sample into two groups, test anxiety and science attitude scales were subsequently applied as a pre-test, and an independent sample t-test was carried out. No statistically significant difference was found between the students' pre-test scores in terms of test anxiety (for TAS, t=-.611; p>0.05, Table 2). Only the equality of the distribution of the test anxiety scores was considered. Table 2 shows the mean scores in the pre-test.

Table 2.   Pre-test means, standard deviations, and standard error means, according to the test anxiety and science attitude scores.

	Groups	N	TAS (Mean)	SAS (Mean)	Std. Dev. (TAS)	Std. Dev. (SAS)	Std. Error Mean (TAS)	Std. Error Mean (SAS)
Pre-test	EG	35	42.28	74.94	10.88	9.43	1.84	1.59
	CG	35	40.57	81.51	12.52	11.99	2.11	2.02

Note. *TAS: Test Anxiety Scores; SAS: Science Attitude Scores.*

As shown in Table 2, the pre-test mean scores for the experimental group were 42.28 (SD=10.88) and 74.94 (SD=9.43), while those of the control group were 40.57 (SD=12.52) and 81.51 (SD=11.99). The results reveal that the difference between the pre-test mean scores (for test anxiety) of the experimental and control groups [t(68)=-0.611, p>0.05] was not significant at the 0.05 alpha level. This suggests that the test anxiety of both groups was equal at the beginning of this research.

Instrument

The Test Anxiety was measured by using the Revised Test Anxiety (RTA) scale (Benson et al., 1992; Benson & El-Zahhar, 1994). The Turkish adaptation of this scale had been done by Akın et al., (2013). The scale consists of 20 items, which are divided into four sub-scales through factor analysis. A four-point Likert-type scale is used for scoring, from 1=*almost never* to 4=*almost always*, according to the frequency with which each is experienced. A Cronbach alpha reliability coefficient of 0.89 was obtained for the test anxiety scale. In the present research, the Cronbach Alpha internal consistency reliability coefficient of the scale was calculated as 0.92 based on pre-test of test anxiety results.

The Science Attitude Scale developed by Akınoğlu (2001) was used to measure the students' attitudes towards science. This scale also contains 20 items, of which 10 are negatively keyed (items 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20). Two examples are "While trying to science lesson I am bored" (negatively keyed) and "I like science lessons more than the others" (positively keyed). Each item was rated on a five-point Likert-type scale, from 1=*strongly disagree* to 5=*strongly agree*. The higher the score, the more positive is the attitude towards science. The Cronbach Alpha internal consistency reliability coefficient of the scale was 0.89. In the present research, the Cronbach Alpha internal consistency reliability coefficient of the scale was calculated as 0.87 based on pre-test of attitude results.

Procedure

Instead of conventional science questions, using context-based questions that reflect the real world can reduce the students' test anxiety. Context-based questions can also improve their attitudes towards science and their understanding of science concepts. As part of the paradigm shift in assessment, the students' everyday life and potential experiences or other relevant world contexts have been included in their teaching and assessment. For this reason, standardized multiple-choice and open-ended questions in examinations are being replaced by structured questions that are embedded in contexts. Much research effort has therefore been invested in the use of context-based questions in teaching, learning, and assessment models in response to calls for more relevant teaching and assessment in science (Taber, 2003; Ahmed & Pollitt, 2001). Taber (2003) has determined that the shift towards more contextualized questions results in more complex questions in which students must discriminate between relevant and irrelevant information. Much work has been done in context-based teaching and the advantages have been documented (Barker & Millar, 2000; Bennett & Lubben, 2006; Demircioğlu, et al., 2013; Hofstein & Kesner, 2006; Kukliansky &Eshach, 2014; Pilot & Bulte, 2006; Ultay & Çalık, 2012). However, substantial research work is still necessary to be able to contribute to the debate on the use of context-based questions in assessment (Ahmed & Pollitt, 2001). Similarly, in science research, there are few studies on the use of context-based tests (Chu & Treagust, 2014; Fraser et al., 2012; Kaltakci & Eryilmaz, 2011; Rennie & Parker, 1996). Considering such scant research, we thus developed context-based questions for assessment based on daily life experiences, societal issues, and technological and scientific questions that were considered relevant and meaningful to students. In this case, the context-based tests were perceived to discriminate between high- and low-performing students to the extent that the low-performing students might have felt discouraged. The students' motivational level may be increased

if unit tests are structured to include context-based questions. However, this type of questions would need to be placed in different sections of the test, as mixing them has been observed to confuse students because they have to think in and out of context.

