Awareness of Space and Earth Systems by Musical Actions

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Abstract. The aim of the study is to show interest of primary school students' to our solar system, planets, space weather and to raise awarenes on these issues. In this research, awareness of 8-year-old students at Istanbul Halkalı Cumhuriyet Primary School on "space and earth system" was analysed. Training methodologies solar – earth systems, weather conditions, astronomy and related contents have been supported by art, music, literature, language and philosophy. An integrated education and awareness program were implemented by making use of body percussion. In the first stage, a questionnaire consisting of 15 questions was applied to 20 students and the students were sung with a ukulele and a song written on the subject. Afterwards, the song was repeated several times with the accompaniment of the students. Then, the students were asked to perform body percussion movements as they wanted by singing a song. Video and audio recordings were taken from the students. At the second stage, these students were given a presentation about space, earth and planets, and then they were asked to answer the same survey questions and to perform body percussion movements again. In both stages, the survey questions were analysed by using SPSS Package Program and screenshots of music audio signals analysed. Video records were digitalized and data was transferred to the computer. The project Results show that there is no a serience differences between boys and girls reactions. The awareness of space and earth sciences showed slightly an increasing trend at the 1st stage and the the second one.

Keywords: Music-based education · sun-space-earth system · body percussion

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1 Introduction

Adams J. and his friends [1] have established a curriculum for K-12 Education in astronomy. According to this curriculum, students in K-4 class; must acquire a geocentric perspective on objects and motion in the sky. 5–8 classrooms, students should learn about solar system motion from a heliocentric perspective. 9–12 ages students should learn about stellar evolution and the structure of the universe.

Meyer, A. O. et al. [2] presented their Moon phases projects to improve students' understanding of the causes ans process of the Moon phases. They implemented this project with a sample of undergraduate ans non-science major students enrolled at a medium-sized public university located in the southeastern part of the United States.

Rollins et al. [3] articulated a vision for science education that would make science literacy a reality for everyone on Earth. They emphasized that science empowers people to solve problems creatively, think critically, work collaboratively and use technology effectively. Thompson end his friends [4] have shown how scientific imagination and research power can bring together people from all continents, in almost all countries of the World. In presenting this impressive result, they aimed to help us understand the unifying power of the questions to understand our universe and use space for this purpose.

J. M. Davila, N. Gopalswamy and B. J. Thompson [4, 16] said that The International Heliophysical Year (IHY) is a UN-sponsored international scientific cooperation program for understanding the external effects of planetary environments and universal processes in solar-terrestrial-planetary-heliospheric physics. IHY focuses on developments in all aspects of the heliosphere and its interaction with the interstellar medium. The term heliophysics was coined specifically to refer to the activity of studying the entire solar-heliospheric-planetary system. In fact, it is a concept that extends the connections from Earth to the Sun and between planets. It is an extension of the concept of "geophysics".

IHY 2007 is planned to coincide with the fiftieth year of 1957–1958 IGY (International Geophysical Year), one of the most successful international science programs of all time. IGY has resulted in tremendous progress in Sun - Earth connections, planetary science and the heliosphere in general, the tradition of the International Years of Science started almost 125 years ago with the first "International Polar Year". It started as "IPY" in 1882–1883, the second IPY was organized in 1932. But the World-Wide Observation Network was implemented by Carl Freidrich Gouss in 1832 after Alexander Humbolt's suggestion. With the support of the British Crown and the Russian Tsar, Gauss succeeded in establishing a network of 53 stations in places such as Greenwich, Dublin, Toronto, Cape of Good Hope. It later added 4 more in India and Singapore. The reason why the law is important is because, in fact, the structure of objects in the universe is largely determined by gravity and magnetism. Gravity is responsible for structuring planets, planetary systems, stars, galaxies. Magnetic forces at work in the solar system's plasma environment are responsible for the storage and subsequent release of large amounts of

energy in solar flares, mass ejections, and magnetic storms. The IHY, organized after the IGY, has 3 main purposes:

1) To improve our understanding of the heliophysical processes that govern the Sun, Earth and Heliosphere.
2) Continuing the tradition of international research and advancing the legacy on the 50th anniversary of the International Year of Geophysics,
3) To show the world the importance of Space and Earth Science.

