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Evaluation of a Science Camp: Enjoyable Discovery of Mysterious World*

Kader BİRİNCİ KONUR[a]
Rize University

Ayşegül ŞEYİHOĞLU
Karadeniz Teknik University

Gülşah SEZEN
Rize University

Ahmet TEKBIYIK
Rize University

Abstract

In this research, summer science camp which is carried out on the purpose of developing positive attitude towards science and nature with enjoyable experiments in primary school students and activities were evaluated. The camp was performed as two 5 days stages with a total 48 students who had finished 7th grade at primary school. The findings of the study were obtained from Science and Technology Course Attitude Scale, Scientific Attitude Scale, Camp Evaluation Survey and student interviews. The gathered quantitative data were analyzed with SPSS and qualitative data were analyzed with NVivo 8.0 program. As a result of the findings, it was determined that after the camp there was a significant increase in the participants' attitude towards the Science and Technology course and in their scientific attitude. It was also observed that most of the students enjoyed camp activities and had a good time during the camp. Besides, it was proved that the camp had a positive effect on increasing the students' self-confidences towards learning science.

Key Words

Science Camp, Activity, Primary School Students, Attitude

According to the national and international evaluations, it is clear that students mostly fail in science courses in our country (Milli Eğitim Bakanlığı [MEB], 2003, 2006; Öğrenci Seçme Sınavı [ÖSS] 2006, akt.Denizoğlu, 2008; 2009). The problems such as insufficient time in the learning process, equipment inadequacy, crowded classrooms, therefore, not doing the lessons as student centered and visual, and running the lessons theoretically can be listed among the reasons of this situation. Researches that were carried out revealed that such problems cause students to lose their interest towards science subjects and to develop a negative effect (Cürebal, 2004; Çakır, Şenler, & Taşkın, 2007; Gürkan & Gökçe, 2000; Jelinek, 1998; Osborne, Simon, & Collins, 2003; Weinburgh, 1995). The lessons that are taught with a traditional approach cannot change students' attitudes towards science (Greenfield, 1998; Özsevgeç, 2007; Weinburgh, 1995).

Science schools are seen as one of the ways to increase the students' attitudes towards science. The general aim of the science schools which have become popular in our country recently is to show

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a PhD. Kader BİRİNCİ KONUR was completed her doctorate in chemistry education in 2010. Her research interests include chemistry education, science education, conceptual change texts, misconceptions. *Correspondence:* Research Assistant PhD. Kader BİRİNCİ KONUR, Rize University, Faculty of Education, Department of Elementary Education, Çayeli-Rize/Turkey. E-mail: kaderbirinci@yahoo.com & kader.birinci@rize.edu.tr. Phone: +90 464 532 84 54.

how much scientific truth and concepts in different branches (science, social, nature, astronomy sciences) are related with daily life and to show that it might be enjoyable and amusing. The studies carried out with regard to the subject in abroad proved that science schools have positive effects on the students' attitudes towards science and on the choice of their profession (Gibson & Chase, 2002; Knox, Moynihan, & Markowitz, 2003; Markowitz, 2004; National Science Foundation [NSF], 1998; Orstein, 2006; Prokop, Tuncer, & Kuasnicak, 2007). Although there are a lot of studies investigating the effects of science schools on students' knowledge levels, abilities and attitudes towards science, it is conspicuous that there are few studies on the evaluation of such kind of programs (Knox et al., 2003). Because science school is a new practice for our country, studies related to the evaluation of the effect of such a practice are necessary. When the limited number of science schools in our country is discussed, it is obvious that most of them are for high school and university students and adults, and there are few numbers of the practices for primary school students (Türkiye Bilimsel ve Teknolojik Araştırma Kurumu [Tübitak], 2010). The summer science camp "Enjoyable Discovery of Mysterious World" that was organized within the scope of TÜBİTAK, 4004 Nature Education and Science Schools Project was realized in the Educational Faculty, in Rize University. In the activities that were carried out, it was aimed to enable students to understand the basic phenomenon in the field of physics, chemistry, biology and geography to realize the fact that there is a relationship between the technological improvements and these science fields and they are included in life.