The present research used contextualized questions that applied science concepts to real-world situations that were familiar to students, often depicted in short scenarios. Various context-based tests were prepared in relation to science concepts, and the questions were mainly at the knowledge and comprehension levels according to Bloom's taxonomy. The validity of the tests was achieved by consulting 15 science teachers. With respect to reliability, different context-based tests were administered to a group of 45 students who had taken the science course in the previous year. The Kuder-Richardson formula was used for determining the reliability of the context-based tests; the resulting reliability coefficient was (α=0.68), which makes the tests satisfactorily reliable (McMillan & Schumacher, 2001). Two sample questions in the context-based and conventional tests are presented in Table 3.

Table 3.   Context-based and conventional questions.

Context-based questions	Conventional questions
1a. You went to the market with your mother and approached a vendor to buy apples. You noticed that the 3-kg apple bag elongate the spring to 15 cm. You want to get 5 kg of apples. How long should the elongation be if the vendor does not try to trick you?	1a. A 3-kg object hanging on a flexible spring (bow) extends the spring to 15 cm. What is the elongation of the spring when a 5-kg object is hung from it?
2a. An old man in your neighborhood named Ahmed makes a living by picking up pieces of old iron and selling them. The capacity of his hand weighbridge is up to 20 N of old iron. How can he change the sprung for it to be able to accommodate 50 N?	2a. How should the sprung of a weigh bridge that can weigh a maximum of 20 N be changed for it to be able to accommodate 50 N?

Before the measures were administered, the participants were informed of the purpose of this research. At the beginning of the research, test anxiety and attitude scales towards science were applied as a pre-test to the control and experimental groups (both n=35). After the pre-test, the experimental group was given context-based questions and the control group, conventional questions, in three exams over 16 weeks. The context-based and conventional questions were administered by the same teachers in one academic session. At the conclusion of the three exams, the test anxiety and attitude towards science scales were administered as post-tests to both experimental and control groups. At the end of the treatment, the data obtained from the 70 students were statistically analyzed using SPSS 13 (Statistical Package for Social Sciences).

Data Analysis

The significance level was set at .05 since this is the most used value in educational studies. In other words, the probability of rejecting the true null hypothesis (probability of making a Type I error) was set to .05 a priori to hypothesis testing. The independent-samples t-test, descriptive statistics, Two-way (2x2) mixed ANOVA and a Pearson's product correlation coefficient were calculated for participant test anxiety and science attitude scores to explore potential relationships between these variables.

Results of Research

The effect of the fact that the students applied the context-based and conventional questions to their test anxieties and attitudes towards science was examined by means of a 2x2 mixed design ANOVA test and Pearson's product correlation coefficient, and the results are reported based on the objectives stated earlier.

Table 4 contains the separate descriptive and inferential statistics for the pre-test and post-test differences of the experimental and control groups. In the experimental group, differences were found between the pre-test ($\overline{X}$=42.28; 74.94) and post-test ($\overline{X}$=38.00; 79.85) means of test anxiety and attitudes towards science. The results indicate that context-based questions reduced test anxiety and improved attitudes towards science. In the control group, differences were also found between the pre-test ($\overline{X}$=40.57) and post-test ($\overline{X}$=45.14) means of

test anxiety. Meanwhile, no difference was found between the control group's pre-test ($\overline{X}$=81.51) and post-test ($\overline{X}$=81.91) means as regards attitudes towards science. The results indicate that conventional questions increased test anxiety and showed no effects on attitudes towards science.

Table 4.   Descriptive statistics regarding pre-test and post-test.

