Science Heroes Association

Girls Meet Science Project

Impact Analysis Report

BİLİM KAHRAMANLARI DERNEĞİ

SİVİL TOPLUM İÇİN DESTEK VAKFI 5. YIL

BAU STEM
Science • Technology • Engineering • Mathematics

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INTRODUCTION

Girls Meet Science Impact Analysis Report aims to examine the impact of the project on students and teachers, which was implemented in the second year of the 2019-2020 season within the scope of the Children's Fund of the Support Foundation of Civil Society (STDV) and carried out with the support of the donors who participated in the Giving Circle event.

"Girls Meet Science" project aims to provide science, technology, engineering, and mathematics skills (STEM) to children between the ages of 6-10, to raise awareness in the field of coding, to gain experience in areas such as project development, teamwork, and presentation.

Within the scope of the project, this season, teams consisting of girls selected from the primary school level of public schools from different provinces have prepared for the *FIRST*® LEGO® League Explore event with their teachers. Teams of girls continuing to work on “BOOMTOWN BUILDSM” challenge, which is the 2019-2020 season theme of the *FIRST* LEGO League Explore program, had the opportunity to share their projects at the expos. Due to the Covid-19 pandemic that has affected the world since the beginning of 2020; the teams could not make progress in a face-to-face environment and had to continue their work online while presenting their projects in online expos.

20 teams of girls participated in the 2019-2020 season of the Girls Meet Science project, and 16 of these teams participated in the fairs during the online process.

The impact analysis of this project, which aims to encourage girls to work and produce projects in STEM fields, focused on the following research questions related to the aims of the program:

Does the “Girls Meet Science” project have a statistically significant effect on the mean scores of female students' ?

- Interest in STEM fields
- Interest in STEM careers
- STEM Identities
- STEM Understanding

Does the “Girls Meet Science” project have a statistically significant effect on teachers' mean scores of ?

- Cooperation between teachers
- Teacher self-efficacy
- Teaching practices

How do participating students convey their experiences within the “Girls Meet Science” project ?

EXECUTIVE SUMMARY

- As part of the Girls Meet Science Project, 16 teams of girls have completed their work on the “BOOMTOWN BUILD” theme, which is the 2019-2020 theme of the *FIRST* LEGO League Explore program.

- Within the scope of the impact analysis studies, the students' interest in STEM fields, interest in STEM careers, STEM identities and STEM understanding scales were applied at the beginning and end of the program. In addition to the scales, focus group interviews were conducted with 14 teams to gain in-depth information about the program experiences of the teams.

- Cooperation between teachers, teacher self-efficacy, and teaching practices questionnaires were applied to the teachers guiding the teams at the beginning and end of the program.

- According to the interest in STEM scale, a comparison of the scores at beginning and at the end of the program showed that the highest increase was in the number of students who marked the options “I am interested” and “I am very interested” in the field of engineering. The increase in science followed the field of engineering. This finding suggests that the students mostly associated their studies within the scope of the program with the field of engineering and that their experiences in the program contributed to their increased interest.

- When the total scores of the interest in STEM scale are examined, it is seen that there is a statistically significant increase in the mean scores of the students’ STEM interest, in favor of the posttest. This finding indicates that there is an increase in students' interest in all STEM fields compared to the beginning of the program.

- In the interest in STEM careers scale, a comparison of the scores at the beginning and at the end of the program showed that, the highest increase was in the number of students who marked the “I am interested” and “I am very interested” options in the computer / technology specialist profession. This profession was followed by scientists and engineering professions. Computer / technology specialist profession was the profession with the lowest score by students in the pretest. The increase seen in this profession can be associated with the experience of students in the areas of interest of this profession. Despite the significant increase observed, this profession scored less than the other professions in the posttests.

- When the total scores of the Interest in STEM career scale are examined, it is seen that there is a statistically significant increase in the mean scores of the students’ STEM career interest, in favor of the posttest. This finding indicates that there is an increase in students' interest in all STEM careers compared to the beginning of the program.

- In the STEM identity scale, a comparison of the scores at the beginning and at the end of the program showed that the highest change in the number of students who marked the “I agree” and “I strongly agree” options on the scale was for the items “People around me see me as someone who is interested in / knowledgeable in science.” and “Being good at math requires an innate ability.” The answers given by the students in the pre-tests indicate that they initially defined their STEM identities based on how they were perceived by their environment and their innate characteristics, but as it can be understood from the items with the highest increase, this approach started to change in different STEM areas.

- When the total scores of the STEM identity scale are examined, it is seen that there is a statistically significant increase in the mean scores of the students in favor of the posttest. This finding indicates that there is a positive change in the STEM identity perceptions of the students compared to the beginning of the program.

- In the Understanding of STEM scale, a comparison of the scores at the beginning and at the end of the program showed that, the highest increase was in the number of students who marked the "I agree” and “I strongly agree" options in the item "I understand that science and technology can produce unique solutions to problems in our daily lives.” This finding suggests that the students started to establish the relationship between their daily lives and STEM fields within the scope of the project.

- When the total scores of the Understanding of STEM scale are examined, it is seen that there is a statistically significant increase in the mean scores of the students in favor of the posttest. This finding indicates that there is a positive change in students' understanding of STEM compared to the beginning of the program.

- Increases in student scales are ranked from largest to smallest according to effect size in the following order: Interest in STEM fields, STEM identity, STEM understanding, interest in STEM careers.

- According to the scales applied to the teachers at the beginning and end of the program, it was found that the area where teachers reported the most strong improvement was the cooperation between teachers. This finding can be interpreted as the program has provided the opportunity and experience for teachers to participate in activities where especially different classes and age groups collaborate and exchange teaching materials with colleagues etc.

- The findings obtained through the teacher self-efficacy scale indicate that teachers spent less time on classroom management at the end of the program. It should also be noted that classroom management practices were not among the basic skills expected from teachers within the scope of the project.

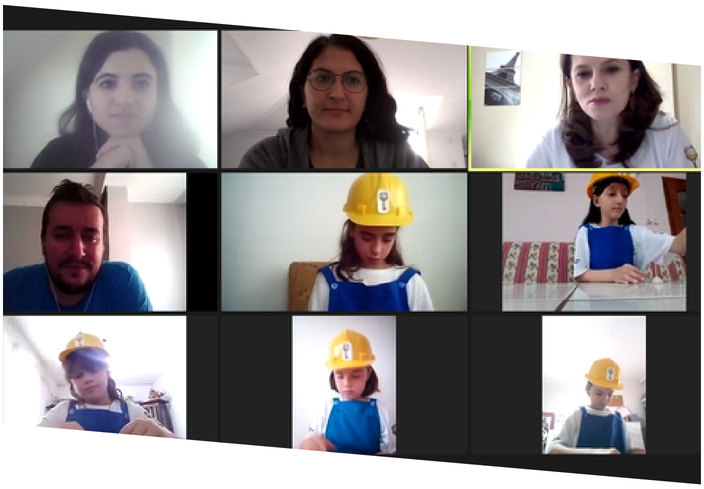
- The teaching practices scale indicated that teachers devoted more time presenting tasks for which there is no obvious solution, assigning tasks to their students that would make them think critically, and having students work in small groups to come up with a joint solution to a problem or task at the end of the program. It can be said that these actions are in line with the understanding and activities of the *FIRST* LEGO League Explore program.

- Focus group interviews showed that in the project development processes, students often focused on the concepts of resistance to natural disasters and sustainability in the cities they designed as part of the project.

- While developing their projects, students found opportunities to improve their cognitive process and social product creation skills. Combining different ideas and generating solutions stood out from cognitive process skills, while it has been observed that students especially enjoyed teamwork while creating a social product.

- The students talked about the coding work they did in the interviews in detail and stated that they enjoyed their coding experience.

- Teams often reflected their excitement, happiness and pride while conveying their experiences at the fairs.



RESEARCH METHOD

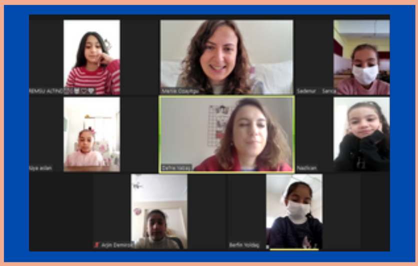
Participants

The study was carried out with 14 teams of girls supported by STDV. 56 girl students and 16 teachers were included in the study, who worked in these teams throughout the season and completed the pre-post test data. Table 1 provides information about the teams participating in the study, their age range, school, province, expo they participated in and the awards they have received.

