

An Investigation of Primary Students' Attitudes Toward the Science Course

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Abstract:

This study aimed to determine attitude levels of primary school students towards science courses and to examine them in terms of different variables (gender, reading books/journals about science courses, watching broadcasts about science courses, grade in science courses, use of laboratory and use of technological applications). The sample of the study was 163 students attending the 4th grade. In this research, in which a scanning model was used, "Attitude Scale towards Science Course" was used as a data collection tool. Independent samples t-test and one-way anova were used to analyze for the data. As a result of the study, it was determined that there was no significant difference between the attitude levels of 4 th grade primary school students towards science courses according to the variables of student gender and the frequency of using technological applications. It was observed that there was a significant difference in the attitude towards science courses according to the variables of the students' science achievement grade and the frequency of using the laboratory, reading books on science and journal article. It was concluded with suggestions to the teachers in order to eliminate negative attitudes of the students and to ensure that they develop a positive attitude towards science courses.

Key Words: Attitude, Primary education, Science courses

Introduction

Since science is a field which explains the events and situations we face in life, it can be considered as the easiest way to provide individuals with the skills of scientific thinking. The new information produced and the advancing technology particularly put forward the significance of science.

The contributions of science and technology, which is produced on a scientific basis, to the development and progress of societies are far too numerous (Böyük & Erol, 2008). Science education is of great importance nowadays, when science and technology are advancing at an unprecedented pace. Accordingly, science courses can be said to be quite important in the education-teaching process of people.

One of the course-related affective factors which influence learning is attitude (Aydın, 2016; Güden & Timur, 2016; Gürbüzöğlü Yalmançı, 2016; Karasakaloğlu & Saracaloğlu, 2009; Kenar & Balcı, 2012; Kurbanoglu & Takunyacı, 2012; Özbaş, 2016; Tekbıyık & Akdeniz 2010;

Tosun, 2011). Attitude can be described as the tendency of individuals to show positive or negative learned reaction against events, objects, items, situations, subjects, or people (Tezbaşaran, 1996; Turgut, 1997; Demirel, 2001; Senemoğlu, 2001; Yenice et al., 2008; Akyol & Dikici, 2009; Özbaş, 2016; Turgut & Baykul, 2011). Since attitudes play a significant role in the determination of behaviors, the positive or negative attitude of students toward a course affects their approach to studying for that course, and thus, their success. The more a student is enjoying the course, the easier it will be for the student to learn and accept the information in that course and to use it in daily life (Kozcu-Çakır et al., 2007). In the 2004, 2013, and 2017 science curricula, it was emphasized that the development of students only in terms of knowledge, understanding, and skills was not sufficient to raise them as scientifically literate individuals, but their affective skills also needed to be improved. Therefore, it will be useful to consider these affective characteristics during the science education process and to plan, organize, and implement the learning-teaching activities by paying attention to affective characteristics as well as cognitive characteristics to achieve the objectives stated in the curriculum.

Science courses are specifically considered difficult for students. As a natural result of this situation, the desired level of success cannot be reached in science (Yaman & Öner, 2006). Therefore, it is important to know the learning styles of students and their attitudes toward their science course in the planning of science education. It has been found that the achievement of students is also affected positively when they have positive attitudes toward science courses (Altınok, 2004; Şişman et al., 2011). It is known that positive attitudes lead to an increase in academic achievement (Tuncer et al., 2015). The effect of the attitude continues not only on the learning at that time, but also on the subsequent learning (Kozcu-Çakır et al., 2007). Studies on attitudes reveal that attitudes are developed at early ages, and they do not change easily as long as no significant experiences are gained on that issue (Kocabaş, 1997). Therefore, students who have positive attitudes toward science courses in primary school years will have an advantage to continue these positive attitudes in later years. In this sense, it is extremely important to help students like science courses as of the primary school years and for students to have positive attitudes toward these courses. The determination of the factors that affect students' attitudes toward science courses is of great importance for turning their course-related attitudes from negative to positive, increasing their positive attitudes, helping students like science courses, and improving the academic achievement of students (Fidan-Dişikitli, 2011).