		Tests	N	$\overline{X}$	SD
EG	TAS	Pre-test	35	42.28	10.88
		Post-test	35	38.00	10.53
	SAS	Pre-test	35	74.94	9.43
		Post-test	35	79.85	12.20
CG	TAS	Pre-test	35	40.57	12.52
		Post-test	35	45.14	12.63
	SAS	Pre-test	35	81.51	9.22
		Post-test	35	81.94	11.76

In order to find out the effect of the context based questions on students' test anxiety and science attitude scores, data were analyzed using a two-way mixed-design ANOVA. The results were shown in Table 5 and 6.

Table 5.   Two-way (2x2) mixed ANOVA for test anxiety scores of experimental and control groups.

Source of Variance	Sum of Squares	df	Mean Square	F	p	Partial eta²
Between Groups	15945	69				
Group (EG/CG)	257.857	1	257.857	1.118	.294	.016
Error	15687.143	68	230.693			
Within Groups	3570	70				
Measure (pre-post-test)	.714	1	.714	.017	.897	.000
Group* Measure	686.429	1	686.429	16.191	.000*	.192
Error	2882.857	68	42.395			
Total	19515	139				

*Note. *p<.01, **p<.05*

Notice in Table 5, the test anxiety scores of the experimental and the control group followed a different pattern through measurements ($F_{(1,68)}$=16.191; p<.05). In this regard, it could be suggested that exposing students to context based questions and conventional questions had different effects on anxiety scores. More specifically, the experimental group's pre-test mean (42.28) decreased to 38.00 in the post-test, whereas the control group's pre-test mean (40.57) increased to 45.14. That is, the results indicated that the context based questions had a significant effect in reducing test anxiety in the experimental group. In contrast, a significant increase in test anxiety was found among the control group. Thus, context-based questions had a positive effect in reducing students' test anxiety. Also, this effect was calculated by partial eta² value (η^2= .192). This value indicated that context-based questions were 19.2 % effective in reducing test anxiety.

Table 6.   Two-way (2x2) mixed ANOVA for science attitude scores of experimental and control groups.

Source of Variance	Sum of Squares	df	Mean Square	F	p	Partial eta²
Between Groups	15045.922	69				
Group (EG/CG)	655.779	1	655.779	3.099	.083	.044
Error	14390.143	68	211.620			
Within Groups	3724.5	70				
Measure (pre- post-test)	249.779	1	249.779	5.149	.026*	.070
Groups* Measure	176.064	1	176.064	3.629	.061	.051
Error	3298.657	68	48.510			
Total	18770.422	139				

*Note. *p<.01, **p<.05*

As shown in Table 6, the science attitude scores of the experimental and the control group did not follow a different pattern through measurements ($F_{(1,68)}=3.629$; p>.05). On this subject, context-based questions did not have a different effect than conventional questions in terms of the science attitude scores. Even though both groups had significantly higher scores in the post-test ($F_{(1,68)}=5.149$; p<.05; $\eta^2=.070$), it was not possible to maintain that one of the group outperformed the other. However, the results showed that there was not determined any effect on science attitude scores by using within both groups ($F_{(1,68)}=3.099$; p>.05).

To identify the correlations between the pre-test and post-test scores for the experimental and control groups, the pre-test and post-test mean scores were analyzed using a Pearson's product correlation coefficient (r). Table 7 shows the relationship between the pre-test and post-test scores of the test anxiety and attitudes towards science of the lower secondary school students.

Table 7.   Results of the correlations between the pre-test and post-test scores of the experimental and control groups.

		EG		CG	
		pre-SAS	*post*-SAS	*pre*-SAS	*post*-SAS
EG	*pre*-TAS	-.270			
	post-TAS		-.505*		
CG	*pre*-TAS			-.427**	
	post-TAS				.042

*Note. *p<.01, **p<.05*

The pre-test-determined mean scores of the experimental group indicate a low negative relationship (r=-.270, p>.05) between test anxiety and attitudes towards science, while the post-test-determined mean scores showed a significant negative relationship (r=-.505, p<.01). In the control group, there was a significant negative relationship between test anxiety and attitudes towards science in the pre-test scores (r=-.427, p<.05). Thus, the higher the test anxiety, the poorer was the science attitude, and the lower the test anxiety, the better was the science attitude. On the other hand, there was a positive relationship between test anxiety and attitudes towards science in the post-test scores (r=.042, p>.05) of the control group. Thus, the more the students worried about an examination, the higher was the score in attitude towards science.