Table 1. Participants (students)

Team Name: AVSULEGO
Province: Hatay
School / Institution: Avsuyu Primary School
Age Range: 8
Number of Students Participating in the Study: 5
Online Expo Participation: 8 November 2020
Award Received: Model Design Award

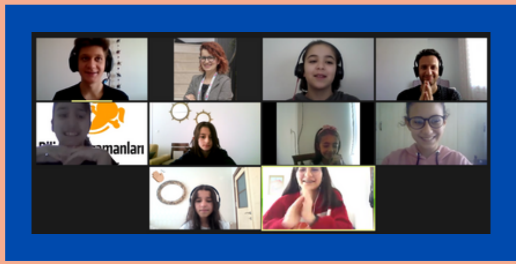
Team Name: HILAR
Province: Diyarbakır
School / Institution: Hürriyet Primary School
Age Range: 6 - 9
Number of Students Participating in the Study: 4
Online Expo Participation: 7 November 2020
Award Received: Collaborative Model Award



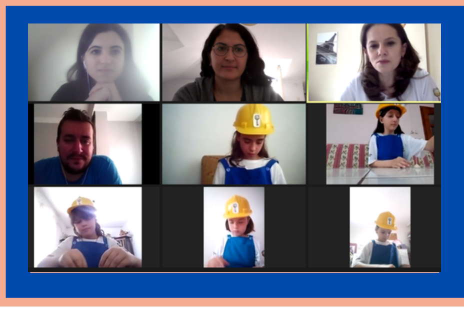
Team Name: ROBOT BATGIRL
Province: Batman
School / Institution: Nureddin Zengi Primary School
Age Range: 8 - 10
Number of Students Participating in the Study: 5
Online Expo Participation: 7 November 2020
Award Received: Explore and Discover Award

Team Name: ROBOKARS
Province: Kars
School / Institution: Fahrettin Kirzioğlu Science and Art Center
Age Range: 9 - 10
Number of Students Participating in the Study: 5
Online Expo Participation: 28 November 2020
Award Received: Discover and Show Award

Team Name: ANAVARZA
Province: Adana
School / Institution: Kozan Primary School
Age Range: 9-10
Number of Students Participating in the Study: 6
Online Expo Participation: 5 December 2020
Award Received: Creative Explorers Award

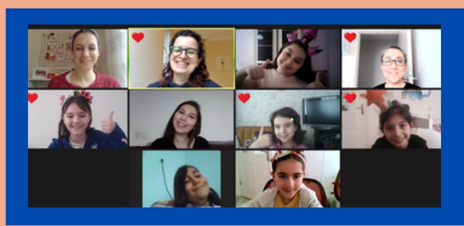


Team Name: ECO-CITY BUILDERS
Province: Edirne
School / Institution: Abalar Primary School
Age Range: 8-10
Number of Students Participating in the Study: 6
Online Expo Participation: 6 December 2020
Award Received: Cooperative Explorers Award

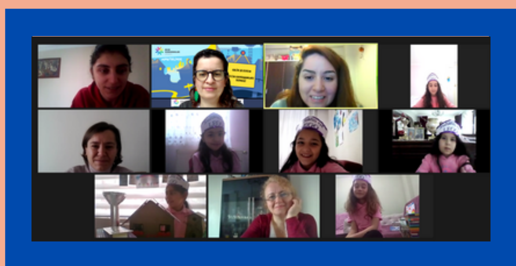


Team Name: BOMBUS ROBO*
Province: İstanbul
School / Institution: 29 Ekim Primary School
Age Range: 7
Number of Students Participating in the Study: 6
Online Expo Participation: 13 December 2020
Award Received: Innovative Explorers Award

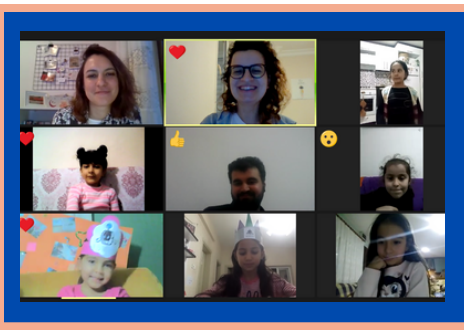
Team Name: MİNİK SEYYAHLAR
Province: Kütahya
School / Institution: Evliya Çelebi Primary School
Age Range: 8-10
Number of Students Participating in the Study: 6
Online Expo Participation: 12 December 2020
Award Received: Explore and Discover Award



Team Name: SULTANS OF LEGO*
Province: İstanbul
School / Institution: Burak Reis Primary School
Age Range: 8-9
Number of Students Participating in the Study: 6
Online Expo Participation: 26 December 2020
Award Received: Creative Show Award

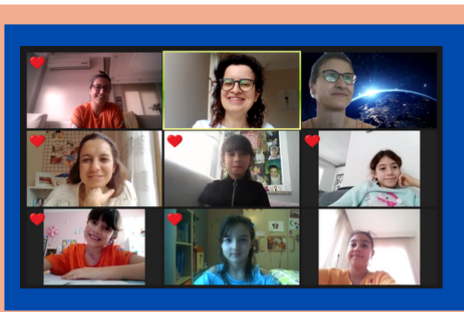


Team Name: ROBOYEN
Province: İzmir
School / Institution: Yeniköy Primary School
Age Range: 7-8
Number of Students Participating in the Study: 4
Online Expo Participation: 27 December 2020
Award Received: Explore and Discover Award



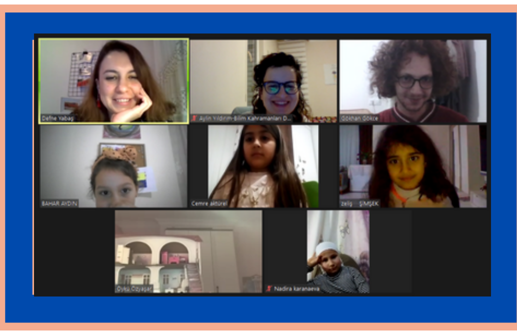
Team Name: FANTASTIC KIDS
Province: Balıkesir
School / Institution: Marmara Primary School
Age Range: 7-8
Number of Students Participating in the Study: 3
Online Expo Participation: 27 December 2020
Award Received: Innovative Model Award

Team Name: BADEMLI SEA STARS
Province: İzmir
School / Institution: Bademli Mehmet Ertuğrul Denizolgun Primary School
Age Range: 8-9
Number of Students Participating in the Study: 6
Online Expo Participation: 27 December 2020
Award Received: Creative Model Award



Team Name: ANGELS OF THE CITY
Province: Mersin
School / Institution: Anamur Primary School
Age Range: 9-10
Number of Students Participating in the Study: 4
Online Expo Participation: 19 December 2020
Award Received: Creative Show Award

Team Name: HAYAT OKULU*
Province: Antalya
School / Institution: Mahmutlar Kılıçaslan Primary School
Age Range: 8-10
Number of Students Participating in the Study: 5
Online Expo Participation: 26 December 2020
Award Received: Creative Explorers Award



*These teams only attended the focus group interviews due to missing pre-post test data.

T69% (n = 11) of the teachers included in the study are classroom teachers. Teachers whose branches are mathematics, technology technologies and English are also included in the study group. 91% of the teachers (n = 13) are women. While the rate of teachers with an undergraduate degree is 69% (n = 11), teachers who graduated from the faculty of education constitute 81% of the study group. Half of the teachers previously coached in the *FIRST* LEGO League Explore program, and 31% (n = 5) worked in different organizations.

Data Collection and Analysis

Questionnaires and focus group interviews were used to collect data from teachers and students about their program experiences. Four questionnaires were applied to the students at the beginning and at the end of the program: interest in STEM, interest in STEM careers, STEM identity, and understanding of STEM. Focus group interviews were conducted with 14 teams of girls to get in-depth information about their experiences from the students. Teachers participating in the study responded to the Teacher Cooperation, Teacher Self-Efficacy, and Teaching Practices scales at the beginning and end of the program. Detailed information on the data collection methods is described below:

All of the scales for students were adapted from the scales used in the FIRST longitudinal study of Brandeis University.[1]

Interest in STEM: There are four items in the scale regarding their interests in Science, Technology, Engineering, and Mathematics (i.e., STEM fields). In order to express their interest in these four STEM domains, students answered the items on a 5-point scale ranging between (1) Not interested - (5) Very interested.

Interest in STEM Careers: The questionnaire focused on the interest of students in professions related to STEM fields. Students were asked to express their interests in six professions, including scientist, engineer, mathematician, computer / technology specialist, STEM educator/teacher, and inventor. Students expressed their interest in these professions on a 7-point scale ranging between (1) Not interested at all - (7) Very interested.

STEM Identity: The scale included questions targeting students' beliefs in science and mathematics. Some example items from this scale are " Most people can learn to be good at math." and " You have to be born with the ability to be good at science". Students scored the items on a 5-point scale ranging between (1) Strongly disagree- (5) Strongly agree.

Understanding of STEM: The scale aimed to allow students to express how they evaluate themselves and their future in STEM fields. Some example items from this scale are " I understand different ways that science and technology can be used to solve problems in the real world" and " I can make a good living as a scientist or an engineer" Students scored the relevant items on a 7-point scale ranging between (1) Not true at all for me- (7) Very true for me.

The questionnaire for teachers had two components, (1) General information such as age, gender, professional year, previous experiences, team building criteria, etc., (2) TALIS (The OECD Teaching and Learning International Survey), which Turkey is a participant, within the scope of cooperation between teachers, teacher self-efficacy, and teaching practices.[2]

[1] Center for youth and communities, Brandeis University. (2019). FIRST longitudinal study: Technical Note. Retrieved from https://www.firstinspires.org/sites/default/files/uploads/resource_library/impact/first-longitudinal-study-technical-details-april-2019.pdf
[2] Organisation for Economic and Cooperation and Development. (2018). Teaching and Learning International Survey (TALIS) 2018. Retrieved from https://www.oecd.org/education/school/TALIS-2018-MS-Teacher-Questionnaire-ENG.pdf

Cooperation Between Teachers Scale: Teachers were asked to indicate the frequency of the practices they performed in order to cooperate with each other. Teachers rated the frequency of their practices on a 5-point scale between (1) Never – (5) Once a week or more. Some example items in the scale are " Engage in joint activities across different classes and age groups (e.g. projects))" and "Exchange teaching materials with colleagues".

