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The Effect of Science Festival on Participants' Attitudes Towards Science

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ABSTRACT

Science festival aims to spread the science culture and communication to wider sections of the society, to provide scientific knowledge to the participants and to comprehend the interaction between science and technology through activities. 30 regional and original events prepared by the units within our university, such as "Adventure of Rose Oil and Rose Water" and "Lavender Perfume" will be realized. The proposed activities include workshops, experimental applications, interactive applications, observation, competitions, collaborative group works, field studies, exhibitions and demonstrations, interviews, and sports activities to attract everyone's attention from 7 to 77. The event aims to present scientific knowledge to the participants within the framework of applied sciences. In addition to regional projects in agriculture, forestry, technology, and aquaculture science, participants at the Science Festival of Isparta University of Applied Sciences as well as activities such as "Reproduction of Medicinal and Aromatic Plants", "Survival and Camping in Nature" and "Arduino" aims to provide. In order to enable the participants to take an active role in the realization of the activities, the activities were diversified in each activity using different types of activities. The scientific attitude scale was used to determine the gains, experiences, and opinions of the participants within the scope of the planned activities. In the study, the level of the science fair participants' attitudes towards science and gender difference in the attitudes of science fair participants towards science, and opinions and suggestions of the participants about the Science Festival are determined. Within the scope of that, the scientific attitude scale and an open-ended question is used. In the scientific attitude scale, there are 40 items structured to explain the nature of science, the way scientists work, and how the participants feel about science. After the survey items, an open-ended question was asked to reflect opinions and suggestions about the Science Festival. Also, a result of this research, it was determined that the attitudes of the participants towards science were high in a positive way, the participants found the organization productive and fun, and they stated that they could experiment, they wanted such organizations to continue by taking precautions during the pandemic process, suggested that more workshops be held at the next science festival.

Keywords: Science Festival, Science Education, Scientific Attitude.

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INTRODUCTION

The purpose of science festivals is to spread the culture and communication of science to wider sections of the society, to convey scientific information to the participants, and to make them comprehend the interaction between science and technology through activities. According to Martin (2009), long-term gains can be achieved in developing positive attitudes towards science with fun, successful and inquiry-oriented science fair practices. Korkmaz (2012) stated that science festivals are accepted as beneficial practices for individuals of all ages. Tezcan and Gülperçin (2008) examined the attitudes of the participants of the science fair and education science festival in İzmir to insects. According to the results of the study, it was determined that the participants' perspectives on nature and insects were positive, willing to relate to nature, aware of nature and insects, but tended to approach cautiously (Tezcan & Gülperçin, 2008). In the research, it was emphasized that the support and dissemination of science fair activities aiming to make people love science and nature are very important, and that new projects to be supported will contribute to the creation of new generations that are more conscious about the environment, nature and insects they are training (Tezcan & Gülperçin, 2008). Şahin (2012), investigated the effect of science festivals on the attitudes of 10th-grade students towards the field of chemistry. According to the results of the research, it was concluded that science festivals have positive effects on the development of high school students' attitudes towards chemistry lessons. In addition, in this study, it was stated that students with low interest in chemistry courses were observed to be more active and interested in the courses taught after they had examined the projects in the science festivals on site and participated in the presentations there (Şahin, 2012). Kızılcık, Cagan, and Yavaş (2018) examined visitor opinions on The Scientific and Technological Research Council of Turkey (TUBITAK) science fairs and the effects of fairs on student attitudes towards physics lessons. As a result of the research, it has been determined that the visitors to the science fair have highly positive opinions about science fairs. In addition, visitors think that such fairs will make a highly positive contribution to students' attitudes towards physics courses (Kızılcık, Çağan, & Yavaş, 2018). Also in this study, no significant difference was found according to the gender variable.