Considering attitude as a variable associated with learning and achievement, it is thought that studies on determining students' levels of attitude toward science courses and examining the variables affecting the attitude levels are important and should be focused on for achieving the goals stated in the curriculum of science courses. It is also thought that these studies will contribute to the literature. In this study, it was aimed to investigate and determine the attitudes of 4th-grade primary education students toward science courses in terms of various variables. When the relevant literature was reviewed, it was observed that studies which investigated students' attitudes toward science courses concentrated more on secondary school and high school levels. The number of studies investigating the attitudes of primary school students toward science courses was found to be low because it is difficult to assess. Based on these facts, it is thought that a contribution to the literature will be made by investigating the effect of some variables on students' levels of attitude toward the science courses and proposing suggestions to enhance the attitudes toward the course and the achievement in the course in this study.

Method

Research Model

In this study, which aimed to determine the attitudes of 4th-grade primary education students toward science courses, the general survey model, one of the descriptive survey methods, was used. The general survey model includes the survey arrangements on the whole population or a group, example, or sample from the population to reach a general conclusion about the population, consisting of numerous elements (Karasar, 1994).

Participants

The study group consists of 9-11 years old children in the center of Karaman 2019-2020 academic year, who were attending in state and private primary schools, and 4th -grade students. The sample of the study was determined by the convenience sampling method.

Data Collection Tool

In the study, a questionnaire was applied to determine students' attitudes toward science courses. "The Attitude Scale Toward Science Course (ASSC)," developed by Uyanik (2014), was used to determine the demographic information of students in the first section and their attitudes toward the science courses in the second section. The scale, developed in a 3-point Likert type, consists of 18 items. Since the scale would be applied to fourth-grade primary education students, it was of a 3-point Likert type, and students' agreement with the items was evaluated from negative to positive as "never" (1), "sometimes" (2), and "always" (3).

Data Analysis

The data were evaluated in a computer environment using SPSS 23.0 statistical software. While percentage (%), mean (\bar{x}), and standard deviation (SD) were used to define the numeric variables, number (n) was used to define the categorical variables. In the comparison of the variables, the independent t-test analysis was used in the interpretation of the difference between two variables, and one-way anova and the "Lsd" technique, one of the post-hoc tests, were used for the comparison of more than two groups. The significance level was accepted as ($p < 0.05$).

Ethical considerations of the study

In this study, all the rules specified within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directives" were followed. None of the actions specified under "The Actions Against Scientific Research and Publication Ethics," which constitutes the second section of the directives, were fulfilled. The study was conducted after receiving the permission of Karamanoğlu Mehmetbey University Scientific Research and Publication Ethics Board Commission numbered (95728670-020-22700).

Findings

As a result of the analysis of the data obtained in the study, the information about students and the data collected were tested within the context of the research questions, and the results are presented in tables respectively.

1.1. Percentage Values For The Students' Demographic Information

| Variables | Section | n | % |
|-------------|----------------------|----|---|
| School type | State Primary School | 78 | |

| | | | |
|---|-----------------------------------|----|------|
| | Private Primary School | 84 | 48.1 |
| | | | 51.9 |
| Gender | Female | 84 | 51.9 |
| | Male | 78 | 48.1 |
| Do you read books/journals about the science courses? | Yes | 89 | 54.9 |
| | No | 73 | 45.1 |
| Do you watch broadcasts about the science courses? | Yes | 93 | 57.4 |
| | No | 69 | 42.6 |
| What is your grade in the science courses? | Needs Improvement | 8 | 4.9 |
| | Good | 32 | 19.8 |
| | Very Good | 12 | 75.3 |
| What is the frequency of your laboratory use? | I don't use it | 2 | 10 |
| | Once a week | 0 | 61.7 |
| | Twice a week | 53 | 32.7 |
| | Three times a week and more often | 4 | 2.5 |
| Do you use of technological applications? | Yes | 6 | 14 |
| | No | 16 | 90.1 |
| | | | 9.9 |

Table 1: Percentage values for the students' demographic information

In table 1, the sample group consists of students studying in state (48.1%) and private (51.9%) primary schools. Of the students in the study, 51.9% were female, and 48.1% were male candidates. It was revealed that 54.9% of the students read books about science courses, 45.1% did not read books, 61.7% did not use the laboratory, 32.7% used the laboratory once a week, 2.5% twice a week, and 3.1% three times a week and more often. Of the students, 90.1% made use of technological applications, whereas 9.9% did not. Of the students, 4.9% had the grade "Needs Improvement," 19.8% "Good," and 75.3% "Very Good" in science courses.