Scientific Goals are listed below:

1) To develop the basic science of heliophysics through interdisciplinary work,
2) To determine the response of terrestrial and planetary magnetospheres and atmospheres to external factors,
3) To determine the solar heliosphere and to encourage the research on the interstellar medium, that is, towards the new frontier,
4) To encourage international cooperation in the research of heliophysical phenomena, now and in the future,
5) To convey the results of IHY to the scientific community and the public on the IHY website.

Since 1988, the UN, through its Space Applications Programme, has supported the establishment of UN Regional Centers for Space Science and Technology in Africa, Asia and the Pacific, Latin America and the Caribbean, and the West.

It publishes reports submitted by all countries on its website. Reports were presented from many centers such as Austria, Moscow, Greater Arab Emirates, Italy, Romania, China, Pakistan, Germany, Brazil, South Africa, Iran, Mexico, Japan, USA, Canada, Czech Republic, Korea, Croatia, and symposiums were held. It was last reported in 2021 by Russia and the Greater Arab Emirates. In Turkey, a symposium was held in September 2010.

Tulunay underlines that space weather shows by conditions in the Sun and solar wind, Earth's magnetosphere, ionosphere and atmosphere. Space weather is primarily an astronomical phenomeon that encompasses various fields of science, such as interdisciplinary physics, engineering, due to solar activity and cosmic rays.

Tulunay and her friends [6, 14, 17] have a project named I love my Sun. It is an educational Project for primary school children aged 4–11. Firstly, as the European COST 724 project, it was made by Y. Tulunay and her team. Throughout the Project, students were asked to draw pictures about the Sun. Afterwards, a 20 –minute presentation was made by a scientist from the related field and students were asked to draw a picture again. These drawn pictures were compared as before and after. The Czech Republic version of the Project was made in 2014 in 16 classrooms. In Spain, it was made for 60 students.

Weather in space, which has numerous satellites and has become the field of activity of many countries, has also become important. The one-to-one effects of changes in space weather in daily life on Earth are very limited, but satellites are very affected. When we say space, we usually mean over 100 km. So, what effect does it have on us at ground level? As a matter of fact, the effects that we can see in daily life are very limited. Because it depends on many factors. But at higher levels it usually has a huge impact on

satellites. It causes some electrification on satellites. It makes the atmosphere expand. Increases drag force. It can cause them to fall out of their orbits or change their orbits. It affects the activities of astronauts on the International Space Station, located 400–500 km away. Although they are protected, they are still exposed to radiation. Many airline flights are around 10 km and it causesan increasein the radiation at these levels. Therefore, the amount of radiation dose should be measured in these flights. It also causes ground-level power outages. "Possible effects are more visible in higher latitudes. A solar storm in 1989 caused a power outage in a Canadian province for 6 h. These effects depend on latitude and the intensity of solar activity. We see it mostly at higher latitudes. We see at latitudes above 50–60 °, the best example of this is the polar auroras. Aurora is actually the release of energy from the sun into the atmosphere. From there, we understand that some particles from the sun filled the atmosphere with mass energy. Therefore, we see its effects more frequently in higher latitudes. As a result of a very strong solar storm and geomagnetic storm in 1989, all these electrical structures, railways or bridges in the Upper latitudes, and their expansion and contraction in the latitudes below these aurora belts are affected by the currents coming from above. Or pipelines carrying oil and natural gas have wear limits, there are loads exceeding those limits. Countries in the latitudes that put more satellites and are affected by it usually map out which regions will be exposed to power cuts in advance and take some precautions accordingly."