In the literature review, studies with students who participated in the science fair with their projects and took an active role were also found. According to the findings obtained in the research, it was determined that the students who contributed and took part in the science fair with their projects had positive attitudes towards science fairs (Karadeniz & Ata, 2013; Yıldırım & Şensoy, 2016; Urmaz, Dinçer, & Osmanoğlu 2017). In the research, the views of primary school students and workshop leaders of the TÜBİTAK 4007 Science Festival project held in the 2018-2019 academic year in Kastamonu were examined (Gulgun et al., 2019). The sample group of the research consists of 1200 primary and secondary school students who visited the science fair between 10-11 October 2018 and workshop leaders of 50 people who worked at the science fair on the same dates. As a result of the study, it was determined that primary school students and workshop leaders were highly satisfied and expressed their opinions about the repetition of similar projects.

Purpose of the research

When the related literature review was examined, it was determined that the science festivals held had a positive effect on the participants. Within the scope of the Isparta University of Applied Sciences Science Festival held in the Fall Term of 2021, it continued for four days with 30 regional and original workshops. Inconsistent with the results of studies in the literature, in this study it was determined that women participated more in positive items, and women participated less in negative items.

The research questions of the research are listed below;

- What is the level of the science fair participants' attitudes towards science?
- Is there a gender difference in the attitudes of science fair participants towards science?
- What are your opinions and suggestions of the participants about the Science Festival?

METHOD

The survey method (Karasar, 2008) is used to determine the gains, experiences, and opinions of the participants in the science festival.

Research Process

Table 1. Isparta University of Applied Sciences Science Festival Workshop list

No	Workshop Name	No	Workshop Name
1	The Adventure of Rose Oil and Rose Water	16	Life in the Water
2	Raising Insect Awareness	17	Let's Examine Sick Fish
3	Correct Spraying in Agriculture	18	Darts Tournament
4	Reproduction with Tissue Culture	19	The Magical World in the Bell
5	Grafting on Fruit Trees	20	1 drop of water 2 different lives: Aquaponic Production
6	Pruning in Fruit Trees	21	Journey from Flower to Fruit
7	Planting Fruit Saplings	22	Arduino Workshop
8	Lavender Perfume	23	I Solder My Own Circuit
9	Reproduction of Medicinal and Aromatic Plants	24	Let's get to Know the Drone Closely
10	Let's Explore the World of Insects	25	Fire Dance with Colors
11	Survival and Camping in Nature	26	Touching the Future from Tradition
12	Let's Get to Know the Birds	27	Dynamic Art Practices
13	Medicinal and Aromatic Plants	28	Breeding Techniques in Aquarium Fish
14	I Use My Personal Protector: Provide Job Security	29	Learning Raspberry pi Coding
15	Draw Your Own Route	30	Innovation Workshop

Isparta University of Applied Sciences aims to spread the science culture and communication to wider sections of the society, to provide scientific knowledge to the participants and to comprehend the interaction between science and technology through activities. Within the scope of that, 30 regional and original events prepared by the units within our university, such as “Adventure of Rose Oil and Rose Water” and “Lavender Perfume” will be realized (Table 1).

The activities include workshops, experimental applications, interactive applications, observation, competitions, collaborative group works, field studies, exhibitions and demonstrations, interviews and sports activities to attract everyone's attention from 7 to 77. The event aims to present scientific knowledge to the participants within the framework of applied sciences. In addition to regional projects in agriculture, forestry, technology and aquaculture science, participants at the Science Festival of Isparta University of Applied Sciences as well as activities such as “Reproduction of Medicinal and Aromatic Plants”, “Survival and Camping in Nature” and “Arduino” aims to provide. In order to enable the participants to take an active role in the realization of the activities, the activities were diversified in each activity using different types of activities, approximately 2000 people visited the science festival (see Figure 1).

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Figure 1. Isparta University of Applied Sciences Science Festival Workshop Process

When the participants came to the relevant workshop stand, after the academician gave brief information about the subject, showed the educational material to the participants, performed the experiment, and had the participants perform some parts of the experiment. Participants were able to observe the experiment, made partial contributions to the experiments, were informed about the subject. For example, one of the "I Solder My Own Circuit" workshop activity was soldering, after the participants learned about the subject and watched the academician do it, they soldered the two ring wires together.