1.2. The Independent Test Results Of The Students' Scores Obtained From The Attitude Scale Toward Science Courses According To The Gender Variable

| Group | n | Mean ±Std.Deviation | sd | t | P |
|--------|----|---------------------|-----|-------|-------|
| Female | 84 | 2.31 ±.23 | | | |
| Male | 78 | 2.32 ±.23 | 160 | -.185 | 0.853 |

Table 2: The independent test results of the students' scores obtained from the attitude scale toward science courses according to the gender variable

In Table 2, the female students' mean score of the Attitude Scale Toward Science Courses is $(2.31 \pm .23)$, and the male students' mean score of the Attitude Scale Toward Science Courses is $(2.32 \pm .23)$. Although the male students' mean score of the Attitude Scale Toward Science Courses is higher than the mean attitude score of the female students, the difference between them is not statistically significant. There is no significant difference between the genders of students and their attitude scores ($P > 0.05$, $t = -.185$).

1.3. The Independent T-Test Results Of The Students' Scores Obtained From The Attitude Scale Toward Science Courses According To The Variable Of Reading Books About Science

| Group | n | Mean±Std.Deviation | sd | t | P |
|--------------|----|--------------------|-----|-------|--------|
| Yes, I do | 89 | 2.38 ±.21 | 160 | 4.370 | 0.000* |
| No, I do not | 73 | 2.23±.22 | | | |

* $p < 0.05$

Table 3: *The independent t-test results of the students' scores obtained from the attitude scale toward science courses according to the variable of reading books about science*

In Table 3, the attitude scale mean score of the students who read books about science courses is observed to be $(2.38 \pm .21)$, and the attitude scale mean score of the students who did not read books about science courses is $(2.23 \pm .22)$. A statistically significant difference was observed between the students who read books about Science and those who did not ($P < 0.05$, $t = 4.370$).

1.4. The Independent T-Test Results Of The Students' Scores Obtained From The Attitude Scale Toward Science Courses According To The Variable Of Watching Broadcasts About The Science Course

| Group | n | Mean±Std.Deviation | sd | t | p |
|--------------|----|--------------------|-----|------|--------|
| Yes, I do | 93 | 2.38 ±.19 | 160 | 4.72 | 0.000* |
| No, I do not | 69 | 2.22±.24 | | | |

* $p < 0.05$

Table 4: *The independent t-test results of the students' scores obtained from the attitude scale toward science courses according to the variable of watching broadcasts about the science course*

In Table 4, the attitude scale mean score of the students who watched broadcasts about science courses is $(2.38 \pm .19)$, and the attitude scale mean score of the students who did not watch broadcasts about science courses is $(2.22 \pm .24)$. A statistically significant difference was observed between the students who watched broadcasts about science courses and those who did not ($P < 0.05$, $t = 4.72$).

1.5. The Anova Analysis Of The Attitudes Toward The Science Course According To The Grades in Science Courses

| Group | Mean±Std.Deviation | f | p |
|-------------------|--------------------|-------|------|
| Needs Improvement | 2.11±.35* | 5.516 | 0.05 |
| Very Good | 2.36±.20 | | |
| Good | 2.26±.24 | | |

*p<0.05

Table 5: *The anova analysis of the attitudes toward science courses according to the grades in science courses*

When Table 5 was examined, a significant difference was found between the “Needs Improvement” grade parameter and other parameters in the attitudes in terms of the variable of grades in science courses ($p<0.05$, $f=5.516$).

1.6. The Anova Test Results Of The Students’ Scores Obtained From The Attitude Scale Toward Science Courses According To The Variable Of The Frequency Of Laboratory Use

| Group | n | Mean±Std.Deviation | f | p |
|--|----|--------------------|-------|------|
| I don't use it | 10 | 2.32±.24 | 0.918 | 0.48 |
| I use it once a week | 0 | 2.28±.21 | | |
| I use it twice a week | 53 | 2.33±.29 | | |
| I use it three times a week and more often | 4 | 2.45±.06 | | |
| | 5 | | | |

Table 6: *The anova test results of the students’ scores obtained from the attitude scale toward science courses according to the variable of the frequency of laboratory use*

It is observed from Table 6 that the attitude scale mean score of the students who stated they did not use the laboratory in science courses was (2.32±.24), the attitude scale mean score of the students who said they used the laboratory once a week was (2.28±.21), the attitude scale mean score of the students who stated they used the laboratory twice a week was (2.33±.29), and the attitude scale mean score of the students who stated they used the laboratory three times a week and more often was (2.45±.06). Although the mean attitude score of the students (2.45±.06) who used the laboratory three times a week and more often in science courses is higher than those of the other students, this difference is not statistically significant. There is no significant difference between the laboratory use of the students in science courses and their attitude scores ($P>0.05$).