Kaymaz Z. et al. [39, 43] say high-energy particles enter the atmosphere, which happens during solar flares. There are more events that increase the radiation dose. It's also something to do with solar radiation. Especially with the development of the computer age, meteorologists for a long time make weather forecasts. Especially the space weather, which we call 'Space Weather', gained a great speed after the 2000 s. Therefore, according to the studies done in the world, the duration of the predictions is a bit long, but we have models and measurements that make the predictions. Measurements are made in different regions with satellites. Meteorology is so developed that there is a meteorology station in every village. We can calculate when the mass from the sun will reach the earth. So predictions are made. Space weather studies in Turkey are carried out for the first time in the Upper Atmosphere and Space Weather Laboratory established at Istanbul Technical University. Modelling studies and measurements are being made.

Space weather is closely related to satellite construction. Scientists believe that solar air can cause satellites to fall out of their orbits. Over the past year, the European Space Agency's Swarm constellation, which measures magnetic fields around Earth, has begun displacing the atmosphere ten times faster than before. European Space Agency (ESA) officials said that the Swarm satellite, which studies the Earth's magnetic field, has sunk into the atmosphere due to solar storms [40]. More solar wind activity, sunspots, solar flares, and coronal mass ejections are being produced at an increasing rate. "There's a lot of complex physics that we still don't fully understand going on in the upper layers of the atmosphere where it interacts with the solar wind [41].

Space Weather forecasting is the prediction of abnormal or intense eruptions on the Sun and their effects on the Earth's Magnetosphere. Space Weather forecast products also contain information about the geomagnetic latitudes affected by this event. National Space Program and Strategic 10 Goals [42]: The National Space Program has been prepared for the coordinated and integrated execution of our country's vision, strategies,

goals and projects in the field of space policies in order to evaluate the current potential in our country, considering the developments in the world. The National Space Program is a comprehensive project prepared for the coordinated and integrated execution of our country's vision, strategies, goals and projects in the field of space policies in order to evaluate the current potential in our country, considering the developments in the world.

Objectives of the National Space Program is listed below: Developing technologies and necessary infrastructures that will stand out within the framework of the needs and capabilities in the field of space technologies, reducing the foreign dependency, planning for the use of space technologies as a tool in the development. They carry existing talents and achievements in the field of space further with national technologies, contributing to the scientific knowledge and experience of humanity, increasing space awareness the country's people, especially young people.

In the 100th anniversary of the Republic, a hard landing will be made on the Moon with a national and original hybrid rocket that will be fired in close Earth orbit with international cooperation. In the second stage, the first launch will be made, this time with a national rocket, and a soft landing will be made on the Moon. By sending a traveling vehicle to the lunar surface with national technologies and more experience in launch technologies and space systems operating in deep space and providing space history will increase awareness with space, ıt is aimed to contribute to world science and technology with scientific experiments on the traveling vehicle.

Space and Astrophysics awareness will be created in order to develop effective and competent human resources in the field of space. Graduate and doctorate scholarships will be awarded in clearly defined fields. National and international summer schools, courses and workshops will be organized.

Bangir Alpan and his friends [25] searched that mental arithmetic education on the visual perception development of five-year old children. The study was conducted at Ministry of Agriculture and kindergartens. Demirci [24] studied to identify the effect of visual perception education on the development of visual perception in the children of five-six ages. Yildirim S. et al. [22] studied the effect of Montessori and mandala education provided to pre-schoolers to visual perception behaviours. They used Frostig Visual Perception Test was applied which was developed by Frostig.

Kurtz [26] explain the concept of visual perception is explained as the ability to recognize, distinguish, group and interpret visual stimuli with previous experiences. A. Reinartz and E. Reinartz [29], while describing visual perception, emphasized that visual perception is not just the ability to see. On the other hand İ. B. Orhon [27] stated that the interpretation of a visual stimulus is realized by the brain, not by the eye. Frostig examined the basis of visual perception behaviour by dividing it into five sub-areas. These sub-fields are; eye-motor coordination, shape-ground distinction, shape constancy, perception of location with space, perception of space relations.