Purpose

The aim of this research was to evaluate summer science camp, held with the purpose of providing students with developing a positive attitude towards science and environment with enjoyable experiments and activities, within the scope of students' attitudes towards Science and Technology course, their scientific attitudes and their views on the camp.

Method

Research Design

The research approach that was used during the camp was carried out in a simple experimental design intended to evaluate the performed practices (as pre-test and post-test). However, when the introduction of practice time and the fact that effects of the process on the students revealed with a qualitative approach are considered, this research can be regarded as an action research. While action research was defined as process of data collection systematically to enable social change by Bogdan and Biklen (2003); Johnson (2003) described it as research process to comprehend and enhance quality of teaching or actions in school and classroom environment. The most important aim of action research in education is known to understand and advance facts appearing in education world systematically (Kuzu, 2009). Köklü (2001) stated characteristics of action research that researchers explore and solve problem via group working in certain environment.

Participants

The participants of the study consisted of 48 primary school 8th grade students who attended the camp. The participants study at different primary schools in Çayeli district, in Rize Province. In the selection of the students, following criteria were taken into account.

1. The student must have passed from 7th grade to 8th grade.
2. Residence of the students should be suitable for the transportation by a service.
3. The number of the male and female participants should be equal.

The students, who wanted to attend the camp, submitted the forms to camp counselor personally by having filled in camp application forms that they provided from schools. In accordance with it, 92 students' applications matching the criteria above were evaluated and 48 participants were determined with random selection. 24 (12 male, 12 female) of the 48 participants attended the first stage of the camp, and 24 participants attended the second stage.

Pilot Study

In order to test whether there is a problem about the scheduled activities for the camp, all the activities (physics, chemistry, biology, geography) were applied in a primary school about two months before the camp. As a result of this practice, it was concluded that there was no problem with the process of this practice and the time given for each activity was sufficient.

Camp Process and Practice Time

The camp was held as 2 stages and each stage took 5 days. Each day of the camp was separated for a discipline. The first day was allocated for physics "Journey to the World of Physics", the second day was allocated for biology "Journey to the World of Biology", the third day was allocated for chemistry "The Mystery of Chemistry", the fourth day was allocated for geography "Geography Explorer", and the fifth day was planned as "Learning trip".

Learning Environment Design

According to Bilgin (2006), science laboratories are the most important learning environments affecting positively students' intellectual learning and their attitudes. Therefore, Enjoyable Discovery of Mysterious World Summer Science Camp was designed in a way that will provide opportunity for students to introduce with different learning environments rather than the classroom environment. In order to endear science to students, it was regarded to use various teaching methods, activities which are related with real life and it is also regarded to have students' necessary materials that can be done with tools, which can be easily obtained from their environments. These activities make the subjects, which are difficult to be imagined, objectified and understood by the students, enjoyable. It was taken care that the activities that were indicated in the program should have a qualification of being realizable outdoors as well as in laboratory environment.

Science laboratory was specialized for the activities performed in laboratory environment and this environment was used for all disciplines. In the laboratory, materials and test equipment which were necessary for each discipline were placed on the tables that were appropriate for disciplines, by this way, they were made easy accessible for students when necessary. Instead traditional order seating, face to face seating arrangement which enabled group work was formed in the laboratory. During the activities, three assistant instructors in collaboration with a moderator who managed the activity were present. While the moderator instructor was generally managing the activity process, assistant instructors were close to their responsible groups and took on the task of meeting any demands that might have come from the groups and enabled groups to perform the activities with an intended efficiency.

