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# Research on the Effect of the Science Camp Project on the Students in Terms of Various Variables

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**Keywords**
Science, astronomy, motivation, attitude, science camp.

**Abstract**
In this study, it was aimed to measure the effect of the Young Brains Science and Art Summer Camp II (YBSASC II) project, which was carried out within the scope of Scientific and Technological Research Council of Turkey (STRCT), 4004 Support Program for Nature Education and Science Schools, on students' attitudes towards learning science, science education, and astronomy. For the project, 40 middle school 8th grade students from Samsun were taken to the science and art camp for 9 days. The project included disciplines of physics, chemistry, biology and astronomy in the science camp. This research was designed in a single group pre-, post-test experimental design. Because the study was carried out with only the students who participated in the project, there is no control group in the study. Pre-test instructions were made on the first day of the project, while post-test instructions were made in the students' schools one month after the project. As data collection method; "Motivation Scale for Science Learning", "Attitude Scale Towards Science Course" and "Astronomy Attitude Scale" were applied in pre- and post-test. Statistical analysis of the data obtained in the study was performed in SPSS 23.0 package program. As a result of the analyses, it was determined that students had significant statistical increase (p<,05) in their attitude towards astronomy, science lessons, and in their motivation for science. These results show that the nature education project has a positive effect on the students. Thus, it is suggested that it would be beneficial for students to practice science education based on real nature experience so that students love, consequently learn science.

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## 1. Introduction

The processes of learning and teaching science are not only cognitive, but also related to emotions. Yet, in schools and universities, science is often portrayed as a rational, analytical, and non-emotional space (Bridigo, Bermejo, Conde and Mellado, 2010). Many researches in science education have emphasized the

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importance of emotions in teaching and learning, and advocating the consideration of cognitive and emotional dimensions (Koballa and Glynn, 2007; Otero, 2006). In some studies, it is emphasized that first-hand experiences in teaching techniques-strategies and teaching practices are closely related to students' attitudes towards science (Czerniak and Scriver, 1994). It is also argued that there is a relationship between negative emotions such as many dilemmas and stresses that cause nostalgia and insecurity during their teaching practices and their motivation and attitudes towards science (Rost, 2002). At this point, nature education comes into effect. Because nature education affects the affection, interest and, attitude towards science positively (Kals, Schumacher and Montada, 1999). By its nature, science does not contain any subject that can be taught inductively and permanently through classical teaching methods and techniques in only classroom environment (Küçükahmet, 2000; Vosniadou, 1992). Contextual issues are features that need to be supported by learning through experience, contact with the student, participation of student in need of application more actively. Therefore, active learning in nature education can be thought to enhance students' motivation and attitudes towards science (Pintrich, Marx and Boyle, 1993).

In Turkey, STRCT supports projects for nature education and science camps to build interest and awareness of science students. For this purpose, "4004 Support Program for Nature Education and Science Schools" within the Presidency of Science and Society Department of STRCT calls out every year and receives project proposals. These projects encourage the implementation of activities that are far from theoretical training.

STRCT's "4004 Support Program for Nature Education and Science Schools" in 2016 aims to spread and disseminate information to the public and to disseminate information as far as possible while visualizing it as much as it can be and communicating it in an understandable manner. In addition, in these projects; it is aimed not to transmit as much information as possible to the participant but to trigger participants' curiosity, research, inquiry and learning desires by enabling them to recognize simple scientific facts (STRCT, 2016).

In the last 10 years in Turkey the majority of the "4004 Nature Education and Science Camp" projects supported by STRCT are based on a single discipline. For example, only astronomy education, only environmental education (the vast majority is on environmental education), only mathematics education, etc. There was no project with art education in it. (This result was reached after examination of the projects which were approved and published on STRCT's official website - www.tubitak.gov.tr-). After this deficiency was found, both the art education (painting, music and theatre) as well as different disciplines (such as astronomy, mathematics, physics, chemistry, biology, nature education) were included in YBSASC II project. This is the unique side of our project.

### 1.1. Young Brains Science and Art Summer Camp II Project

YBSASC II project is the continuation of YBSASC I project supported by STRCT in 2016. The YBSASC II project, which is proposed by taking into consideration the achievements and feedbacks obtained from the YBSASC I project, was supported for the second time by STRCT in 2017. Within the scope of the project, 40 middle

school 8th grade students living in low economic zones in the districts of Samsun province were taken to the 9-day project camp.