[32] One of the similar study is to raise social awareness about space weather, earth, space air and sun through extra-curricular education and body percussion work. It is known that children are familiar from the time they are in the mother's womb. Rhythm studies, education and training programs, which are thought to contribute positively to each of the fields of it can be designed for children of all age groups, primitive since ages, body music has been applied in pre-school institutions in early childhood at the primary

school level, which the Ministry of National Education (MEB) deems appropriate. It can be seen that rhythm study groups have a special place in their weekly programs and different activities can be seen. It can be used actively in education and teaching methods. Saraç [35, 36] underlines that it is appropriate to organize for primary school children. It is observed that he talks about the importance of rhythmic skills in activities and music studies.

When the musical achievements and indicators of 8-year-old children attending MEB Primary School are examined, it is observed that preschool, primary school 1-2-3 achievements, rhythm. Their development related to body movements can be noticed and it can be said that they can accompany with basic body music practices. According to Açılmış and Kayıran [30], it appeals to many senses. With such studies, developmental areas can be supported and positive contributions can be made to the education process in terms of children's learning while having fun (pp.221–222). With the approval of the Ministry of Education. It can be said that one of the most basic of the rhythm activities used in for education and training is the use of body percussion, that is, body music [38]. It can be mentioned that the sounds created by the use of different parts of the body are transformed into a kind of music. Çetin [33] predicted, it can be said that body music exercises can also be used actively in line with the skills and needs of children in rhythm practice (p.74). Body music, which is known to be made by using different forms of sound, such as clapping hands, snapping fingers, hitting the chest and the tops of the legs with the help of the hands, tapping the feet on the ground. Although its effect on children's cognitive, psychomotor, emotional and social development can be mentioned, it can be said that its contribution to children's learning skills is also important. It can be observed that the realization of rapid learning with the help of rhythm studies also allows the use of rhythm studies in education and training. It can be said that the contribution of rhythm studies to children's emotional and social skills is also related to their self-expression skills. Türkmen [37], within the scope of Special Teaching Methods, emphasizes the importance of teaching music with rhythm and the use of rhythm studies in general teaching methods in terms of children's skills (pp. 80–98). The fact that children can express themselves with body music in line with their developmental level also contributes to many learning and teaching practices. It can be said that it has caused its inclusion in the method children's creativity development. It can also be said that the improvisation studies, which are thought to support the children, are more efficient than the choreographies taught to children by imitation, and that these studies are important in terms of gaining self-confidence. Alpagut et al. [31] underlines the need and importance of improvisation in terms of the development of self-confidence in children (p. 75). In the Specific Music Teaching Methods, in which improvisation studies are actively involved. [19] Bentz studied with students in different arts and climate change project.

Mentioning the importance of improvisation and rhythm studies, [35]'s rhythmic. It is also observed that it emphasizes the importance of studies and their use in education (pp. 137–198). In the music study carried out within the scope of the Scientific Research Project (B.A.P.), body music used to observe their attitudes towards awareness, in other words, measurement was expected to contribute as an intermediary. Understanding students' sun awareness in the study.

For the purpose of singing, a study of singing was done without using the sun and related terms and again together. It is provided to be accompanied by the body percussion movements studied. Lyrics for children the study, which was prepared to arouse curiosity, in itself, the awareness of the sun. It was evaluated in two stages, before and after the information. Ozgül and friends [34] researched researched the importance of learning by having fun and improvising on the subject for primary school children. It can be said that it emphasizes and predicts that learning will be easier (p.119). Önal [7] carried out a study in order to determine autistic children's responsiveness and predisposition towards music education. Savan Anna [8], says music effects people physiological and biochemical, so it is important for education. Gürbüz and his friends [9] studied the effects of the lessons taught with educational songs and games in the "Let's Get to Know the Matter" unit of the 4th grade primary school science lesson on the academic success and permanence of the students. Yangın et al. [10] determined the effect of applications supported with children's songs in primary school 4th grade science lesson on students' learning. Ata P. [11] searched the effect of music and drama on learning. Aydın S. et al. [12] investigated the effect of the use of the process evaluation method on the academic success and permanence of the student in the unit of study. Başer A. [13] searched that if music clearly contributes to language, social life, personality, mental and emotional situation. Sen Y. [15] studied recent developments in the importance of music in the preschool period, to enrich the preschool programs by using the effect of music on children, to determine the role of music. They make the art of music popular in these institutions. N. Devi et al. [23] aimed to development, standardize and validate a 'Questionnaire on Music Perception Ability' that can be used as a tool to classify the individuals as with and without musical abilities. Tugrul B. and her friends [28] study of the effect of the frostig developmental visual perception educational program on the visual perception levels of six aged children.