Discussion

According to the literature, many factors can influence the achievement of students at different levels. Pintrich et al. (1993) argue that students' affective features (such as anxieties and attitudes) may shape their interest, motivation, and curiosity in learning; thus, the relationships between these affective features should be examined in detail. The test anxiety and science attitudes of students have a combined and relatively significant influence on science achievement. These two independent variables are important predictors of science achievement. The assessment strategy is also a variable to consider in the effort to ease students' test anxiety and improve their attitudes towards science. Therefore, assessment strategy is a major concern of both educators and policy planners. The present research explored the effect of context-based questions on the test anxiety and science attitudes of Turkey lower secondary school students.

In this research, significant differences were found between the pre-test and post-test means for test anxiety and attitudes towards science of the students in the experimental group. In the pre-test (before the treatment), the means for anxiety were high and for attitudes towards science, low. However, after the application, the post-test anxiety means of the experimental group were low and for attitudes towards science, high. The findings indicate that context-based questions reduced the test anxiety of the experimental group students; their attitudes towards science were positive. In the control group, differences were found between the pre-test and post-test means for test anxiety. In the pre-test, the students' means for anxiety were low and for attitudes towards science, high. However, their post-test means for anxiety were high; while the means for their attitudes towards science did not change. The findings indicate that conventional questions increased test anxiety. In contrast, no difference was found between the pre-test and post-test means of the attitude towards science of the control group. Thus, context-based questions appear to be a positive effect in reducing students' test anxiety and improving their attitudes towards science. On the other hand, conventional questions appear to be a negative effect construct in reducing test anxiety. Putsoa, et al. (2003) showed that there was a statistically insignificant improvement in the students' performance in the contextualized items. They also showed that students taught in a non-contextualized way but assessed with both context-based questions and the equivalent conventional questions performed in similar ways. Ahmed and Pollitt (2000) observed that context-based questions were favorable for high-performing students and also recognized the contribution of context-based questions in reducing students' test anxiety and improving their attitudes towards science. Consequently, context-based questions that reflect the real world may be used to reduce the test anxiety of students and improve their attitudes towards science. Previous studies (Erbe, 2007; Berk & Nanda, 2006; Noh et al., 2000; Stober, 2004; Foster, Paulk, & Dastoor, 1999; Kondo, 1996; Serok, 1991) have reported that various measures and strategies reduced test anxiety among students. Whereas, it has not been proved from the literature that context-based questions can reduce students' test anxiety and improve their attitudes towards science, this research has shown that context-based questions can reduce test anxiety and improve attitudes towards science. Meanwhile, since the post-test mean scores of the control group showed an increase in test anxiety and minimal improvement in their attitude towards science, it can be concluded that the treatment employing conventional questions appears to have substantial and positive effect on students' test anxiety.

Furthermore, the results of this research showed the relationship between the pre-test and post-test scores of test anxiety and attitudes towards science of the lower secondary school students. There was a significant negative relationship between test anxiety and attitudes towards science post-test scores in the experimental group ($r=-.505$; $p<.01$). After the context-based questions were applied to the experimental group, the mean scores of test anxiety decreased and those of attitudes towards science, increased. In other words, the context-based questions appear to be a positive effect construct for students' test anxiety and attitudes towards science. Additionally, these results demonstrated that there was a significant negative relationship between test anxiety and attitudes towards science of the control group students before the treatment ($r= -.427$; $p<.05$). Some studies (Ali & Mohsin, 2013; Fraser & Fisher, 1982; Kurbanoglu & Akin, 2010, 2012; Kurbanoğlu, 2013, 2014; Sağır, 2012) have shown a negative relationship between anxiety and science-related attitudes.

Conclusions

The research findings revealed that the context-based questions significantly reduced the test anxiety of the students who were appointed as the experimental group and improved their attitudes towards science when compared with the control group. In other words, the strength of context-based questions was proved on ameliorating test anxiety and improving attitudes among secondary school students. A couple of recommendations should be aligned based on the finding. Teachers should provide context-based questions within the assessment procedure because these questions improve science achievement and attitudes. Future research should consider more studies involving treatments using context-based questions. Additionally, research should be conducted with high school and university students, as well as the use of a larger sample.

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