Teacher Self-Efficacy Scale: Teachers were asked to indicate how often they carried out the practices that define self-efficacy. Teachers rated the frequency of their practices on a 4-point scale between (1) - Not at all and (4) - A lot. Some example items in the scale are "Helping students value learning" and "Provide an alternative explanation, for example when students are confused ".

Teaching Practices Scale: Teachers were asked how often they performed the listed teaching practices in the classroom. Teachers rated the frequency of their practices on a 4-point scale between 1 (Neve or almost never) and 4 (Always). Some example items in the scale are "I give students projects that require at least one week to complete" and " I have students work in small groups to come up with a joint solution to a problem or task. ".

After pre- and post-test matching 12 of 16 participant teachers' data was analyzed.

- Focus group interviews with groups of 4-6 people were held with the teams to gather in-depth information about the students' program experiences.

Focus Group Interviews with Teams: Focus group interviews were held online. Interviews took 45-60 minutes. One of the research coordinators facilitated the interview with students and if applicable, asked them to share any additional experiences. Audio and video recordings of the interviews were taken over the online meeting platform. During the interviews, the teams were asked about the details of the projects they prepared for the *FIRST* LEGO League Explore Program, their online expo experiences, the information they have learned, and the new experiences they had acquired within the program. 14 teams participated in the focus group discussions.

Parents signed an informed consent form for all the data, images and audio recordings collected from the students.

The data collected in the student and teacher questionnaires were analyzed with percentage, frequency analysis, and paired-sample t tests for statistical significance, and the findings are presented in this report. The audio / video recordings from the focus group interviews were transcribed and a qualitative content analysis was conducted.

RESULTS

Findings regarding student and teacher gains are presented in the following sections in parallel with the research questions.

First Research Question:

Does the Girls Meet Science project have a statistically significant effect on the mean scores of female students' interest in STEM, interest in STEM careers, STEM identity, and understanding of STEM?

Students’ Interest in STEM Fields

Table 2 presents the results of the number and percentage of students who have marked the options **“I am very interested”** and **“I am interested”** in the pre-test and post-test implementations of the interest in STEM scale.

Table 2. Students who marked the options “very interested” and “interested” in the interest in STEM scale. (n=50)

	Pre-Test		Post-Test	
	f	%	f	%
How interested are you in the *science* field?	35	70%	44	89 %
How interested are you in the *mathematics* field?	46	92%	49	98 %
How interested are you in the *technology* field?	35	70%	41	82 %
How interested are you in the *engineering* field?	32	64%	48	96 %

Table 2 shows that the highest increase in the number of students who marked the “interested and “very interested” options in the scale was in the field of engineering. Science, technology, and mathematics fields follow the engineering field, respectively. Figure 1 illustrates the percentages of students that marked the options “interested” and “very interested” in the pre- and post-tests.

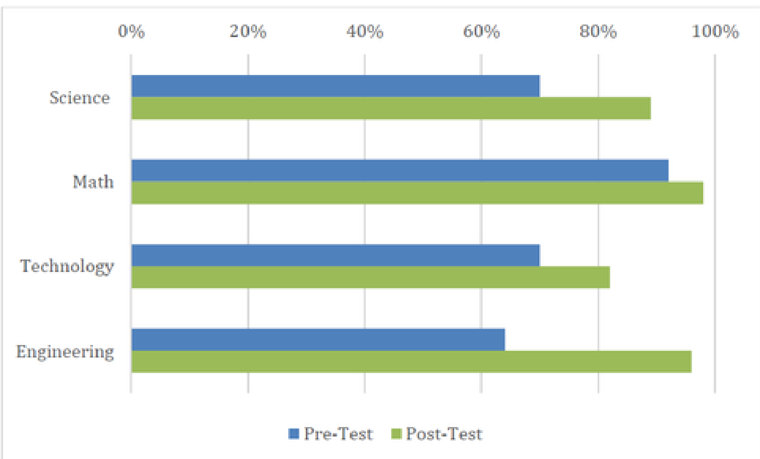


Figure 1. Interest in STEM

The students' answers for each item were scored from 1 to 5, and the total score was obtained by adding the scores from the four questionnaire items. The students' total mean scores and standard deviations in the pre-test and post-test are presented in Table 3.

Table 3. Descriptive statistics of students' interest in STEM fields

	Mean	Standard Deviation
Pre-Test	15.86	2.72
Post-Test	18.28	1.78

Table 3 shows that, when the pre- and post-test results were compared, there was an increase in students' interest in STEM Fields, in favor of the post-test. In order to test the statistical significance of this increase, paired sample t-test was applied the findings of the t-test are presented in Table 4.

Table 4. Results of the t-test of students' interest in STEM fields

	N	Mean	Standard Deviation	t	sd	p	Cohen's d
Pre-Test	50	15.86	2.72	5.08	49	.00	1,03
Post-test		18:28	1.78				

When comparing the mean scores of students' interest in STEM fields, the findings from the t-test ($t = 5.08$, $p < .05$) indicated that there is a statistically significant difference in favor of the posttest. Cohen's d coefficient, which expresses the effect size, pointed to a high level of impact.

Students' Interest in STEM Careers

Table 5 presents the results of the number and percentage of students who have marked the options "very interested" and "interested" in the pre-test and post-test implementations of the interest in STEM careers scale.

Table 5. Students who marked the "interested" and "very interested" options on the interest in STEM careers scale (n = 50)

	Pre-Test		Post-Test	
	f	%	f	%
Scientist	31	62%	46	92%
Engineer	28	56%	44	88%
Mathematician	36	72%	42	84%
Computer or technology specialist	23	46%	40	80%
STEM educator/teacher	34	68%	41	82%
Inventor	37	74%	46	92%

Table 5 shows that the highest increase in the number of students who marked the "interested” and “very interested" options in the scale was in the computer / technology specialist career. The computer or technology specialist was followed by scientist and engineering professions, respectively. Figure 2 illustrates the percentages of students that marked the options “interested” and “very interested” in the pre-and post-tests.

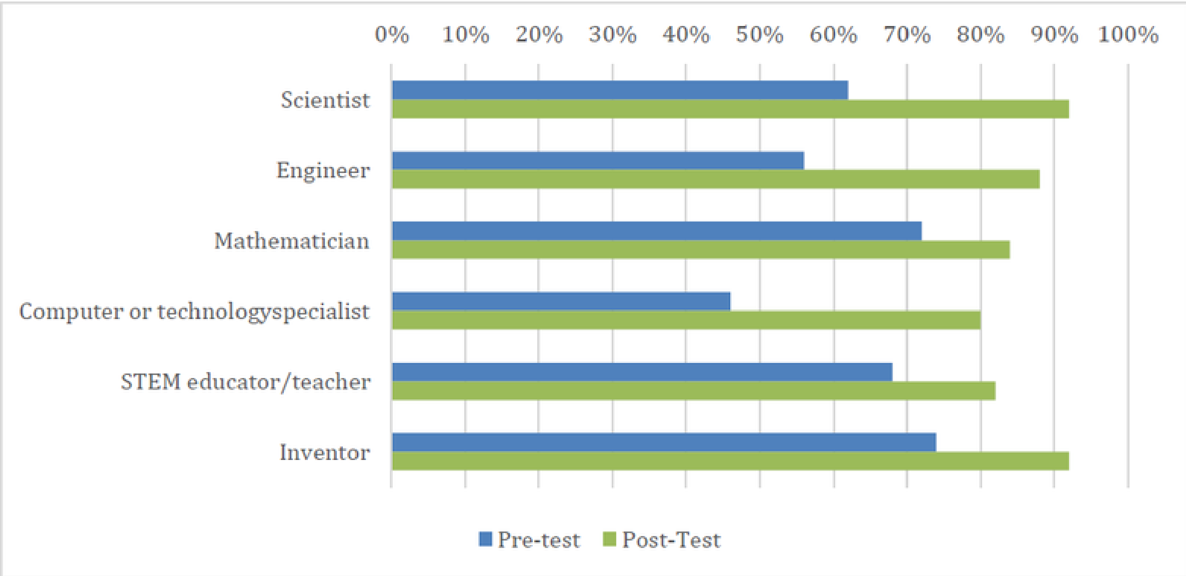


Figure 2. Interest in STEM careers

The students’ answers for each item were scored from 1 to 7, and the total score was obtained by adding the scores from the six questionnaire items. The students' mean total scores and standard deviations in the pre-test and post-test are presented in Table 6.

Table 6. Descriptive statistics of interest in STEM careers

	Mean	Standard Deviation
Pre-Test	33.06	6.32
Post-Test	36.74	4.27

Table 6 shows that, when the pre- and post-test scores are compared, an increase in students’ interest in STEM careers has been discovered in favor of the post-test. To test the statistical significance of this increase, paired sample t-test was applied. The findings of the t-test are presented in Table 7.

Table 7. Results of the t-test for interest in STEM careers

Interest in STEM Fields	N	Mean	Standard Deviation	t	sd	p	Cohen’s d
Pre-Test	50	33.06	6.32	3.46	49	.00	0.70
Post-test		36.74	4.27				

When comparing the mean scores of students' interest in STEM careers, the findings from the t-test ($t=3.46$, $p<.05$) indicated that there is a statistically significant difference in favor of the posttest. Cohen's d coefficient, which expresses the effect size, pointed to a moderate level of effect.