In the first stage of the present paper, students were asked to answer the questionnaire, it was determined whether children had knowledge about sun awareness and related topics. The purpose of the study was not mentioned in order to evaluate them. At this stage it was expected that they would reflect their knowledge with body music, thus sound intensity. To the music of the song children, accompanied by body movements and sounds, express themselves through improvisation expected and recorded.

The children, who were informed about the awareness of the sun, performed the same music for the second time. They were asked to do this and they were expected to think about the information they learned together with the lyrics. They were asked to reflect on the loudness in body music. Then students were asked to answer the questionnaire again. As a result of the studies evaluation of questionnaires were analysed. The next part is related with methodology. The third part of the paper covers results.

2 Material and Method

In this section, the research model, sampling, how the data were collected and data analysis are included. Flow chart of this study is below (see Fig. 1):

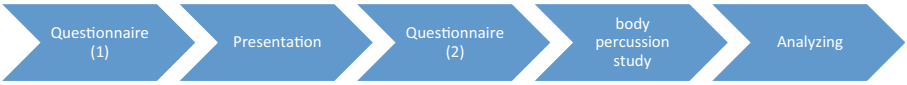


Fig. 1. Application of the research on music perception ability

2.1 Study Area

Our survey work; was built in Halkalı Cumhuriyet Primary School in Küçükçekmece district of Istanbul.

In line with the basic objectives of Turkish National Education, the school aims to raise our children as individuals with personality, adhering to the Principles of Atatürk, loving their homeland, nation and flag, in accordance with the National Education Basic Law, in accordance with the 2023 Education Vision Plan of the Ministry of National Education. There are 37 teachers and 918 students in school**.**

In addition, the school is involved in many different international projects under the headings of e twinning, e-safety, Erasmus, waste material recycling, reading to my brother, white flag, nutrition-friendly. At the school, between 2020–2022, with the cooparation of Poland and Germany, the Erasmus Project has been realized eithin the scope of Erasmus K229 named "Making Math More Motivating". In 2021, an e-twinning project conducted with international teachers from Poland, Albania, Italy, Portugal, Romania and Turkey. In the project, students would find solutions to the problems they encountered while traveling in space with STEM education. They provided STEM education to their students. They conducted interdisciplinary studies using the disciplines of Science, Mathematics, Engineering and Technology. Their students got chance to meet with international students at different schools. Their students did many activities with different schools. The goals of their project are:

1- To enable the students to learn interdisciplinary topics
2- The students get to know different cultures
3- To develop students' knowledge in engineering projects
4- Students learn web 2.0 tools

2.2 Method

The first stage of the survey study was conducted on students in the 8-year-old group. In the continuation of the work, the first questionnaire was applied to all students, then a song related to the subject was sung with the students accompanied by the ukulele and the body percussion was worked on. Afterwards, a 20-min presentation on space, space air, earth, planets was given by expert professors. The following questionnarie was filled by all students again. The video and voice records were taken from students.

3 Results

The sample of the study consisted of 8-year-old children studying at Halkalı Cumhuriyet Primary School in Küçükçekmece district of Istanbul in the 2022–2023 academic year.

Table 1. Demographic information of students

Gender	N	Age
Female	10	8
Male	10	8
Total	20	20

The demographic information of the sample group included in the study is given in Table 1, 2 and 3.