1.7. The Independent T-Test Results Of The Students’ Scores Obtained From The Attitude Scale Toward Science Courses According To The Variable Of Making Use Of Technological Applications.

| Group | n | Mean±Std.Deviation | sd | t | p |
|--------|----|--------------------|-----|-------|-------|
| do | 46 | 2.32±.22 | 160 | 0.309 | 0.758 |
| do not | 16 | 2.30±.28 | | | |

Table 7: *The independent t-test results of the students' scores obtained from the attitude scale toward science courses according to the variable of making use of technological applications.*

In Table 7, the Attitude Scale Toward Science Courses mean score of the students who made use of technological applications is observed to be (2.32±.22), and the Attitude Scale Toward Science Course mean score of the students who did not make use of technological applications is (2.30±.28). There is no significant difference between making use of technological applications and the attitude scores of students ($P>0.05$, $t=0.309$).

Discussion and Conclusion

To reach the desired level in science education, the attitudes of the students toward science can be developed positively starting from the first grade of primary education (Kenar & Balcı; 2012), their interest can be enhanced, and they can be guided toward working in the field of science in the future (Mattern & Schau, 2001; George, 2006). Therefore, it is necessary to determine students' attitudes toward science courses, which is of great significance in their education life, and to investigate factors affecting these attitudes. This study was carried out to determine attitudes of 4th-grade students in primary schools in city center of Karaman toward science courses in terms of various variables.

When the results obtained in terms of the gender variable were reviewed, the mean attitude scores of the 4th-grade primary education male students for science courses were observed to be higher than those of female students; however, the difference between them was not statistically significant. Similar results were also encountered in the literature. In the study performed by Akbudak (2005), the attitudes of males toward science courses were found to be more positive, but there was no significant relationship between the genders. In their studies, Yılmaz (2012) and Najafi et al. (2012) concluded that the attitudes of male students were more positive compared to female students. There are also studies in which the mean attitude scores of female students for science courses are higher. In their study, Ocak and Erbasan (2017) concluded that the attitudes of female students toward science courses were more positive than those of male students. Although Alkan (2006) Can and Dikmentep (2015) concluded in their studies on the attitudes of primary education students toward science courses that attitudes did not differ significantly by gender, the attitudes of female students are higher than those of male students according to the results of both studies. In the relevant literature, the gender variable was asserted to be the most influential factor in students' attitudes toward science courses in many studies conducted until 1991, and a result in favor of males was revealed. However, the studies conducted after 1991 showed that gender did not have a significant effect on attitude (Osborne, 2003). According to these results, it can be said that gender is not a determinant factor in determining students' attitudes toward the science courses. As a result of the integrative approach

of Science teachers, teaching course without discriminating female and male students can be thought to affect the attitudes of students toward the course.

When the attitudes of the students who read books about science courses toward the course were examined, the attitudes were found to be at a significantly higher level than the students who did not read books about science courses ($t=4.370$; $p<0.05$). In the literature, there are studies supporting the result that the variable of reading books about science causes differentiation in students' attitudes toward the course. The study carried out by Yıldırım and Karataş (2018) on primary education students and the study conducted by Ocak and Erbasan (2017) on primary education students can be given as examples. Based on these findings, reading books about science courses is considered a significant variable that will create a difference in students' attitudes toward the course.

When the attitudes of the students who watched broadcasts about science toward the course were evaluated, the attitudes were found to be at a significantly higher level than the students who did not watch broadcasts about science ($t=4.72$; $p<0.05$). In the literature, there are studies supporting the result that the variable of watching broadcasts about science causes differentiation in students' attitudes toward the course. The study carried out by Yıldırım and Karataş (2018) on primary education students can be given as an example. Yılmaz (2016) concluded that the variables of reading historical books and watching films created a significant difference in the attitudes of secondary school 8th-grade students. However, in the study performed by Ocak and Erbasan (2017), no significant difference was observed between the variable of following a scientific website and students' attitudes toward science courses. Based on these findings, watching broadcasts about science is considered a variable that will create a significant difference in the attitudes of students toward science courses.