Students' STEM Identity

Table 8 presents the results of the number and percentage of students who have marked the options "agree" and strongly agree" in the pre-test and post-test implementations of the STEM identity scale.

Table 8. Students who marked the "agree" and "strongly agree" options on the STEM identity scale (n = 44)

	Pre-test		Post-Test	
	f	%	f	%
I see myself as a math person.	39	89%	41	93%
Others see me as a math person.	30	68%	35	80%
Most people can learn to be good at math.	38	86%	40	91%
You have to be born with the ability to be good at math. *	23	52%	12	27%
I see myself as a science person.	34	77%	41	93%
Others see me as a science person.	25	57%	36	82%
Most people can learn to be good at science.	36	82%	42	95%
You have to be born with the ability to be good at science. *	19	43%	15	34%
I see myself as a technology person.	31	70%	37	84%
Others see me as a technology person.	23	52%	33	75%
Most people can learn to be good at technology.	38	86%	40	91%
You have to be born with the ability to be good at technology. *	17	39%	11	25%

*Negative items

Table 8 shows that the highest increase in the number of students who marked the "agree" and "strongly agree" options in the scale was in the "Others see me as a science person" and "You have to be born with the ability to be good at math.". These items were followed by "Others see me as a technology person". Figure 3 illustrates the percentages of students that marked the options "agree" and "strongly agree" in the pre-and post-tests.

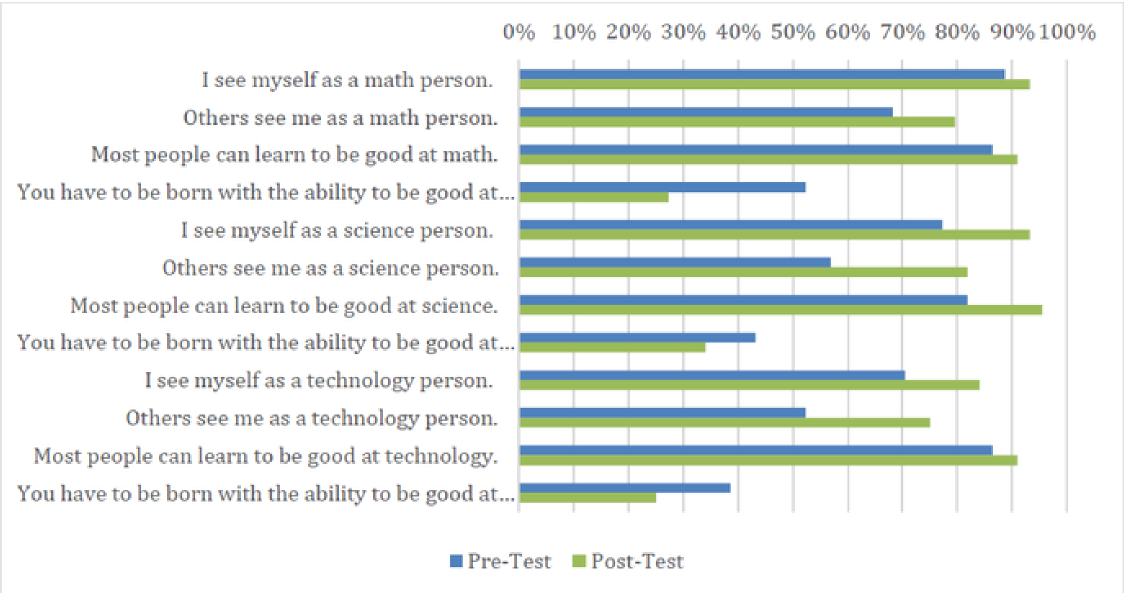


Figure 3. STEM identity

The students' answers for each item were scored from 1 to 5, and the total score was obtained by adding the scores from the 12 questionnaire items. The negative items were included in the calculation after reverse coding. The students' mean total scores and standard deviations in the pre-test and post-test are presented in Table 9.

Table 9. Descriptive statistics of STEM identity

	Mean	Standard Deviation
Pre-Test	44.41	6.63
Post-Test	48.52	4.51

Table 9 shows that according to comparison of the pre- and post-tests, there was an increase in students' STEM identity, in favor of the post-test. In order to test the statistical significance of this increase, paired sample t-test was applied. The findings of the t-test are presented in Table 10.

Table 10. Results of the t-test for STEM identity scale

	N	Mean	Standard Deviation	t	sd	p	Cohen's d
Pre-Test	4 4	44.41	6.63	3.5 8	43	.00	0.77
Post-test		48.52	4:51				

When comparing the mean scores of students' STEM identities, the findings from the t-test ($t=3.58$, $p<.05$) indicated that there was a statistically significant difference in favor of the posttest. Cohen's d coefficient, which expresses the effect size, pointed to a high level of effect.

Students' Understanding of STEM

Table 11 presents the results of the number and percentage of students who have marked the options "very true for me" and "true for me" in the pre-test and post-test implementations of the understanding of STEM scale.

Table 11. Students who marked the "very true for me" and "true for me options on the STEM understanding scale (n = 40)

	Pre-Test		Post-Test	
	f	%	f	%
I want to learn more about science and technology.	31	78%	37	93%
I can use math and science to do something interesting.	26	65%	28	70%
I have a good idea of what I want to study in college or technical school.	23	58%	27	68%
I am interested in having a job or career that uses science and technology.	19	48%	21	53%
I understand different ways that science and technology can be used to solve problems in the real world.	20	50%	32	80%
I have a good understanding of how engineers work to solve problems.	7	18%	18	45%
I know about a variety of jobs and careers in STEM (science, technology, engineering and/or mathematics).	26	65%	31	78%
I have the kinds of skills that are needed to be a scientist or engineer.	14	35%	21	53%
I can make a good living as a scientist or an engineer.	21	53%	29	73%
I would enjoy working as a scientist or an engineer.	28	70%	30	75%
I can use math and science to make a difference in the world.	29	73%	35	88%

Table 11 shows that the highest increase in the number of students who marked the "true for me" and "very true for me" options in the STEM understanding scale was for the "I understand different ways that science and technology can be used to solve problems in the real world." item. This item is followed by "I have a good understanding of how engineers work to solve problems.". Figure 4 illustrates the percentages of students that marked the options "true for me" and "very true for me" in the pre-and post-tests.

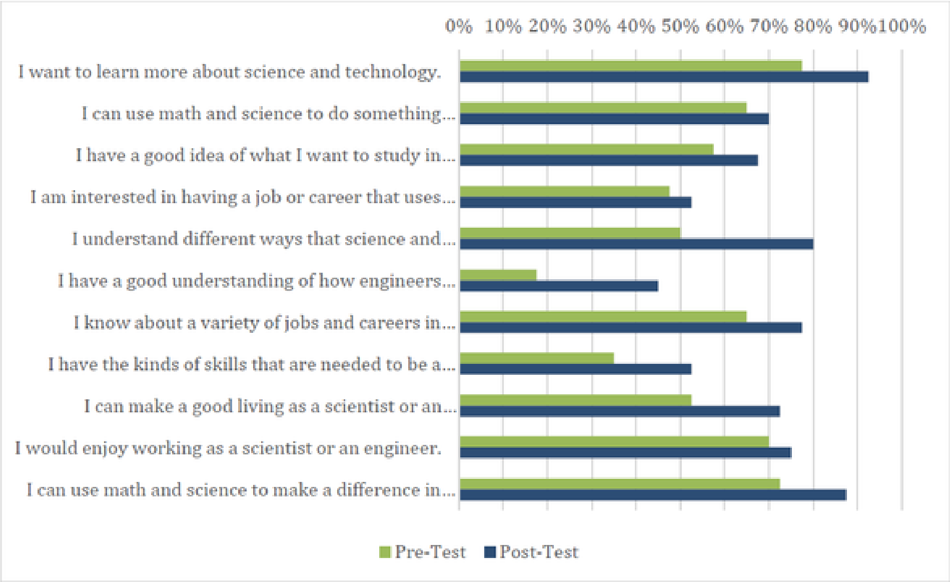


Figure 4. Understanding of STEM

The students' answers for each item were scored from 1 to 5, and the total score was obtained by adding the scores from the 11 questionnaire items. The students' total mean scores and standard deviations in the pre-test and post-test are presented in Table 12.

Table 12. Descriptive statistics in STEM understanding

	Mean	Standard Deviation
Pre-Test	57.48	13.52
Post-Test	63.58	9.00

Table 12 shows that, when the pre- and post-test results were compared, there was an increase in students' understanding of STEM, in favor of the post-test. To test the statistical significance of this increase, paired sample t-test was applied. The findings of the t-test are presented in Table 13.

Table 13. Results of the t-test for STEM understanding

	N	Mean	Standard Deviation	t	sd	p	Cohen's d
Pre-Test	40	57.58	13.52	3.07	39	.00	0.70
Post-Test		63.58	9.00				

When comparing the mean scores of students' STEM understanding, the findings from the t-test ($t=3.07$, $p<.05$) indicated that there is a statistically significant difference in favor of the posttest. Cohen's d coefficient, which expresses the effect size, pointed to a moderate level of effect.