As seen in Table 1, 20 students participated in our study. Half of them are girls and half of them are boys, but all of them are 8 years old.

Table 2. Educational status of the parents

Mother	Father	Other	Literacy
1	1	0	İlliterate
0	0	0	Primary school
1	5	0	High School
18	14	0	University
20	**20**	**0**	**Total**

When the educational status of the parents was analyzed, it was found that 90% of the mothers have university degree, 5% have high school degree, and 5% were illiterate; It was concluded that 70% of the fathers have university degree, 25% have high school degree, and 5% were illiterate, (Table 2).

Table 3. Distribution of answers to some questions

	Yes	No	1 year and lower	2 years	3 years and more	not watching documentaries	nature and science	nature and science + culture and art	Total
Q_4	18	2							**20**
Q_5			4	9	7				**20**
Q_6	18	2							**20**
Q_7	15	5							**20**
Q_8						5	8	7	**20**

According to **Q_4**, 10% of the students did not receive early childhood education, (Table 3). According to **Q_5**, 20% of those who receive early childhood education have a period of 1 year or less, 40% 2 years, the remaining 40% have received early childhood education for 3 years or more. According to **Q_6**, 10% of the students do not have a library at home. According to the question **Q_7**, 75% of the students who have a library at home have books on space, nature and planets in their library. According to **Q_8**, 25% of the students do not watch any documentaries, 40% only watch documentaries about nature and science, 35% watch documentaries on nature, science, culture and art (Table 3). In our research, Wilcoxon signed-rank test was used to investigate the effectiveness of education [20–22].

Table 4. Evaluation of Questions (**Q_4, Q_5, Q_6, Q_7, Q_8**) Before Presentation.

	Q_4	Q_5	Q_6
Mean	1.1000	2.1500	1.1000
Median	1.0000	2.0000	1.0000
Mode	1.0000	2.0000	1.0000
Std. Dev	0.3077	0.7451	0.3077
Variance	0.0950	0.555	0,095
Minimum	1.0000	1.0000	1.000
Maximum	2.0000	3.0000	2.000

Table 4 indicate that mean value of Q_4 is 1.1000, Q_5 is 2.1500 and Q_6 is 1.1000. Standart deviation of these questions are 0.3077, 0.7451 and 0.3077. A small differences in the standart deviation shows that the values in the data set are close to each other.In addition the standart deviation values in questions 4 and 6 are equal to each other.

Tables 4 and 5 show some differences and slight increase between standard deviation and variance of questions before and after presentation.

Table 5. Evaluation of Questions (**Q_7** and **Q_8**) Before Presentation & After Presentation

	Q_7	Q_8_1	Q_8_2	Q_8_3	&	Q_7	Q_8_1	Q_8_2	Q_8_3
Mean	1.2500	0.7000	0.6000	1.2000		**1.3000** ↑	0.6000	**0.7000** ↑	1.2000
Median	1.0000	1.0000	0.0000	0.0000		1.0000	1.0000	0.0000	0.0000
Mode	1.0000	1.0000	0.0000	0.0000		1.0000	1.0000	0.0000	0.0000
Std. Deviation	0.4442	0.4701	0.9403	1.5078		**0.4701**↑	**0.5026**↑	**0.9787** ↑	1.5078
Variance	0.1970	0.2210	0.8840	2.2740		**0.2210** ↑	**0.2530** ↑	**0.9580**↑	2.2740
Minimum	1.0000	0.0000	0.0000	0.0000		1.0000	0.0000	0.0000	0.0000
Maximum	2.0000	1.0000	2.0000	3.0000		2.0000	1.0000	2.0000	3.0000

Table 5 shows that the value of mean and standart deviation of Q_7 and Q_8_2 are increased before presentation and after presentation. On the other hand the value of mean of Q_8_1 is decreased and the value of standart deviation of Q_8_1 is increased. But the values of Q_8_3 don't show any differences in comparison with the before and after presentation.

