

## Contribution of Artvin Bilim ve Robotikle Renkleniyor Project to Middle School Students' Science Opinion

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**Abstract:** This study aims to reveal the opinions of middle school students regarding science after attending “Artvin Bilim ve Robotikle Renkleniyor” project including variety of science activities related with robotic, science and nature under the scope of TÜBİTAK 4004 Nature and Science School program. Data of the current study was collected via a personal information form and a survey from a total of 30 6th and 7th grade students in six middle schools in Artvin province who participated in the project. In this study, a two-question survey developed by Akay (2013) was used to reveal the students' opinion regarding science. Qualitative data of the study were analyzed by using content analysis method and quantitative data were analyzed by giving frequency and percentages. 19 of the students are female and 11 are male. 14 of these students are in 6th grade and 16 of them are in 7th grade. At the end of the project, students were asked to define science and the students were asked what would you like to invent if you were a scientist. Moreover, researchers tried to determine how the students' attitudes towards science changed after the project. When the respond of the students were examined, it is seen that most of the students define science as the work of producing new things, discovering and explaining the universe. In addition, the students stated that they want to build a time machine that facilitates transportation if they were a scientist. Furthermore, the number of students who want to discover a flying car and teleportation tool is higher than others. In general, it is seen that most of the student want to discover transport and technology related products. Most of the student state that their science interest has increased after the Project. Moreover, the number of students who realize the importance of science and increase their curiosity and desire to learn is also high. So, it can be said that the project has increased students' positive perceptions towards science.

**Keywords:** Science school (camp), Science, Middle school student, Active learning

### Introduction

Quality science teaching is evaluated as a key point of world's future in terms of the future of the nations considering the fact that scientific knowledge increase incrementally, technological innovations advance at a great pace, and the effects of science and technology are felt in every field of life (Yalçın and Şişman, 2018). Becoming a society of the 21<sup>st</sup> century is through raising scientifically literate individuals who can respond to the increasing values and adapt to the science age (Doğanay, 2002). Since we are living in an age which is named information age due to the rapidity of accessing information, societies continuing their existence today are called information society (Yankayış, Güven and Türkoğuz, 2014). Certain innovations are required due to reasons such as the rapid changes in the information world, increasing education standards, increasing classroom sizes, and the fact that technology advances faster than education (Balçı, 2007). The individuals in the developing world are required to produce information and technology instead of taking information and using when necessary and to be interrogative instead of acceptive (Aydoğmuş, 2008). TÜBİTAK (The Scientific and Technological Research Council of Turkey) which desires a vast majority of target group, ranging from students to public employees, to interact with science, implemented a program named 4004 - Nature Education and Science Schools and the projects supported within this context provide significant opportunities in terms of

eliminating the insufficiencies of formal training programs on nature-environment and procuring nature-friendly individuals to the society (Avcı et al., 2015).

When the science school projects in our country are examined, Marulcu, Saylan, and Güven (2014) determined that most of the primary-school students participated in the “Little Scientists Science School” project supported by TÜBİTAK found it entertaining and the conducted activities contributed students to associate the subjects they learn in courses with daily life. Yıldırım, Atila, and Doğar (2016) determined that primary-school students participated in the “Little Scientists Explore” project carried out by TÜBİTAK found the activities conducted in the project more entertaining and favorable than the activities conducted in their schools and students acquired numerous knowledge in these activities. Tekbıyık et al. (2013) reported that the attitudes of primary school students, who participated in a summer science camp based on active learning, towards science increased significantly after the camp. In the study of Akay (2013), it was determined that the perspectives of middle-school students participated in the “Learning by Doing Summer Science School” project carried out by TÜBİTAK towards science and scientific knowledge increased positively as a result of learning different scientific activities by doing and with active learning. In the study of Buluş Kırıkkaya, Bozkurt and İmalalı conducted on 2010, it was determined that students, who participated in the “Evaluation of the Little Scientists’ Science School” project supported by TÜBİTAK, were quite satisfied since they were learning through entertainment and participated in the long-lasting activities without getting bored. According to the study of Konur et al. (2011) conducted on the evaluation of science camp, it was stated that science camp influenced students to develop positive attitudes towards the science course and the scientific activities carried out in the camp and scientific environment had significant roles in reaching this conclusion.