Second Research Question:

Does the Girls Meet Science project have a statistically significant effect on the mean scores of cooperation between teachers, teachers' self-efficacy, and teaching practices scales?

Cooperation Between Teachers

Table 14 presents the results of the number and percentage of teachers who have marked the options "1-3 times a month" and "once a week or more" in the pre-test and post-test implementations of the cooperation between teachers' scale.

Table 14. Teachers who have marked the options "1-3 times a month" and "once a week or more" in the cooperation between teachers' scale (n=12)

	Pre-Test		Post-Test	
	f	%	f	%
Teach jointly as a team in the same class	2	17%	4	33 %
Observe other teachers' classes and provide feedback	2	17%	2	17 %
Engage in joint activities across different classes and age groups (e.g. projects)	4	33%	8	67 %
Exchange teaching materials with colleagues	6	50%	9	75 %
Engage in discussions about the learning development of specific students	7	58%	9	75 %
Work with other teachers in this school to ensure common standards in evaluations for assessing student progress	4	33%	6	50 %
Attend team conferences.	--	--	2	17 %
Take part in collaborative professional learning.	2	17%	5	42 %

Table 14 shows that the highest increase in the number of teachers who marked the "1-3 times a month" and "once a week or more" options in the cooperation between teachers' scale was for the "engage in joint activities across different classes and age groups (e.g. projects)" item. This item was followed by "exchange teaching materials with colleagues" and "take part in collaborative professional learning". Figure 5 illustrates the percentages of teachers who marked the options "1-3 times a month" and "once a week or more" in the pre-and post-tests.

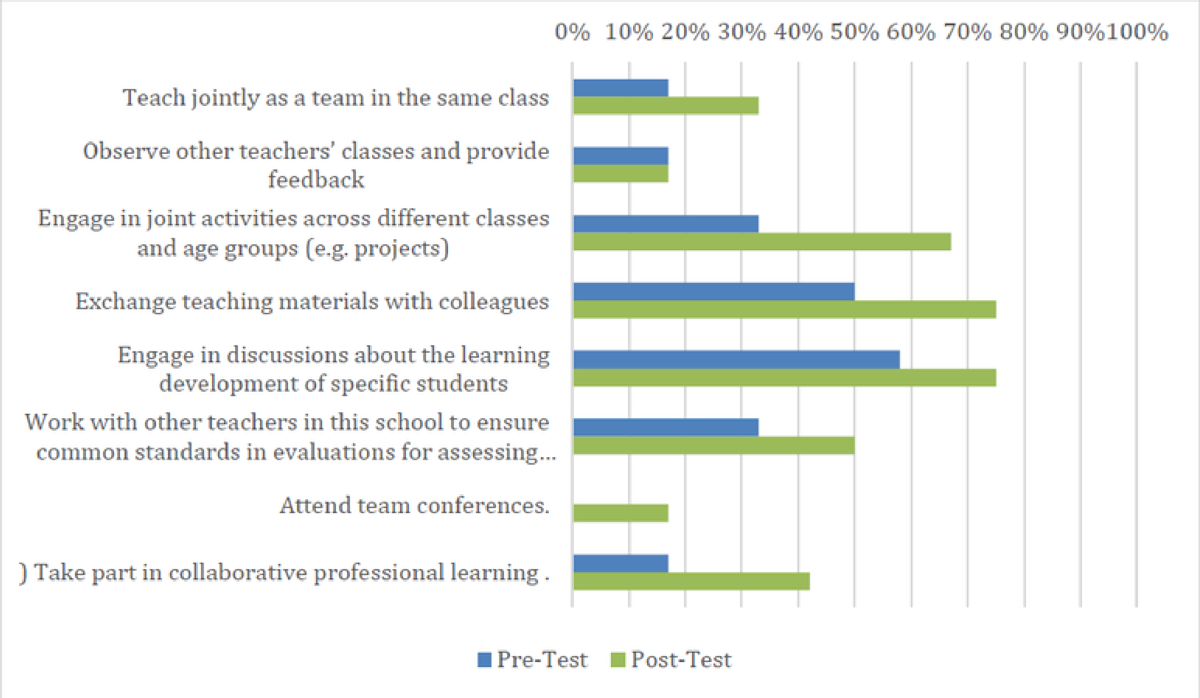


Figure 5. Cooperation between teachers

The teachers' answers for each item were scored from 1 to 6, and the total score was obtained by adding the scores from the eight questionnaire items. The teachers' total mean scores and standard deviations in the pre-test and post-test are presented in Table 15.

Table 15. Descriptive statistics for cooperation between teachers

	Median	Standard Deviation
Pre-Test	27.25	9.11
Post-Test	31.83	7.17

Table 15 shows that, when the pre- and post-test results were compared, there was an increase in teachers' cooperation, in favor of the post-test.

Teacher Self-Efficacy

Table 16 presents the results of the number and percentage of teachers who have marked the options "quite a bit" and "a lot" in the pre-test and post-test implementations of the teacher self-efficacy scale.

Table 16. Teachers who have marked the options “quite a bit” and “a lots” in the teacher self-efficacy scale (n=12)

	Pre-test		Post-Test	
	f	%	f	%
Get students to believe they can do well in schoolwork	12	100%	12	100 %
Help students value learning	12	100%	12	100 %
Craft good questions for students	12	100%	12	100 %
Control disruptive behavior in the classroom	12	100%	10	83%
Motivate students who show low interest in schoolwork	12	100%	12	100 %
Make my expectations about student behavior clear	12	100%	11	92%
Help students think critically	12	100%	12	100 %
Get students to follow classroom rules	10	83%	7	58%
Calm a student who is disruptive or noisy	11	92%	11	92%
Use a variety of assessment strategies	10	83%	10	83%
Provide an alternative explanation, for example when students are confused	12	100%	12	100 %
Vary instructional strategies in my classroom	12	100%	11	92%
Support student learning through the use of digital technology (e.g. computers, tablets, smart boards)	12	100%	12	100 %

Table 16 shows that teachers gave high scores to items related to self-efficacy in pre-tests. In the post-tests, it was observed that there was a decrease in the items primarily in “Get students to follow classroom rules” followed by “Control disruptive behaviour in the classroom”, “Make my expectations about student behaviour clear”, and “Vary instructional strategies in my classroom”. This finding can be interpreted as teachers had to devote less time to classroom management tasks at the end of the program. Figure 6 illustrates the percentages of teachers who marked “quite a bit” and “a lot” options in the pre-and post-tests.

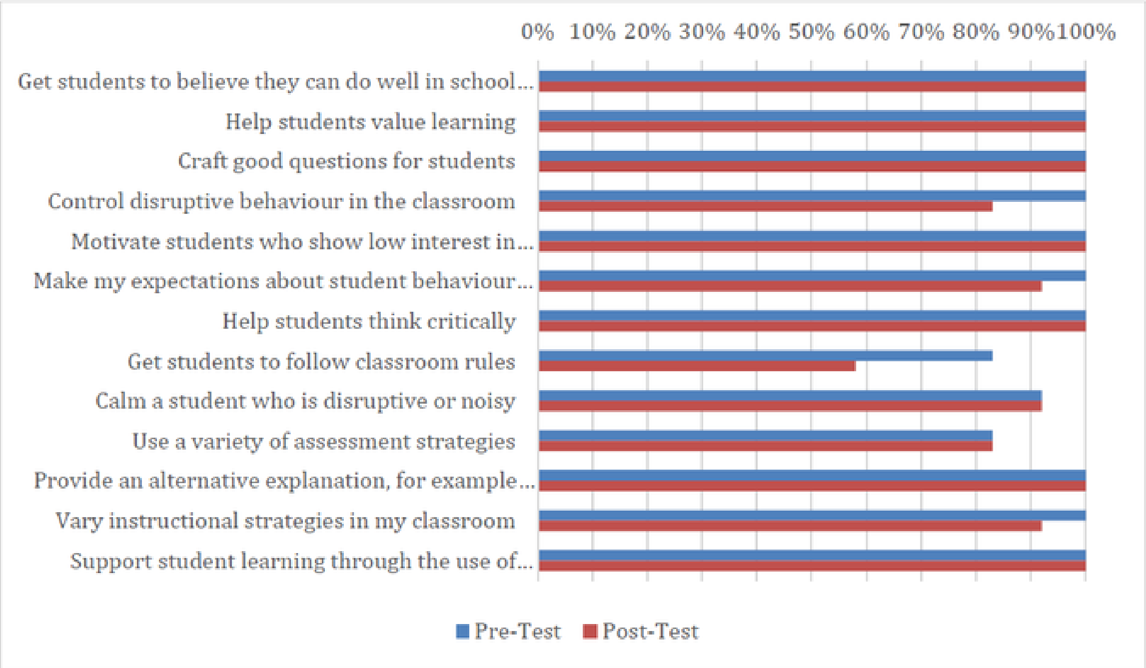


Figure 6. Teacher self-efficacy

The teachers' answers for each item were scored from 1 to 4, and the total score was obtained by adding the scores from the 13 questionnaire items. The teachers' total mean scores and standard deviations in the pre-test and post-test are presented in Table 17.

Table 17. Descriptive statistics for teachers' self- efficacy

	Mean	Standard Deviation
Pre-Test	46.42	3.80
Post-Test	45.63	5.35

Table 17 shows that there was less than a one-point decrease in teacher self-efficacy post-test total mean scores compared to the pre-test.