4 Conclusion

In this section, the results of the analysis made with SPSS are given by dividing them into sub-headings.

4.1 Gender and Score Relationship Analysis

Relational data on gender score is given at Table 6.

Table 6. Descriptive statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Gender	20(pre+post)	1.5000	0.5063	1.0000	2.000
Score	40(pre+post)	2.4500	0.4748	1.0000	3.00

Table 7. Evaluation of wilcoxon test

		N	Mean Rank	Sum of Ranks	Z	p
Score-gender	Negative Ranks	1	3.50	3.50	−3.702	0.000
Score-gender	Positive Ranks	18	10.36	186.50	−3.702	0.000
Score-gender	Ties	1				
	Total	20				

12^{th}, 14^{th} and 15^{th} questions in the questionnaire, when we assign a score value to the average of the questions and investigate the effect of this average score on gender, since our research group's N value is less than 30, when we apply the Wilcoxon Test, one of the non-parametric tests, since the score and gender averages are different from each other, and the p value is less than 0.005. There is a significant difference between the mean score of the questions and the gender (Table 6).

Table 7 shows results of Evaluation of Wilcoxon Test. P values (0.000) explain that there is a significant difference between mean score of questions, 12, 14 and 15 and gender distribution.

Table 8. Descriptive statistics for gender-presentation relation

	N	Mean	Std. Deviation	Minimum	Maximum
Gender	40	1.5000	0.5063	1.000	2.000
Presentation	40	1.5000	0.5063	1.00	2.00

4.2 Analysis for Students Awareness of Solar and Earth System

Analyses descriptive statistics for questions number 10 and 11 after presentation for boys and girls do not show an important difference. Table 9 shows values are same for pre presentation and post presentation activity for boys and girls.

Table 9 shows values are same for pre presentation and post presentation activity.

Table 9. Presentation differences

		N	Mean Rank	Sum of Ranks	Z	p
Gender-Presentation	Negative Ranks	10	10.50	105.00	.000	1.000
Gender-Presentation	Positive Ranks	10	10.50	105.00	.000	1.000
Gender-Presentation	Ties	20			.000	1.000
	Total	40				

According to the Tables 8 and 9, about the survey, when the relationship between presentation and gender was examined, it was observed that presentation did not make a significant difference on gender, since the mean values were equal to 10.50 and the p = 1 value was greater than 0.005. As a conclusion, there is no difference was observed between female students and male students in terms of the permanence of the presentation. When the 9^{th}, 10^{th} and 13^{th} questions are examined, there is a significant difference between the 9–1 question and the presentation since the mean values are different and the p value is less than 0.005. The training provided was beneficial in terms of sun, solar and earth system awareness.

When the question numbered 9–2, namely space air, in the questionnaire was examined, it was observed that the presentation raised awareness about the subject of solar system, since the average values were different from each other and the p value was less than 0.005.

After the values for the earth item no. 9–3; since the mean values are close to each other and the p value is greater than 0.005, it has been observed that the presentation given to the students does not make a significant difference in the formation of their awareness on solar and earth systems. It is concluded that the students have participated in another pilot space supported by EU. For this reason, awareness level of the students are high.

In the 11th question and since the p value was greater than 0.005, it was observed that the presentation given to the students was not related to the student's previous participation in a science workshop. In the chosen institution, students already have prior knowledge in this field; It would be beneficial to make a similar application in schools in other geographical regions and with different dermographic characteristics. Similar studies would be extended and beneficial to outreach. These activities would be some part of future plans and an infrastructure on this subject in the future, and this will raise awareness in the society. For this reason we build a web site for outreach of the subject. It is www.ssaoutreach.aydin.edu.tr [18].

4.3 Conslusions and Recommendations

This study has a contribution to primary school education programs, considering the combination of music and survey work and the effect of art on the learning speed of individuals. Similar to the study of Tulunay Y. [6] and her team, positive results were obtained. Considering that the group selected for the study have already knowledge some information on this field, a positive result were still observed in comparison with pre and post training programs. Boys and girls have no difference for the first and second stage reactions. In addition to this specific situation, the sample group can be selected wider so that the social contribution will be more meaningful. For the future work, the study would become more comprehensive if this study is applied among student groups with different demographic structures.