During the YBSASC II project, the students were able to actively work in the collaboration during the learning process. Within the scope of the project, by carrying out mathematical modelling, 3D hands-on models, workshop studies, nature-exercise instructions, painting-music instructions, laboratory instructions, STEM instructions, dramatization activities and planetarium-observatory instructions; students were able to make their own learning in the process of learning, to understand them more easily by embodying them, to show a positive attitude towards science and art, and to create social learning environments for motivation development.

The 7-day part of the 9-day YBSASC II project was carried out as a science camp and the 2-day part was art camp. The activities in the project were carried out by lecturers from various universities. A theme was set for each day of the 9-day camp, and activities that are suitable for the theme were held on the same day. The general theme of these activities is as follows;

- Teaching activities with hands-on modelling
- Physics-Chemistry-Biology laboratory activities
- Mathematical modelling activities
- Nature-exercise practices
- Planetarium-Observatory activities
- Science education activities with dramatization
- STEM activities

### 1.2. The Purpose of the Study and the Research Question

The purpose of the research is to measure the effect of YBSASC II project, which was realized within the scope of STRCT 4004 Support Program for Nature Education and Science Schools, on students' attitudes towards science learning, attitudes towards science and attitudes towards astronomy. Within the scope of this aim, the following research questions were searched.

- How does the science camp project effect the motivation of students to learn science?
- How does the science camp project effect students' attitudes toward science?
- How does the science camp project effect students' attitudes toward astronomy?

## 2. Method

This research was designed in a single group pre-, post-test experimental design among experimental research designs. Since the study was carried out with students participating in the project "YBSASC II" for 9 days, there is no control group in the study.

## 2.1. Research Sample

The sample of this study constitutes a total of 40 middle school students participating voluntarily in the project "YBSASC II", numbered 117B034, which was held in Samsun and was supported by STRCT in the Black Sea region of Turkey in 2017. The students were selected on the basis of volunteerism from 5 different districts of Samsun province.

## 2.2. Data Collection Tools and Analysis

Three different data collection tools were used to measure the effects of the activities carried out in the project process on attitudes towards science, motivation, and astronomy.

- The "Motivation Scale for Science Learning" consisting of 23 items which was developed by Dede and Yaman (2008) in order to determine the change in the motivation of students to learn science was applied as pre- and post-test.
- The "Attitude Scale Towards Science Course" consisting of 20 items developed by Nuhoğlu (2008) and was applied as a pre- and post-test in order to determine the effects of the activities carried out in the project on the attitudes of the students towards science.
- The "Astronomical Attitude Scale" consisting of 27 items developed by the Türk and the Kalkan (2015a) for middle school students was used as a pre- and post-test to determine the effects of the projects carried out on the students' attitudes towards astronomy.

Statistical analysis of the data obtained in the study was performed in SPSS 23.0 package program. Prior to the statistical analysis, descriptive statistics were calculated for the scores that all students obtained from one test. Next, normality and homogeneity tests were performed to determine which of the parametric / non-parametric analysis techniques to use in data analysis. These tests are given separately below for each measuring tool.

The results of the normality test of motivational scale pre- and post-test data for science learning are presented in Table 1.

**Table 1.** Motivation scale normality test results for science learning

| | Kolmogorov-Smirnov | | |
|---|---|---|---|
| | **Statistic** | **df** | **p** |
| **Pre-Test** | ,131 | 40 | ,080* |
| **Post-Test** | ,167 | 40 | ,077* |

*p>,05

When Table 1 was examined, it was seen that the motivation scale for learning science was p>,05 for the pre- and post-test data.

The results of the homogeneity test of motivational scale pre- and post-test data for science learning are presented in Table 2.

**Table 2.** Motivational scale homogeneity test results for science learning

| Levene Test | | | |
|---|---|---|---|
| Statistic | $df_1$ | $df_2$ | p |
| 3,450 | 1 | 78 | ,067* |

*p>,05

When the results of Levene test in the Table 2 are examined, it is seen that the motivational scales for learning science have a homogeneous distribution of the pre- and post-test data.

The results of the normality test of pre- and post-test data of attitude scale for science course are presented in Table 3.

**Table 3.** Attitude scale normality test results for science course

| | Kolmogorov-Smirnov | | |
|---|---|---|---|
| | **Statistic** | **df** | **p** |
| **Pre-Test** | ,183 | 40 | ,200* |
| **Post-Test** | ,159 | 40 | ,120* |

*p>,05

When Table 3 is examined, it is seen that the attitude scale for the science course is p>,05 for the pre- and post-test data. This means that the data show a normal distribution.