When the findings were examined in terms of grades in science courses, a significant difference was found between the "Needs Improvement" grade parameter and other parameters in the attitudes of the students toward science courses ($f=5.516$; $p<0.05$). The mean score of the attitudes of the students, who had the grade "very good" in the grade parameter, toward the course was ($2.36\pm.20$), the mean score of the students with the grade "good" was ($2.26\pm.24$), and the mean score of the students with the grade "needs improvement" was ($2.11\pm.35$). On the other hand, in the study conducted by Mdletshe et al. (1995), it was concluded that attitudes affected achievement, and achievement affected attitudes, which supports these findings. In the study carried out by Alkan (2006), the attitudes of students who had high grades in science courses were found to be at a significantly higher level than students with low grades in science courses. It was put forward that the attitudes of students toward science courses were positive, and attitude and achievement were positively correlated (Dieck, 1997; Martinez, 2002). In their study, Gürkan and Gökçe (2000) reported that the achievement of students who had high-level attitudes toward science courses in science was higher regarding the correlation between the attitude toward science courses and achievement. It can be said that the achievement level in science courses is a variable that can create a significant difference in the level of the attitude toward science courses, and when the attitude decreases or increases, the achievement of students is influenced directly or indirectly (Kozcu et al., 2007). In the literature, unlike our study, studies (Gömleksiz & Yüksel, 2003) that have concluded that primary education students have negative attitudes toward science courses are encountered, although rarely, and the studies mostly have results similar to this study. The maintenance of students' positive attitudes toward science courses from primary school is important in terms of influencing their achievement in the course positively (Demirbaş & Yağbasan, 2004; Balım et al., 2009; Şişman et al., 2011). At this point, the continuous monitoring

of attitudes is thought to be effective in identifying the factors which influence students' attitudes toward science courses.

When the findings are examined with regard to the variable of the frequency of the science laboratory use, the mean attitude scores of the students who stated that they did not use the laboratory ($2.32 \pm .24$), used the laboratory once a week ($2.28 \pm .21$), twice a week ($2.33 \pm .29$) and three times a week and more often ($2.45 \pm .06$) were close to each other, and this finding indicates that the variable of the frequency of the laboratory use did not create a significant difference in the attitude scores. However, as a result of the increase in the frequency of the students' use of laboratory, the mean attitude scores of the students for science courses were found to be higher. Considering this situation, it is assumed necessary to include more laboratory and experimental activities in the course. In the literature, no studies supporting the result that the variable of the frequency of the science laboratory use did not lead to a differentiation in students' attitudes toward science courses were encountered. In the studies conducted by Kaya and Boyuk (2011) and Kozcu -Çakır et al., (2007), it was concluded that the laboratory use affected the attitude toward science courses positively. Furthermore, in the studies performed by Bilgin et al., (2002), Bilgin and Geban (2004), and Mordi (1991), teaching methods and techniques were emphasized among the most important factors affecting students' achievement in a course and attitudes toward the course, and the achievement of students who take the course in a laboratory environment is thought to increase as a result of having more fun through experiments and experiences.

When the data on the variable of primary school 4th-grade students' use of technological applications were reviewed, no significant difference was observed between the attitude scores of the students who followed technological applications and the students who did not. In contrast, in their study on primary education students, Yıldırım and Karataş (2018) found a significant difference between the attitude scores of students who stated that they always and often used technological applications and the attitude scores of students who stated that they sometimes, rarely or never used technological applications. Based on this finding, the use of technological applications as the ages of students advance during their education is considered a variable that can create a significant difference in the attitude scores of students.

Recommendations

The frequency of the laboratory use in science courses, achievement in science courses, reading books/journals about science courses, and watching broadcasts about science play a significant role in the attitudes of students toward science courses. In line with these conclusions, the following recommendations can be made:

1. Enriching the practices related to the science education in the preservice educational processes of primary education classroom teachers, and planning and organizing them in consideration of the activities aimed at improving cognitive characteristics, such as academic achievement, as well as activities that will contribute to the improvement of affective characteristics will be useful to achieve the objectives in the curriculum.

2. To eliminate the negative attitudes of students toward science courses, classroom teachers should keep various current scientific resources (books, journals, brochures, etc.) in school and classroom bookshelves and encourage students to examine them. Additionally, activities such as watching broadcasts, documentaries, and films about science should be organized on certain days of the week.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

This article does not contain any studies with animals performed by any of the authors.

Conflicts of interest.

The authors of this paper certify that they have NO affiliations with or involvement in any organization or entity with any financial or non-financial interest (such as honoraria; educational grants; membership, employment; affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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