Science fair activities were carried out after the academicians presented their workshop proposals, the project management reviewed and approved the workshops, and the workshops were corrected during the TUBITAK project writing process, this process lasted for 9 months. Meetings were held with workshop leaders and guides about the science fair workshops, and the presentations of the workshops were supervised by the project management. Science fair workshops were presented to the participants between 20-23 October 2021. In order for the participants to be everyone from 7 to 77, one of the event days is Saturday in order to ensure the participation of the people working in the workplace. In the event calendar, it is aimed to offer diversity by repeating 30 workshops in different numbers on different days, an average of 16 workshops were held in one event day.

Participants

206 people, 118 women and 88 men participated in the survey voluntarily. The %80 of the participants is between the ages of 13-24 (n=165), see Table 2.

Table 2. Demographic characteristics of the participants

Variables		N	Percentage
Age	0-12	17	8.25
	13-24	165	80.10
	25-36	13	6.31
	37-48	9	4.37
	49-	2	0.97
Gender	Female	118	57.28
	Male	88	42.72
Total		206	100

Data Collection Tool and Data Analysis

The scientific attitude scale was developed by Moore and Foy (1997), and its original English form was obtained by e-mail from the researchers who developed the scale and translated into Turkish (Demirbaş & Yağbasan, 2006). In the scientific attitude scale, there are 40 items structured to explain the nature of science, the way scientists work, and how the participants feel about science. The items were created in a five-point Likert type and the degree to which people agree with the items; it was classified as "Strongly Agree", "Agree", "Undecided",

"Disagree" and "Strongly Disagree". In the survey, 20 of the items were determined as positive and 20 of them as negative. In addition, the scale is divided into 6 categories. While 5 of the categories are related to the nature of science and the way scientists work; One category included items about how students felt about science. While creating the categories, a scoring format of 5, 4, 3, 2, 1 for positive items and 1, 2, 3, 4, 5 for negative items were taken into consideration in scoring the answers given by the participants.

Table 3. Creation of survey categories

Scale	Number of items	Category	Numbers of items on the scale
1. AB*	3+3	The Structure of Scientific Laws and Theories	(4,16,34) ;(11,15,35)
2. AB*	3+3	Structure of Science and Approach to Events	(10,19,33) ;(2,7,26)
3. AB*	3+3	Exhibiting Scientific Behavior	(17,18,25) ;(3,5,32)
4. AB*	3+3	Structure and Purpose of Science	(20,21,28) ;(9,24,31)
5. AB*	3+3	The Place and Importance of Science in Society	(12,23,29) ;(6,8,38)
6. AB*	5+5	Willingness to Do Scientific Studies	(1,27,30,36,40) ;(13,14,22,37,39)
Positive items	20	-	-
Negative items	20	-	-
Total	40	-	-

**contains negative meaning*

After the survey items, "What are your opinions and suggestions about the Science Festival?" an open-ended question was asked. Since participation in the survey is voluntary, this optional open-ended question was answered by many people. The words in the answers given to this open-ended question were processed with content analysis, and the themes most frequently mentioned by the participants were transferred as codes. Two academicians who are experts in their fields worked for content analysis. Encoder reliability in the analysis of the data is measured by calculating the percentage of agreement (Miles and Huberman, 1994). The agreement between encoders was calculated as 93%. Also, some one-to-one versions of the expressions used by the participants are presented.

FINDINGS

The survey results of the science festival participants are presented in Table 4. According to the findings, it was determined that the scientific attitudes of the participants were high in a positive way. Positive items of the survey received high scores and negative items of the survey received low scores. In Table 4, the request to reverse the item has not been applied