Teaching Practices

Table 18 presents the results of the number and percentage of teachers who have marked the options "frequently" and "always" in the pre-test and post-test implementations of the teaching practices scale.

Table 18. Teachers who have marked the options "frequently" and "always" in the teaching practices scale (n=12)

	Pre-test		Post-Test	
	f	%	f	%
I present a summary of recently learned content.	11	92%	11	92%
I set goals at the beginning of instruction.	12	100%	11	92%
I explain what I expect the students to learn.	11	92%	10	83%
I explain how new and old topics are related.	12	100%	12	100 %
I present tasks for which there is no obvious solution	4	33%	7	58%
I give tasks that require students to think critically	10	83%	12	100 %
I have students work in small groups to come up with a joint solution to a problem or task.	9	75%	11	92%
I ask students to decide on their own procedures for solving complex tasks.	12	100%	12	100 %
I tell students to follow classroom rules	10	83%	7	58%
I tell students to listen to what I say.	8	67%	9	75%
I calm students who are disruptive.	11	92%	11	92%
When the lesson begins, I tell students to quieten down quickly	5	42%	6	50%
I refer to a problem from everyday life or work to demonstrate why new knowledge is useful.	12	100%	12	100 %
I let students practise similar tasks until I know that every student has understood the subject matter.	12	100%	12	100 %
I give students projects that require at least one week to complete.	6	50%	8	67%
I let students use ICT (information and communication technology) for projects or class work.	10	83%	11	92%

Table 18 shows that the highest increase in the number of teachers who marked the “frequently” and “always” options in the teaching practices scale was for the “I present tasks for which there is no obvious solution” item. This item was followed by “I give tasks that require students to think critically”and “I have students work in small groups to come up with a joint solution to a problem or task.”. Figure 7 illustrates the percentages of teachers who marked the options “frequently” and “always” in the pre-and post-tests.

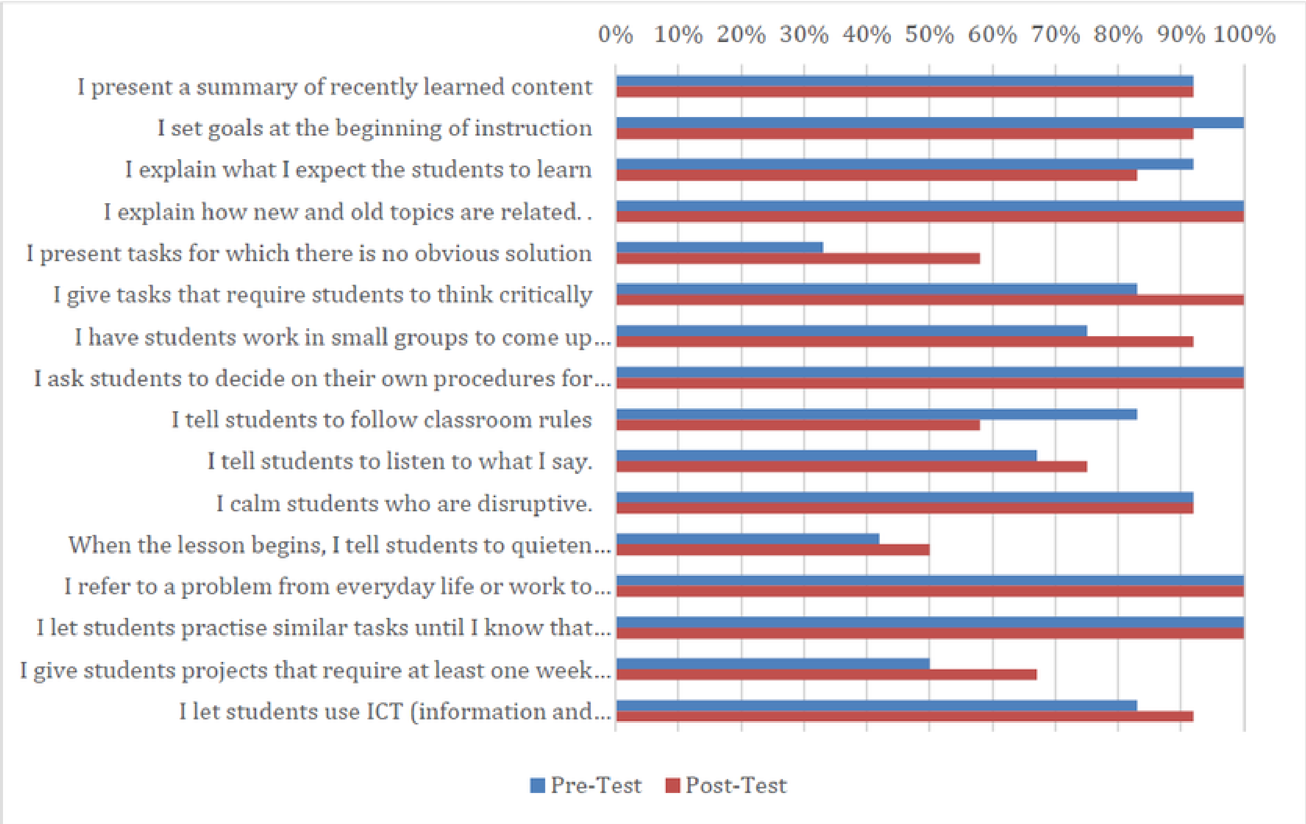


Figure 7. Teaching Practices

The teachers’ answers for each item were scored from 1 to 4, and the total score was obtained by adding the scores from the 16 questionnaire items. The teachers’ total mean scores and standard deviations in the pre-test and post-test are presented in Table 19.

Tablo 19. Descriptive statistics for the teaching practices

	Mean	Standard Deviation
Pre-Test	51.75	6.14
Post-Test	51.33	5.53

Table 19 shows that there was less than a 0.5-point decrease in teaching practices post-test total mean scores compared to the pre-test.

Third Research Question:

How do participating students express their experiences within the "Girls Meet Science" project?

The qualitative thematic analysis from the focus group interviews conducted to determine how students evaluate the *FIRST* LEGO League Explore Program process are presented in this section. The codes created in the interview data with the teams were combined and themes were created. Findings about how the students experienced the process are presented under these themes:

Participation in the Program and Previous Experiences

Students were asked questions about how they participated in the *FIRST* LEGO League Explore Program and their previous experiences. Students in all teams became aware of the existence of the *FIRST* LEGO League Explore program through their teachers. Some of the students who heard the program primarily from their teachers stated that they also received the information about the program from their families afterwards. The students in the teams started the program willingly, self-motivated, and voluntarily after learning that they were assigned by their teachers to participate in this program. When asked why they thought their teachers selected them for the team, the students gave the following answers:

Because we are successful / smart / clever / hardworking: Nearly in all the groups, students thought that they were chosen for the team because of their academic success: "First we were smart. Our teacher said let us choose 6 people.", "Maybe because we are smart and hardworking", "Maybe because the teacher saw that we would work well with LEGOs.", "We were chosen according to our success. "I gave a good performance and I think the teacher chose me by deciding this way." While some teams had students assigned by their teachers according to their general class success, some students said that their teacher gave them tasks that prompted creativity, imagination, etc. and that they were included in the team because they successfully fulfilled these tasks.

Because we had prior experience in robotic coding: In a small number of the teams, students stated that they were selected based on their previous experience in robotic coding or the FIRST LEGO League Explore program:

"Our teacher first chose me with T. and we were going to complete the robot.", "We were doing that kind of thing before. We started coding in the 2nd 3rd grade. "

Because they were forming a girls' team: In one team, the students stated that they were added to the team because they were girls: "Our teacher said that only the girls participate in this", "For the girls to advance more."

While students mostly thought that they were included in the team based on their academic success, the most common answers given by the teachers to the question of how they formed the team in the teacher questionnaire was as follows:

- **Interest in STEM fields**
- **Academic success**
- **The student having a positive understanding of STEM fields**
- **Gender**
- **Student's request to participate in the program**

When asked whether the students had participated in a similar program before, most of them answered that they were participating in the FIRST LEGO League Explore Program for the first time, while some of them were involved in robotics and coding activities before. The students especially wanted to underline that although they had experience with LEGO's, they were excited to gain the experience of doing a project with them for the first time:

"I used to love LEGOs. Back then, doing things with LEGOs made me very happy", "I was very excited when we first got there. Because we had a lot of LEGOs when we were little", "Our teacher told us, thanks to our teacher, we learned about LEGOs, we learned that there was something called LEGO, I did not know that there is a thing called LEGO, I learned it thanks to my teacher ", "I also love to play with LEGOs. That's why I joined. But I haven't participated in anything like this before."

"I see this for the first time too. There were people that came out of the LEGOs. It was very beautiful. It was the first time I saw it. I learned that."

"I used to set up a system with those little LEGOs, but I wasn't prepared for a project."

Project Development Process

This section focuses on how students conveyed their projects about the “BOOMTOWN BUILD” theme, which was the season theme of the FIRST LEGO League Explore Program. The main task of the season theme was to design and build a city. The points emphasized by the teams in the cities they designed in their projects are as follows:

Resistance to natural disasters: The teams stated that they designed and constructed the buildings and public areas to be resistant to natural disasters. The most emphasized ones in natural disasters were earthquakes and floods.