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APPENDIX- Questionnarie

SPACE AIR, EARTH AWARENESS LEVEL DETERMINATION SURVEY

Dear Participant,

Thank you very much for taking the time to complete this survey. The purpose of this survey is to determine the awareness levels of students aged 7-11 about space weather, earth, sun and planets. Your answers and evaluation that will guide us are very important for the next stages of this research.

It is not possible to access the data to be obtained in this study within the scope of the protection of personal information and to use the shared information for other than its purpose.

All questions must be marked. None of the questions asked will be used for scoring you.

SECTION 1

1. How old are you? ( ) lower than 8 ( ) 9 -10 ( ) 11

2. Gender: ( ) Female ( ) Male

3. Educational Status of Your Elders With Whom You Live At Home (Mother, Father, Other…)

Mother: ( ) illiterate
( ) primary school
( ) high school
( ) university

Father: ( ) illiterate
( ) primary school
( ) high school
( ) university

Other : ( ) illiterate
( ) primary school
( ) high school
( ) university

4. Did you receive early childhood education before starting primary school (like nursery, kindergarten)?

( ) Yes ( ) No

5. If you received early childhood education (nursery, kindergarten), how many years did you take?

( ) 1 year or lower than ( ) 2 years ( ) 3 years and more

6. Do you have a library in your home?

( ) Yes, I have ( ) No, I have not

7. If your answer to question 6 is yes, do you have books about nature, space, planets in your library?

( ) Yes, I have ( ) No, I have not

SECTION 2

8. What kind of documentaries do you prefer to watch on television and other digital media? (More than one option can be ticked)

( ) Nature and Science ( ) Art or Culturel ( ) I don't watch documentary

9. Which of the following concepts have you heard before? (More than one option can be ticked, you can mark by putting an X in the boxes.)

Space weather includes the environmental conditions created by the sun and solar winds in the earth's and atmosphere layers. These conditions, electronics etc. on earth demands affect human health. Studies are underway to estimate the effects on biological and technological systems.

( ) Sun ( ) Space Weather ( ) Earth

10. Which of the following concepts have you heard before? (More than one option can be ticked, you can mark by putting an X in the boxes.)

The plasma emitted as a result of solar activities collides with these charged particles and ripples, forming a tail in the opposite direction and takes the form of a drop. The particles trapped in the tail section accelerate towards the poles of the Earth, which is a giant magnet, as a result of fluctuations. Particles reaching the upper layers of the atmosphere transfer their energy to the atoms and molecules there. After this energy transfer in the polar regions where the magnetic field lines of the Earth are concentrated, atoms and molecules that gain extra energy emit this energy in the form of light. The light show, which is as intense as the amount of particles in the solar wind, continues until all the extra energy transferred is transformed into light. Particles flowing from the magnetic tail towards the poles reach both poles at the same time, and aurora lights occur at both poles at the same time. Aurora lights, which contain high amounts of particles, give an impressive spectacle to the audience, but can interfere with radio and GPS signals or cause power outages.

( ) Northern Lights ( ) Solar System ( ) Planets

11. Have you ever attended a science workshop or an event such as a science camp? ( ) Yes, I joined ( ) No, I did not joined

12. The education I received at school; arouses my curiosity about space weather, sun, planet, earth.

( ) I don't agree ( ) I am undecided ( ) I agree

13. When I hear about space weather and universe in the cartoons and documentaries I watch, I read these subjects from the internet, books, etc. I search

( ) I don't agree ( ) I am undecided ( ) I agree

14. Space weather is an important concept for the earth.

( ) I don't agree ( ) I am undecided ( ) I agree

15. There is a relationship between space weather and the earth.

( ) I don't agree ( ) I am undecided ( ) I agree

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