Data Collection Tools and Analysis of the Data

Science and Technology Course Attitude Scale that was developed by Nuhoğlu (2008) in order to present the efficiency of activities that were performed during the camp, on the students' attitudes related to Science and Technology course was used. This scale was administered to students as pre-test and post-test. Three point likert scale has a five factor construct and is comprised of 20 items. The Scale's Cronbach- Alfa inner consistency coefficient was calculated as 0,87.

With the aim of measuring the participants' attitude towards science, Scientific Attitude Inventory (SAI II) comprising of 40 items and developed by Moore and Foy (1997) was administered as pre-test and post-test. Cronbach Alfa reliability coefficient of the scale which was adapted to Turkish by Demirbaş and Yağbasan (2006) was calculated as 0,76. In the analysis of quantitative data that were obtained from the scales, SPSS software was used and t-test was performed on the data for the correlated sample.

"Camp Evaluation Survey" and semi-structured interview were used to present the participants' views on camp. Camp evaluation survey was comprised of 5 open ended questions. It includes questions about students' pleasure from the camp, its contribution to themselves and how much their expectations were met. The data gathered from the survey were individually coded by two researchers and the statements on which a consensus was reached were presented with frequency analysis.

Semi-structured interviews were carried out with 6 randomly selected participants in order to probe into the participants view on camp and to support other data. The content validity of 6 questions that were prepared in accordance with project team in the semi-structured interview was ensured. Each participant was interviewed face to face and it was recorded to a digital media with a recorder. The data which were recorded as a word document were transferred to NVivo 8.0 qualitative data analysis software and were analyzed with "content analysis". Outputs of this analysis were presented as short finding presentation in which themes and codes stood out. In content analysis, similar data are collected as part of specific concepts and themes and interpreted significantly (Yıldırım & Şimşek, 2006).

Results

As a result of the findings obtained from science and technology attitude scale, students' attitude points oriented to the scale's dimension of liking to do activities in Science and Technology course ($t_{(42)}$=-2.26; p<0.05), liking Science and Technology course at school ($t_{(42)}$=-3.58; p<0.01), learning new knowledge and using them ($t_{(42)}$=-2.29; p<0.05), being successful at Science and Technology course ($t_{(42)}$=-2.539; p<0.01), had a significant increase after the camp compared to the situation before the camp. However, on the dimension of "requiring doing activities in Science and Technology course", previous to camp attitude points of the primary school students who attended the summer science camp and the points after the camp statistically showed no significant difference ($t_{(42)}$=-.141; p>0.05).

According to the findings obtained from science attitude scale, attitudes of the students who participated in science summer camp, had a significant difference after the camp compared to pre-camp process ($t_{(42)}$ =-3.912; p<0.01). Accordingly, great amount of the students changed their negative attitudes towards science.

According to the qualitative data obtained from the camp evaluation survey, the reasons of 38 students who stated that their expectations were largely met are like this: while there were some participants who thought that they would be bored at first but recognized that they were wrong, being many participants who were pleased with participating in more activities and entertainment than they had expected and who described camp as exciting and active revealed that expectations were largely met. It was also seen that the trip date expectations of the students who hadn't expected to go on any trip were also largely met. The students, who found an opportunity of observing different kinds of birds and butterflies in the field, frequently expressed their satisfaction. It made a positive effect to provide material richness by using equipment during the activities and students' encountering method, material and activities that they were not accustomed much in the teaching environment they had been in. In this sense, it provided positive feedback for the participants to reflect technological facilities or teaching technologies into the classroom environment. The source of criticism having done by seven students, who claimed that their expectations weren't met, is like that: In the trip to Aquaculture Faculty, students' expectations about seeing different living things weren't met in this sense because of having observed just regional species. Some of these students stated that they saw the review of some subjects that they had already known. There were students who saw the summer science camp as a technique which was instructive or a remindful for the things they had learnt but forgot. Also, some of the participants stated that they made friends and they were pleased with working in groups. Some of the students expressed that they were taught the subjects that they had wondered about in this camp and they felt like scientists in the teaching environment in the camp process.