"We talked with each other about how to prevent buildings from collapsing and being damaged in earthquakes,"

“Earthquake resistant. In other words, because they use less or poor-quality materials while constructing the building, it collapses easily in an earthquake. "

“There was also a problem. Stealing material while constructing the building. So if you were going to use 10 tons, they were using 9 tones and not using 1 tone. As a solution to this, we found that we should put officials in the construction area of the building and supervise it. "

“I made a seismic isolator for the earthquake. We place the seismic isolator under the house, and nothing happens when there is an earthquake. "

“Our designed houses have a rail system. It has sensors against floods and earthquakes. When there is a flood, our homes go up and back down so that people can continue their normal lives. In short, it is not affected by flooding. Since there is a rail system, during an earthquake, our houses go up and minimize the shaking of the earthquake. After the earthquake, the houses go down so that people can go down to the street. "

“Actually, this can be applied in the Izmir earthquake as well. If we use it in environments where floods and earthquakes act at the same time, we can move both. "

“I made a sphere, a monitoring room. We can see natural disasters in my monitoring room. "

These statements by the students show that they consider the natural disasters, earthquakes, and floods, to be a priority for the safety of a city, and that they found solutions by doing research on these issues.

Sustainability: Teams highlighted the use of renewable energies, i.e. solar and wind energy, water saving, storing and recycling of rainwater and wastewater in their projects. All teams had statements explaining that they were working on at least one of these issues for a sustainable city.

Among the renewable energy sources, wind turbines and solar panels were mostly used in the cities designed by the teams for their projects. Existing methods in the use of wind and solar energy were included in the projects, as well as innovative methods in some projects:

“There is one wind turbine here, and with it, we generate electricity and meet our electricity needs. We also meet our heating needs with solar panels. "

"We built cars and houses powered by solar energy."

"We built mills that spin with the wind and provide electricity."

“We made one (wind) propeller that doesn't hurt the birds. The birds did not crash, so the birds never died. We built a cage like this, both the air can pass through, and the birds will not hit here, it prevents it from coming. "

"My house also has a balcony, and there are wind-powered wind panels and solar panels to generate electricity."

“There were also propellers where the plane was. You know the propellers that blow wind while the plane is flying! That wind turns the propellers. "

There are also sample statements that show that the teams took a holistic view of the system while working on water saving and rainwater recycling:

“Our rain pool here gets full when it’s raining. From here it goes to this pipe, and when we turn on the tap, vegetables and fruits grow. Our pipe goes inside from here. We can access this water in our kitchen and the water flows there as well.”

“I drew gutters on the roof in my painting. It was filled into the canister with the help of the fountain. The pipe watered my garden with rainwater."

“We made a green roof system. It sucks the rainwater and gives us clean water. "

“We tried to design the building and the school in a way that would not harm the environment. It was able to generate energy by itself by taking advantage of the wind. For example, rainwater was going to the water tank through pipes. We used the water in the water tank for garden cleaning. "

Accessibility: While the teams were designing their cities, gave attention to make the areas in the city accessible for disabled populations. While the teams talked about the exploration models, they emphasized the handicapped ramps and elevators and the guide tracks for the visually impaired.

“I have a small farm. It has stairs and elevators for the handicapped. "

“I have a ramp here in my house for the handicapped to pass. I have a ramp here too. This is the third floor, and this is the second floor. And I have a ramp here, that used to go down from the third floor to the second floor. "

“So that handicapped people can also use it. I also designed the books in the library of the school in the languages of the handicapped. "

“I built a walking place, a ramp for our friends in wheelchairs. I built an elevator for our special friends here. "

While creating solutions for several handicapped people, they were also inspired by a handicapped friend around them:

“First of all, we have a friend named M. who is disabled and is in a wheelchair, so M. cannot climb the stairs or walk. We decided to make a ramp for M.; that was also a challenge. We made an effort for this. For example, we used the crane as an elevator. "

Teams also coded the application for building elevators for handicapped people by using smart brick and WeDo 2.0:

“We built elevators for the handicapped. We used WeDo 2.0 to do that. When we press the up button in the elevator, the blue light turns on, when we press the down button, the red light turns on. In the meantime, there is someone with the handicapped person, like security to prevent them from falling. "

Animals, plants, and recreation areas: When the teams designed their cities, they also worked on creating spaces that provided opportunities for improving the living conditions of stray animals in addition to sports, entertainment, recreation etc. for everyone:

“We built a nest for stray animals so that they do not get cold in the winter or in the fall. We built a cat and a doghouse. We also built a bird's nest. "

"We also built a birdhouse."

Parks, forests, and green spaces were important components of teams' exploration models. Teams focused on safety, comfort and environmental friendliness, etc., while they worked on these areas, and they included these features in their exploratory models.

“My park is also an accessible park. For children, I used a soft floor instead of a hard floor, namely asphalt or concrete, and I put recycling boxes in my park. My park was like this"

“I did something like a tea garden. There are children here. I made a seat. I put fruit and water in small crates. I also put LEGOs on the sides. I also put in a ball shaped LEGO so they can play. "

“There is a garden there. There is an alarm next to the garden. For example, when there is a fire or flood, that alarm should make a sound so that I know that my garden or building is on fire. "
"We built a park area for children to play, then we made chickens, we built a tree house, then we built a library, I wanted a library to be built in the city center."

“Let us say we made a girl in a wheelchair. For example, there were outdoor sports areas, there was an area where they could camp. There was also an area where they could ride horses. "

Knowledge and Skills Acquired Throughout the Project

While talking about their project experiences, the students had the opportunity to explain many of their knowledge and skills they have acquired. The knowledge and skills acquired by students consisted of skills that fall within the scope of cognitive process and social product.

Cognitive Process: Teams carried out two main cognitive processes of fact finding and ideation throughout their projects. It was observed that the teams learned new information by doing research, used different resources to design the elements they used in their projects, and applied this knowledge in their projects. The areas where the teams stated that they have obtained information were renewable energy types, materials and processes used in construction, and increasing the accessibility of handicapped people. It can be understood from the expressions that the students have learned detailed information about renewable energy types.

"I didn't know what (wind) propellers were for."

“I knew what solar panels meant, but I didn't know exactly. I went and saw them. They looked like they were designed from glass. "

"I did not know that electricity could be produced from chicken’s fertilizer, I just learned."

"And we never thought of such a thing that does not harm the birds with cages in it, we never knew that something like that could be done."

“So, I learned about a solar-powered car. I learned that solar panels generate electricity. "

One student’s statement **"I learned that energy is precious"** indicates that students were able to gain awareness about energy and sustainability issues.

The teams also learned about protecting living spaces against the damages that may be caused by natural disasters. For example, **“In earthquakes, rubber does not break like concrete, it stretches. Most people are injured in earthquakes because concrete is broken. That's why we researched rubber and put it under it. "**

Students’ research has also led them to learn about how buildings are constructed in real life. Some examples that two students shared were, “For example, I thought that the buildings were built using brick, what else could it be other than brick, but then I learned it was a very interesting thing indeed. How could I have learned about that otherwise?” and “the real ones do not look much like the ones we build with LEGOs. For example, we just build them with our hands, we do it that way, but it takes a lot of time to lift a brick there with a crane, it takes a lot of time even to put a brick into its place. For example, they do what we do in 10 days in 100 days. "

Students also learned about professions, including engineering and architecture. The following statement by a student shows that gaining detailed knowledge and experiences about professions also help them to break down gender stereotypes:

“I decided I wanted to be an architect when I grow up. One day at school, a fourth grader said, "What will you be when you grow up?" I said, "I will be an architect" He said, "You cannot carry a brick, you are a girl." I was upset, but as the project continued, I learned that the architects would not carry bricks, they would design the house, design them to be more durable and guide the workers.”

One student said, “I used to have a notebook, and sometimes I would write projects in them. But my opinions changed in terms of how to build a durable house, how to strengthen them, what can we add in terms of both aesthetics and durability”. This statement exemplifies hat children gained more in-depth knowledge about the profession they are interested in.

Students' sources of information about their projects were mainly their teachers. The teachers gave close support to the teams throughout the entire project. Teams consulted their families and internet resources after their teachers:

“Sometimes I was asking my father. Because my father is also a bit knowledgeable on these issues, so I got a lot of ideas from him on this subject too.

"I asked my mother, she assisted me in helping disabled to come out when they are sick."

“I did not get information from (smart)phones. I got some information from my father. Then I studied these with my father. There were also some things I memorized. That's why I tried to explain the house as my father knows. "

“I have an aunt that is an engineer. I got information from her. My father helped, and most of all my teacher helped. "

"We also got help from computers to design the houses. My uncle works in a construction company, and I got help from him. "

Some teams made field visits before the pandemic and received information from experts. Some examples of these visits included construction sites, airport, and architectural office visits.

The teams frequently emphasized that they made decisions together during the ideation phase for their projects. They stated that they first identified the problems and then discussed the solution:

"We determined our problems, our solutions, we wrote the problems and their solutions on paper."

“Some of them offered an idea, we would tell them if we didn't like that idea. We would decide as a group and decide whether it should happen. For the ideas we decided not to happen, we were changing things a little bit and still doing it. We made a good school. Then everyone finished what they did, and when we finished, we brought them all together as our school's garden. "

"By bringing together all the ideas and all the problems we have decided what kind of thing we are going to create."