The results of homogeneity test of attitude scale pre- and post-test data for science course are presented in Table 4.

**Table 4.** Attitude scale homogeneity test results for science course

| Levene Test | | | |
|---|---|---|---|
| Statistic | $df_1$ | $df_2$ | p |
| 9,264 | 1 | 78 | ,089* |

*p>,05

When the results of the Levene test in Table 4 are examined, it is seen that the pre- and post-test data of attitude scale towards science course show a homogeneous distribution.

The results of the normality test of the astronomy attitude scale pre- and post-test data are presented in Table 5.

**Table 5.** Astronomy attitude scale normality test results

| | Kolmogorov-Smirnov | | |
|---|---|---|---|
| | **Statistic** | **df** | **p** |
| **Pre-Test** | ,069 | 40 | ,200* |
| **Post-Test** | ,120 | 40 | ,150* |

*p>,05

Since the p value in Table 5 is greater than ,05 it is seen that the data show a normal distribution.

The results of the homogeneity test of the astronomy attitude scale preliminary and final test data are presented in Table 6.

**Table 6.** Homogeneity test results of astronomy attitude scale

| Levene Test | | | |
|---|---|---|---|
| Statistic | $df_1$ | $df_2$ | p |
| 2,061 | 1 | 78 | ,155* |

*p>,05

Since the Levene test results in Table 6 are p>,05 it is seen that the data show a homogeneous distribution.

It has been decided to use parametric analysis techniques in the analysis of data as a result of normality and homogeneity tests on motivation scale for science learning, astronomy attitude scale and attitude scale towards science course. For the analysis of pre- and post-test measurements made at specific time intervals in the same group, t-test can be used for related samples (Büyüköztürk, 2005). For this reason, a t-test was conducted for related samples to determine whether there was a meaningful difference between the students' motivation to learn science, attitudes toward science course and attitude scores towards astronomy. When the results of statistical analysis were interpreted, the level of significance was taken as 0, 05.

## 3. Findings

Findings of research problems are included in this part of the study. Findings for each probing sub-heading are given.

### 3.1. Findings Related to the First Research Problem

The average scores and standard deviation values of students participating in the project from the motivation scale for learning science are given in Table 7.

**Table 7.** Descriptive statistics of motivation scale scores for science learning

| | N | Mean | SD |
|---|---|---|---|
| Pre-Test | 40 | 90,6000 | 2,00538 |
| Post-Test | 40 | 97,9750 | 2,34179 |

According to the findings in Table 7, the average motivation scores of the students before the project were 87,8750, while the motivation scores of the students after the project increased to 92,1500. To determine whether this increase was statistically significant, t test analysis was performed for the related samples and the results are given in Table 8.

**Table 8.** T-test results of motivational scale scores for science learning

| Test | Mean | SD | df | t | p |
|---|---|---|---|---|---|
| Pre-Post Test | -7,37500 | 15,51292 | 39 | -3,007 | ,005* |

*p<,05

When Table 8 is examined, it is seen that the change in the motivation scores for science learning of the students participating in the project is statistically significant *(t =-3.007, p<,05).* From this finding, it can be said that the activities carried out in the project are effective in increasing the motivation of students to learn science.

### 3.2. Findings Related to the Second Research Problem

Descriptive statistics of students' attitude scale scores towards science course are given in Table 9.

**Table 9.** Descriptive statistics of attitude scale scores for science course

| | N | Mean | SD |
|---|---|---|---|
| Pre-Test | 40 | 13,9250 | ,80971 |
| Post-Test | 40 | 15,6000 | ,53923 |

From the findings in Table 9, the average attitude scores of the students were 13.9250 in the pre-test, up to 15.6000 in the post-test. To determine whether this increase was statistically significant, t-test analysis was performed on the related samples and the results are given in Table 10.

**Table 10.** T-test results of attitude scores towards science course

| Test | Mean | SD | df | t | p |
|---|---|---|---|---|---|
| Pre-Post Test | -1,67500 | 4,95822 | 39 | -2,137 | ,039* |

*p<,05

When Table 10 is examined, it is seen that the change in the attitude scores of the students participating in the project is statistically significant *(t=-2,137, p<,05).* This finding shows that the activities carried out in the project are effective in increasing the attitudes of the students towards the science course.