It is considered that determining the opinions of children towards science, revealing their ideas towards science as a result of activities they participate in science schools/camps and making necessary regulations for applying these teaching-learning processes in schools can be a significant foundation both for the society and the future generations (Akay, 2013). In this context, this study was conducted in order to examine the opinions of 6<sup>th</sup> and 7<sup>th</sup> grade students towards science after they perform different active learning and learning by doing activities in the learning fields of robotics, nature, and science in the “Artvin Bilim ve Robotikle Renkleniyor” (Artvin is Enlivened with Science and Robotics) project which was based on robotics activities and supported by TÜBİTAK within 4004-Nature Education and Science Schools projects. Within this scope, the direction and degree of the effect of activities in the project to the participants were researched. In this context, the participants were asked “What do you think science is?” and “If you were a scientist, what would you like to invent?” and the data obtained from the participants were analyzed.

Artvin Bilim ve Robotikle Renkleniyor project was carried out between the dates of 1-7 July 2019. 30 students participated in the project of which the total application duration was 7 days. 19 of the students were female and 11 of them were male. 14 of these students were in 6<sup>th</sup> grade and 16 of them were in 7<sup>th</sup> grade. The survey model was used in the study. Personal information form was used in order to collect data on the personal information of the students and a two-questionnaire developed by Akay (2013) was used in order to reveal the opinions of students towards the concept of science. Quantitative data were collected with personal information form and quantitative data was collected with the questionnaire. Quantitative data was analyzed with the content analysis method and qualitative data was analyzed by giving frequency and percentages. At the end of the project, the students were asked to define science and the question of what would you like to invent if you were a scientist. Furthermore, it was also aimed to determine the perspectives of students participated in the project towards science after the project. A questionnaire developed by Akay (2013) was used in order to reveal the opinions of students towards the concept of science. Quantitative data was analyzed with the content analysis method and qualitative data was analyzed by giving frequency and percentages.

Table 1. Opinions of participants towards science

|  | <b>f</b> |
|--|----------|
| The profession of producing, inventing, exploring new things             | 9        |
| Everything that changes humans and life                                  | 3        |
| Set of knowledge that explains the universe                              | 7        |
| Way of reaching information based on observation and experiment          | 6        |
| Way of fulfilling desires and needs                                      | 2        |
| Performing useful works for humanity                                     | 4        |
| The profession of explaining the unknown by using consistent information | 2        |

When Table 1 is examined, it was observed that the most stated definition about science by the students was; it is a profession of producing, inventing, exploring new things (f=9). The second most stated definition about science was; it is the set of knowledge that explains the universe (f=7). The third most stated definition about science by the students was; it is a way of reaching information based on observation and experiment (f=6). On the other hand, the least stated definition about science by the students was; the profession of explaining the unknown by using consistent information (f=2).

Table 2. The things that students want to invent

|   |   | f |
|---|---|---|
| Technological tools                                       | Artificial planet   | 1 |
|   | A machine that examines animals   | 1 |
|   | A mind-reading machine  | 3 |
|   | Construction robots   | 1 |
|   | Precision telescope   | 1 |
|   | A machine that corrects errors or mistakes                              | 1 |
| Vehicles that facilitate transportation                   | Flying car  | 4 |
|   | Teleportation machine   | 6 |
|   | A vehicle that can travel everywhere in space                           | 3 |
|   | Time machine  | 9 |
| Inventions aimed at protecting the environment and nature | A gas that would prevent ozone layer depletion                          | 1 |
|   | A machine that regulates, changes climates in accordance with the needs | 1 |
| Inventions on health protection                           | A patient's bed that determines microbes                                | 1 |
|   | A vaccination that prevents Alzheimer's disease.                        | 1 |
|   | A vaccination that cures cancer   | 2 |
| Inventions aimed at other purposes                        | Everything that would be beneficial for humankind.                      | 1 |
|   | A handicap-accessible vending machine                                   | 1 |