“We talked about what we can do. We thought about how we can design our house. We exchanged ideas with our friends. "

“If we give an example from our teamwork, everyone expressed their opinions while we were deciding on the problems and our solutions. We came up with good ideas, combined them, and wrote them down. I mean, we were not upset when we didn't use all of our ideas."

Social Product: Girls continued to work in teamwork to transform their ideas into products. The students explained their product development experiences together in the following expressions:

"I knew how to collaborate with friends before, but I have practiced it much more."

For example, we sometimes argued where I would say “I want to be in this group”. Another friend of mine would say "No, I'll be in this group" but then we found a solution immediately.

"I really enjoy my friends asking me for help."

“We also helped each other. We did not avoid helping just because we were not assigned to that task, for example, if I had two LEGO pieces that my friend was missing one, I would give it to him, so we did it by sharing them together. There has never been such a fight between us anyway. "

"When we saw each other, we worked together and chatted with each other."

When we first met, we formed friendships together. Then we decided to build this airport by watching videos at school.

"We all wanted to do it, so we shared it and we all got a part."

“That’s how we all met. We loved each other very much. So, when we were doing projects, we found something to highlight all of our ideas. No offense, no worries. When one of us was happy, we were all happy. When one of us was sad, we were all sad in the situation. "

Coding Activities: Students mostly focused on coding activities while using their knowledge and skills they learned within the scope of the project. Most of the students in the teams stated that they were doing coding activities for the first time. Some of the statements of the students about their experiences with coding are as follows:

“We built a robot. There was a tablet. There were arrow keys on that tablet, it could move, it could turn, it could go forward, it could go backward with the buttons, we made it move. The crane could move too."

“Our moving crane also had a few cubes. It was pulling the cubes up when we turned it.

“We made that to spin the wheel. There was one eye, I was very curious what it was for. Then my teachers said: "We're going to put them on as eyes when we make robots or something." There was a thing that looked like a drink. We attached it somewhere too, we would attach it to such parts of the robot. "

“It would make noises, it would make alarms, there was a red light in front of our crane, we were not putting very heavy bricks, for example, we were paying attention to it. We weren't forcing our crane, we were setting it to go up to the second floor, we set it to stop there, move forward, start, hold, and set them all, lower and lift our bricks. "

"We hesitated a bit when (the code) didn't work, we worried if it wouldn’t work, we were happy when it worked later, that's the challenge."

“Yes, I ran it from the tablet. My friend Z. took out the bricks and put them somewhere else. Then we lowered the crane with the tablet. "

“We first designed our crane with the WeDo 2.0 application. Then we started to move our crane. "

Students' Expo Experience

Teams made an effort to prepare the expo presentations, and some groups did rehearsals before the expo and distributed the tasks in order to be able to make their presentations effectively within the given time. Some teams had time management problems.

“We made our presentation one by one. For example, 3 groups presented separately. "

"It was our turn, so we all presented about it in turns."

“Time was not enough, actually, we couldn't present it exactly like we wanted. We presented it with a video. Our time was not enough for us to speak. If we had time, we would have presented more. "

“We usually practiced, but still we had little time, so we tried to keep time and reduce the time in that expo. We cut the presentation and we did it. It was great for me. We all wanted the narration to fit within 10 minutes. We tried very hard for that. But it was worth it. "

The teams have generally expressed their expo experiences with positive expressions. The emotions they mostly expressed were excitement, happiness, and pride:

"I felt very good and spoke very well."

"I was a little excited, but still talked."

"We were proud of ourselves; we did a very good job."

"I was excited at first, but our teachers there motivated us a little too, so there was nothing to be afraid of, nothing to be excited about."

Some students were worried that they would not perform well before the presentation, but expressed that they were satisfied with the result:

“Then, when we went on the expo day, we presented our project. First, I was embarrassed for saying something wrong. Then we all presented, all the teams. They combined all the teams in a live broadcast. Then they announced the awards. We did activities and danced. Then they announced the awards, they awarded us in the second place. "

Some students stated that they were happy at the expo, but they were sad because the project was over:

“It was a lot of fun, but actually I was a little upset because it was ending. I think it is also very sad that something that was a lot of fun ended. Because it was a lot of fun. "

“I wish this project did not end. I still do not understand how such a beautiful project ended in such a short time. We got a medal, but I'm still sorry."

The awards they received also excited the teams, and the students stated that they shared the joy of the award with their families:

"I turned off the camera and started crying with happiness."

“I was also very excited at the award ceremony. My friend E. also said so and I said so. We said that it (reward) will not be announced, then it was announced suddenly. "

"When we were at the fair, there was a thought about what award we would get, when I was at the last award ceremony, I was very excited about what we would win. “

“After the awards ceremony, my mother came and watched on YouTube live, but I ran directly to them. I was very happy. It happened that way. "

CONCLUSION

The impact analysis study conducted within the scope of the Girls Meet Science project has shown that the participation of students and teachers in the program has positive effects. Students had the opportunity to develop especially in the fields of interest in STEM, their STEM identity, understanding of STEM, and their interest in STEM careers. It is thought that project activities caused students to get to know and experience STEM fields more, and in this way, they had the opportunity to reconsider their interests and perceptions in STEM fields. It is hopeful that positive effects on STEM fields can occur in teams consisting of girls, indicating that girls can develop themselves in these areas when given the opportunity.

It was found that the teachers guiding the teams also benefited from the program implementations to a certain extent. Teachers reported especially an increased frequency of cooperation between teachers. Despite the pandemic conditions, the increase in cooperation is thought to be related to the program activities. While teachers were working with students from different grade levels, they may have interacted with the teachers of the relevant grade level.

When the scales of teacher self-efficacy and teaching practices are examined based on the questionnaire items, it can be said that teachers spent less time on classroom management and performed more applications that can be associated with the curriculum. Within the scope of the program, it can be deduced that providing more support for teachers to improve their mentorship will have a stronger effect due to the program.

Project Stakeholders

Science Heroes Association

Science Heroes Association (Bilim Kahramanları Derneği) is a non-profit organisation.
As Science Heroes, we strive to spread science to all segments of society, as well as to enable children and teens to meet with science in the early stages of their lives. Organization's missions can be explained as follows: to work for spreading and promoting the science, scientific thinking and scientific awareness in every segment of the society, to enable children and teens to meet with science in the early stages of their lives. Our goals are to support scientific productivity processes and scientists, to contribute to the upbringing of children and teens as productive and mindful world citizens equipped with 21st. century skills and to make scientific studies in order to enhance the life quality of society and to help maintain the sustainability of the planet.

Support Foundation for Civil Society

Support Foundation for Civil Society contributes to the creation of innovative and sustainable solutions by civil society through strategic donations. It carries out various activities in the fields of service to donors, support to non-governmental organizations and development of donor culture.

Bahçeşehir University BAUSTEM Center

Bahçeşehir University BAUSTEM Center was established in 2016 to pioneer in and increasing the quality of science and mathematics education and training in our country by developing research-based projects. The projects developed in the center are non-profit and designed to be beneficial to the society. In the past 5 years, besides public and private schools, projects with high widespread impact have been developed with the support and cooperation of BUEK, TÜSİAD, TÜBİTAK, TEMA, and Science Heroes Association. The activities of BAUSTEM and its stakeholders have received great interest by the national and international media, and at the same time, our projects have been the subject of many academic publications and theses. With teachers and educators connected through a wide network in Turkey in the world, BAUSTEM continues to work as respected research center.

Girls Meet Science Project

Girls Meet Science Project of The Science Heroes Association aims to make more girls interested in science and STEM (Science, Technology, Engineering and Mathematics) fields and to eliminate gender stereotypes in these fields at an early age and it was supported for the first time by the Support Foundation for Civil Society in 2018.
In the first year of the project, the participation of 72 girls in the *FIRST* LEGO League Jr. program run by the Science Heroes Association was provided. The second year of the project was supported by the Support Foundation for Civil Society with the Giving Circle event in Istanbul. The project, which continues with the support of individual donors, reached 120 girls in the second year of it. In addition, an impact study was planned to be conducted in cooperation with Bahçeşehir University STEM Center in order to see the achievements of the girls and their teachers participating in the project during the project process and the impact of the project.
The project continues in its third year with the support of the Support Foundation for Civil Society and Turkey Mosaic Foundation.

FIRST LEGO League Explore

FIRST LEGO League Explore is a non-competitive, requiring dexterity STEM program for kids ages 6 to 10. *FIRST* LEGO League Explore sparks kids' creativity by introducing an exciting new theme each year. Teams of at least 3 kids and up to 6 kids get to explore this theme connected to the real world with the exclusive LEGO Education Inspire Model. Using this model as a basis, children design their own new models with LEGO bricks. As kids work with LEGO Education WeDo, they learn basic engineering and programming skills and apply the concepts they learn to make their models move.

Giving Circle 2019 Istanbul Event

TUSEV Philanthropy Infrastructure Development in Turkey Project has started working to facilitate the adaptation and implementation of the Giving Circle model in Turkey in 2014. This project is the implementation in Turkey of the “Giving Circle” model, which is a collective donation model that has been successfully conducted in different countries of the world and contributes to the fundraising of many non-governmental organizations by increasing their visibility. The event creates an opportunity for individuals who care about social change to meet with non-governmental organizations with limited access to funding, to implement projects that create social change.