### 3.3. Findings Related to the Third Research Problem

Descriptive statistics on the astronomical attitude scale scores of the students participating in the project are given in Table 11.

**Table 11.** Descriptive statistics of astronomy attitude scale scores

| | N | Mean | SD |
|---|---|---|---|
| **Pre-Test** | 40 | 98,2250 | 2,28470 |
| **Post-Test** | 40 | 104,7750 | 2,77431 |

From the findings in Table 11, astronomy attitude scale scores of pre-project were 98,2250, while post-project attitude scores increased to 104,7750. To determine whether this increase was statistically significant, t test analysis was performed for the related samples and the results are given in Table 12.

**Table 12.** T-test results of astronomy attitude scores

| Test | Mean | SD | df | t | p |
|---|---|---|---|---|---|
| Pre-Post Test | -6,55000 | 17,57468 | 39 | -2,357 | ,024* |

*p<,05

When Table 12 is examined, it is seen that the change in the astronomical attitude scores of the students participating in the project is statistically significant *(t=-2,357, p<,05).* From this finding, it can be said that the activities carried out in the project are effective in increasing the attitudes of the students towards astronomy.

## 4. Conclusion and Discussion

The first problem with the study is whether the students' motivation for learning science is influenced by the science camp. The results show that the motivation of the students to learn science has increased after the science camp. This increase

means that the science camp has a positive impact on students' motivation to learn science. It can be considered that the source of this increase is the teaching methods and techniques used during the project. During the camp, the activities, materials and environments that attracted the attention of the students were used. Similarly, Ryan and Deci (2000) emphasize that environments that meet innate psychological needs for careful efficiency and autonomy are important to motivate students to learn. Another researcher (Rost, 2002) found that teaching environments that did not attract students and that activities that caused them anxiety and distrust had negative effects on students' motivation to learn science. Compared with the results of similar studies in the literature (Rost, 2002; Ryan and Deci, 2000), it is thought that the results obtained in our study are important. Because the instructions made within the scope of the study increase the motivation of the students to learn science, they are compatible with the literature and they also presented a new proposal (science camp instructions).

Within the scope of the second problem of the study, the effects of the activities instructed in the science camps on the attitudes of the students towards science were investigated. The most general outcome in this direction is that the science camp has developed positive attitudes towards the science of students. Czerniak and Scriver (1994) noted that first-hand experience in teaching-strategies and teaching practices is important for students to develop a positive attitude towards science. As is known, once attitude occurs, it does not easily change (Ajzen and Fishbern, 1980). In addition, Özdemir (2010) stated that science education practices based on nature experience have positive effects on students' perceptions towards the world of science. Kals et al. (1999) emphasized that the nature education and the behaviour of the students towards the science can be improved positively. The results obtained in the framework of the second problem of our study are consistent with the literature. From this point of view, science camps can be realized more frequently in increasing students' attitudes towards science.

The influence of the science camp on students' attitudes toward astronomy has been examined within the framework of the last issue of the study. YBSASC II, the teaching techniques used in the direction of the educational strategies that enable students to determine their own way of learning and the fate of their research have increased their attitudes towards astronomy science. Starting from early ages, children hear about concepts such as earth, sun, moon and sky. It is important to develop the questions and attitudes of astronomy of these older children positively. Otherwise, there are misconceptions and negative attitudes that are difficult to be changed in the future (Türk and Kalkan, 2015b). In our work, the camp is one of the important consequences of the project to increase students' astronomy attitudes.

## 5. Research Limitations and Future Directions

This research, together with being an experimental study, does not include the control group. This is the limitations of the study. It is useful to conduct studies with control groups so that the results obtained in the study can be tested more effectively.

It was determined that the camp implemented in the study has the effect of increasing the students' attitudes towards science learning, science and astronomy. Studies that compare the results of this research with the effects of the science curriculum implemented in schools will be important in the literature.

The results obtained in this study were reached with the project "YBSASC II" supported by "STRCT 4004 Support Program for Natural Education and Science Schools". The study stages are limited to this project. However, it is useful to compare the results obtained from the results of similar "4004 Nature Education and Science Schools" projects supported by TUBITAK. For this reason, it is beneficial for the results obtained within the scope of other projects to be given as literature publication.

It is suggested that more scientific camps and nature education practices should be included in science education by taking into consideration the effects of science camp instructions within the scope of the study to increase students' attitudes towards science learning, science and astronomy.

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