When Table 2 is examined, five categories were determined from the answers of students. These categories were created as a result of the evaluations of the specialists. These are; technological tools, vehicles that facilitate transportation, inventions aimed at protecting the environment and nature, inventions on health protection, inventions aimed at other purposes. Under the technological tools category, the things that students wanted to invent were respectively; a mind-reading machine (f=3), artificial planet (f=1), a machine that examines animals (f=1), construction robots (f=1), precise telescope (f=1), and a machine that corrects errors or mistakes (f=1). Under the vehicles that facilitate transportation category, the things that students wanted to invent were respectively; time machine (f=9), teleportation machine (f=6), a flying car (f=4), and a vehicle that can travel everywhere in space (f=3). Under the inventions aimed at protecting the environment and nature category, the things that students wanted to invent were respectively; the machine that regulates, changes climates in accordance with the needs (f=1), and a gas that would prevent ozone layer depletion (f=1). Under the inventions on health protection, the things that students wanted to invent were respectively; a vaccination that cures cancer (f=2), a vaccination that prevents Alzheimer's disease (f=1), and a patient's bed that determines microbes (f=1). Under the inventions on health protection, the things that students wanted to invent were respectively; a handicap-accessible vending machine (f=1) everything that would be beneficial for humankind (f=1).

Table 3. The perspectives of participants towards science

|  |   | f  |
|--|---|----|
| The contribution of the project to the perspective towards science | The increase of interest in science after the project               | 10 |
|  | Recognizing the importance of science                               | 5  |
|  | Increase in the sense of wonder towards the unknown                 | 4  |
|  | Increase in the desire to learn new information                     | 4  |
|  | Recognizing the entertaining aspect of science                      | 4  |
|  | Increase in the interest towards robotics coding                    | 2  |
|  | Acknowledging that it is not difficult and impossible to do science | 3  |
|  | Elimination of prejudice towards science                            | 2  |

When the contribution of the project to the perspective of students towards science in Table 3 is examined, it was observed that the statements of students were respectively; the increase of interest in science after the project (f=10) recognizing the importance of science (f=5) increase in the sense of wonder towards the unknown (f=4) increase in the desire to learn new information (f=4) recognizing the entertaining aspect of science (f=4), acknowledging that it is not difficult and impossible to do science (f=3), increase in the interest towards robotics coding (f=2), and elimination of prejudice towards science (f=2).

According to the analysis of data obtained from the present study in which the opinions of 6<sup>th</sup> and 7<sup>th</sup> towards science after performing different active learning and learning by doing activities in the learning fields of robotics, nature and science, it was determined that most of the students' interest in science increased. While it was observed that students defined science as inventing new things, exploring, and the profession of explaining the universe, there were a number of students who realized the importance of science and whose sense of wonder and eagerness to learn have increased. When the opinions of students towards science are examined, it was determined that all of the students made positive statements about science. It can be observed that the present study complies with the studies in which a positive contribution was observed towards science and scientific knowledge by middle-school students (Akay 2013; Tekbıyık et al. 2013). When the answers of the participants to "If you were a scientist, what would you like to invent?" question is examined, it was determined that most of the students wanted to invent a time machine. When the obtained results are examined, it can be stated that the activities students performed affected their desire to invent construction robots, artificial planet, precise telescope, a gas that would prevent ozone layer depletion, and a vehicle that can transport everywhere in space. Furthermore, the number of students who wanted to invent a flying car and teleportation machine was higher than other students. Overall, it can be observed that the things students want to invent were products about transportation and technology. From this point of view, it can be interpreted that this project increased the positive perceptions of students towards science.

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