Table 4. Mean and standard deviation scores or scale items

Question	N	Mean	SD
1. I would enjoy studying science	206	3.88	1.17
2. Anything we need to know can be found out through science*	206	3.12	1.14
3. It is useless to listen to a new idea unless everybody agrees with it*	206	2.04	1.36
4. Scientists are always interested in better explanations of things	206	3.57	1.17
5. If one scientist says an idea is true, all other scientists will believe it*	206	1.64	1.15
6. Only highly trained scientists can understand science*	206	1.78	1.08
7. We can always get answers to our questions by asking a scientist*	206	2.13	1.18
8. Most people are not able to understand science*	206	2.33	1.21
9. Electronics are examples of the really valuable products of science*	206	4.17	0.99
10. Scientists cannot always find the answers to their questions	206	4.33	0.98
11. When scientists have a good explanation, they do not try to make it better*	206	1.77	1.11
12. Most people can understand science	206	3.44	1.13
13. The search for scientific knowledge would be boring*	206	2.52	1.19
14. Scientific work would be too hard for me*	206	2.69	1.21
15. Scientists discover laws which tell us exactly what is going on in nature*	206	3.68	1.12
16. Scientific ideas can be changed	206	4.24	1.07
17. Scientific questions are answered by observing things	206	4.05	1.01
18. Good scientists are willing to change their ideas	206	3.29	1.27
19. Some questions cannot be answered by science	206	3.86	1.16
20. A scientist must have a good imagination to create new ideas	206	4.13	1.05
21. Ideas are the important result of science	206	4.11	1.09
22. I do not want to be a scientist*	206	2.73	1.41
23. People must understand science because it affects their lives	206	3.30	1.16
24. A major purpose of science is to produce new drugs and save lives*	206	3.43	1.25
25. Scientists must report exactly what they observe	206	4.35	0.95
26. If a scientist cannot answer a question, another scientist can*	206	1.60	1.03
27. I would like to work with other scientists to solve scientific problems	206	4.18	1.09
28. Science tries to explain how things happen	206	4.19	0.99
29. Every citizen should understand science	206	2.72	1.26
30. I may not make great discoveries, but working in science would be fun	206	4.11	1.05
31. A major purpose of science is to help people live better*	206	4.02	1.06
32. Scientists should not criticize each other's work*	206	2.30	1.43
33. The senses are one of the most important tools a scientist has.	206	3.88	1.13
34. Scientists believe that nothing is known to be true for sure	206	3.39	1.25
35. Scientific laws have been proven beyond all possible doubt*	206	3.51	1.19
36. I would like to be a scientist	206	3.44	1.36
37. Scientists do not have enough time for their families or for fun*	206	2.85	1.35
38. Scientific work is useful only to scientists*	206	1.63	1.11
39. Scientists have to study too much*	206	3.66	1.22
40. Working in a science laboratory would be fun	206	4.17	1.02

**contains negative meaning*

The answers given by the participants to the survey items and the results of the analysis by gender t-test are presented in Table 5. According to the t-test results according to gender, it was determined that women participated more in positive items, and women participated less in negative items. Therefore, the scientific attitude of women is higher than that of men in a positive way.

Table 5. Scale items t-test results according to gender

Question	Gender	Mean	SD	*F*	*p*
4. Scientists are always interested in better explanations of things	F	3.58	1.015	14.690	0.000
	M	3.56	1.363		
7. We can always get answers to our questions by asking a scientist*	F	2.03	1.045	13.286	0.000
	M	2.25	1.341		
9. Electronics are examples of the really valuable products of science*	F	4.15	0.883	4.600	0.033
	M	4.20	1.126		
11. When scientists have a good explanation, they do not try to make it better*	F	1.67	0.916	12.155	0.001
	M	1.91	1.319		
14. Scientific work would be too hard for me*	F	2.65	1.130	4.971	0.027
	M	2.73	1.313		
15. Scientists discover laws which tell us exactly what is going on in nature*	F	3.77	0.991	11.425	0.001
	M	3.57	1.267		
17. Scientific questions are answered by observing things	F	4.14	0.936	4.037	0.046
	M	3.93	1.091		
24. A major purpose of science is to produce new drugs and save lives*	F	3.34	1.123	11.657	0.001
	M	3.50	1.397		
33. The senses are one of the most important tools a scientist has.	F	4.04	1.016	6.438	0.012
	M	3.67	1.238		

**contains negative meaning*

In the survey, 6 subcategories were created (Demirbaş & Yağbasan, 2006). While creating the categories, a scoring format of 5, 4, 3, 2, 1 for positive items and 1, 2, 3, 4, 5 for negative items was taken into consideration in scoring the answers given by the participants. According to the answers given by the participants to the survey, when the category averages are examined, the highest "Exhibiting Scientific Behavior" and the lowest "Structure and Purpose of Science", see table 6.