The results obtained from the interviews revealed that they enjoyed very much during the camp, various methods and techniques were used in the learning environment, responsible instructors were very interested, and they were pleased with being provided with necessary information for their needs in rich laboratory environments to them.

Discussion, Conclusions and Suggestions

At the end of this study, it was concluded that science camp had a positive effect on the participants' attitude towards Science and Technology course, in accordance with the aim of this study. It can be said that scientific activities and scientific environment that were formed at the camp had a great role on reaching this result. In the researches having done in literature, it was found that there were positive changes on the students' performance in science courses in terms of knowledge, skill and attitude (Knox et al., 2003). According to the qualitative and quantitative data obtained in accordance with the research questions, students' attitudes towards science were affected in a positive way after the camp. Students' expressing that they felt themselves as scientists in the camp evaluation survey was also an indicator of this fact. It can be interpreted as an indicator of the change that students expressed they wanted to participate in such camps again. According to it, it can be said that there has been a change in the students' views towards the science, scientific knowledge, scientific environment and scientists. Similarly, in the literature, in a study related to summer science camp it was revealed that students' interest in scientific research and their wishes of building career in this area in the future developed (Markowitz, 2004). Students' thoughts towards school lessons being positively affected can be explained with the fact that the camp process enabled students to gain self-confidence. This situation helped them to develop the belief of being successful at school lessons and to

develop a positive attitude towards disliked lessons. This result is also supported by the fact that camp program is suggested to include all possible disciplines by the students. It can be seen in the literature that the students who participated in such kind of camps increased their attitudes towards science and technology course compared to those who didn't participate; therefore, they wanted to improve themselves (Gibson & Chase, 2002). Another qualitative finding of the research was that students had difficulty in learning abstract subjects. In the researches on science camps done in the literature, it was stated that participants gained multi-directional knowledge, their satisfaction levels increased and their views changed in a positive way (Güler, 2009; Keleş, Uzun, & Uzun, 2010).

In the interviews that were done at the end of the summer science camp, other results obtained from some of the student statements are like this: the camp programs that are longer, boarding and participated by more participants can have more effective results. At the same time, students would like to see the program as simple, and see its structure and laboratory environment rich. Designing activities in which interdisciplinary relationships are formed and which are current and technological, are expressed as the suggestions done by the students to increase the efficiency of the camp. In terms of the participants, it is also a desired situation to have experiments frequently and doing activities outdoors individually. But, most of the participants who are the owners of these statements which is sort of advice, want the summer camp to be repeated frequently and they want to be taken a chance to participate in it again. The findings that were obtained from scientific attitude scale and camp evaluation survey support these statements. The reason lying beyond the students' wanting to form a correlation between disciplines (physics, chemistry, biology, geography) may depend on the fact that each day of the camp is separated for one discipline. Besides, as a result of the research, it influenced the success of the camp to have lecturers who are responsible at the camp and who are found academically professional and successful in their field, personally friendly, relevant, amusing and trustful. The following suggestions were done at the end of the study.

- The process of adaptation of the knowledge that was gained at the camp into daily life and other disciplines should be cared.
- On the student trips planned to be done during the camp, it can be possible to go out of the living environment or the camp participants can be chosen from different environments by considering motivation and students' interest/ needs.
- Planning camp as boarding might facilitate the adaptation process and may positively affect the relationship between participants.
- It can be suggested to popularize such scientific camps for different audience, place and disciplines within the scope of universities and student participation should be encouraged.
- It can be allowed time to amusement, social, cultural and sportive activities in order to differ the camp environment from school environment.
- It can be suggested that science camps and lessons can be designed by assessing the facilities provided by quite environments that are enriched with material, method and techniques, laboratories and facilities provided by open air.
- Students can be provided for common clothes and accessories (apron, cap, t-shirt, laboratory glasses, name tag, etc.) designed for scientists in order to adapt them to the process more easily.

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