Table 6. Categories results of the scale

Category	Mean	Sd
The Structure of Scientific Laws and Theories	3.37	0.451
Structure of Science and Approach to Events	3.87	0.553
Exhibiting Scientific Behavior	3.95	0.611
Structure and Purpose of Science	3.13	0.418
The Place and Importance of Science in Society	3.62	0.520
Willingness to Do Scientific Studies	3.53	0.667

After the survey items, "What are your opinions and suggestions about the Science Festival?" an open-ended question was asked. Since participation in the survey is voluntary, this optional open-ended question was answered by many people. According to the answers given to the open-ended question, the participants found the organization productive (n=123) and fun (n=85), and they stated that they could experiment (n=89), they wanted such organizations to continue by taking precautions during the pandemic process (n=66), suggested that more workshops be held at the next science festival (n=45). In addition, some of the expressions used by the participants are given below.

P12: "It was very nice, the scientists explained all of them one by one and they gave us good information, I had the opportunity to experiment."

P84: "They were very friendly and expert people. His explanations were clear and helpful. Personally, I found the science festival very positive and productive."

P121: "Academics were very successful in teaching and informing. The fact that they answered every question asked, stood on it until they understood the event, and waited patiently in our activities increased my interest in the Science Festival."

P125: "It was enjoyable, could have more workshops"

P180: "All the events held during the pandemic period show the importance our country attaches to science and science learning. Therefore, it is a great honor for me to increase these activities even more."

P186: "It was a nice event. They paid attention to the pandemic. Mask and distance rules were applied. I think it would be good if the event was held in the open air."

CONCLUSION AND RECOMMENDATIONS

The science festival develops positive scientific attitudes such as scientific thinking, observation and awareness in the participants (Bencze & Bowen, 2009; Durmaz, Dinçer & Osmanoğlu, 2017; Finnerty, 2013; Keçeci, 2017; Başar et al., 2018). Isparta University of Applied Sciences Science Festival aims to spread the science culture and communication to wider sections of the society, to provide scientific knowledge to the participants and to comprehend the interaction between science and technology through activities. Isparta University of Applied Sciences Science Festival was held for 4 days with 30 different workshops and a total of 2000 people attended the workshops. In the research, 206 people voluntarily participated in the survey conducted with the participants of the science festival.

In the study, the level of the science fair participants' attitudes towards science and gender difference in the attitudes of science fair participants towards science are determined as sub-problem. As a result of this research, it was determined that the attitudes of the participants towards science were high in a positive way. According to the answers given by the participants to the survey, when the category averages are examined, the highest "Exhibiting Scientific Behavior" and the lowest "Structure and Purpose of Science". Kızılcık et al. (2018) found no significant difference towards science according to the gender variable. But, when the participant answers according to the gender variable were examined in this paper, it was determined that the scientific attitudes of the female participants were higher in the positive direction compared to the male participants.

Moreover, opinions and suggestions of the participants about the Science Festival is determined as sub-problem of the research. According to the answers given to the open-ended question, the participants found the organization productive and fun, and they stated that they could experiment, they wanted such organizations to continue by taking precautions during the pandemic process, suggested that more workshops be held at the next science festival. It has

been determined that the results of the research are compatible with the studies that carried out other science festivals in the literature (Kızılcık, Cagan, & Yavaş 2018; Karadeniz, & Ata, 2013; Yıldırım & Şensoy, 2016; Urmaz, Dinçer, & Osmanoğlu 2017; Gülgün et al., 2019; Akkanat 2020) in terms of the usefulness of science festivals.

Limitations

The vast majority of the participants of this study were between the ages of 13 and 24 (80.1%), no age-related analysis was performed. Again, the group that gives the most answers to the open-ended question is the same age range. Therefore, an analysis and inference could not be made according to the age of the participants in this study, this is the limitation of the study.

Recommendations

When the survey results and open-ended questions applied in the study are evaluated, suggestions for future science festivals are presented below.

- Science festivals are considered productive and fun by the participants and should be carried out by taking measures to increase interest in science.
- The number of workshops in science festivals should be kept as much as possible.
- Participants considered it important to be able to conduct experiments and practices on their own, it is important for the participants to be active in the workshop after information is presented by the trainers at the science festivals.

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