

VALUE BASED EDUCATION



Final Report Growing STEM

OCTOBER 2021 - JULY 2022



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CONTEXT

In recent years, Romania has fast-tracked efforts to modernize education and ensure higher tertiary education participation, especially in STEM areas, where PISA results show that improvement is still possible. Funding for investments in the educational system remains limited, even as European funds are being accessed, making private involvement a welcome option to accelerate educational reform.

About Growing STEM

Școala de Valori Association implemented the Growing STEM (CreȘTEM Viitor) project in Romania, with a duration of 10 months. The project is funded by Raytheon Missiles & Defense USA. The project development period is October 2021 - July 2022.

The project aims to deliver tutoring lessons to prepare 30 students to pass Bacalaureate exam and to continue their studies at STEM profile universities, as well as to promote school retention by increasing their literacy, numeracy, and social skills.

Target Group

The target group is represented by 30 students in the 12th grade from Romanian high schools, who come from economically and socially disadvantaged backgrounds.

Structure

3 STEM subjects
Mathematics, Biology
and Informatics
from the Bacalaureate
curriculum

21 free tutoring
sessions for each
student

3 Value Based Education
Workshops - Engaging
students in a range of
educational activities
intended to promote active
learning, develop their life
skills and reduce their
vulnerabilities

2 Living Library
Workshops with STEM
professionals who will
explain the importance
of these disciplines.

30h individual
counseling sessions to
help young people
overcome emotional
barriers regarding the
final exam

Results Summary

The various results of the project are summarised as follows:

- **147 Tutoring Sessions delivered // 294 h**
- **3 STEM Subjects : Mathematics, Biology and Informatics**
- **157 students registered**
- **30 students selected, enrolled and distributed in 7 groups**
- **3 Value-Based Education Workshops**
- **2 Living Library Workshops**
- **10 h of Individual Counseling**
- **19 Romanian High Schools**
- **14 Counties in Romania**



66.6% Promovability at Bacalaureate Exam

General average per subject - Bacalaureate exam grades

Mathematics	Biology	Informatics
6.03	6.30	8.25



Promovability Rate per subject

Mathematics	Biology	Informatics
60%	40%	100%

Let's talk statistics

The students' progress is observed in all the subjects: Informatics, where the average increase between the initial test and the bacalaureate results is 1.28 points, followed by Biology with 1.22 points and Mathematics with 0.8 points.

As a result of the Personal Development program, 2 out of 3 participants (61.54%) developed their emotional intelligence ability, these young people having better self-knowledge, self-control, motivation, empathy, but also higher social skills; 84.62% developed their communication skills and learned to provide feedback in an effective manner.

Among the enrolled students, 82% intend that after graduating high school to follow Romanian universities and 18% see themselves employed in full-time jobs, following their passions (e.g. flight attendant courses, mechanic) or they just don't know what they will do at the moment.

Participants

The 30 finalist students come from **19 different high schools in Romania**, distributed in **14 counties**. The high schools have different profiles: technological, theoretical, technical and economic. For this project, we selected students with specializations in direct connection with the STEM fields: mathematics & informatics, natural sciences, economics and environment protection.

Registration and recruitment

In the first stage, in order to register and select the participants, a registration form was disseminated among the targeted high-schools from all over the country, which was opened to be completed between November and December 2021. During the two months, 157 students from Romania enrolled, from which 30 participants were selected.

The students' enrollment in the project took place in two stages and involved submitting an online registration form, followed by a mini interview regarding their motivation only for 50 preselected students.

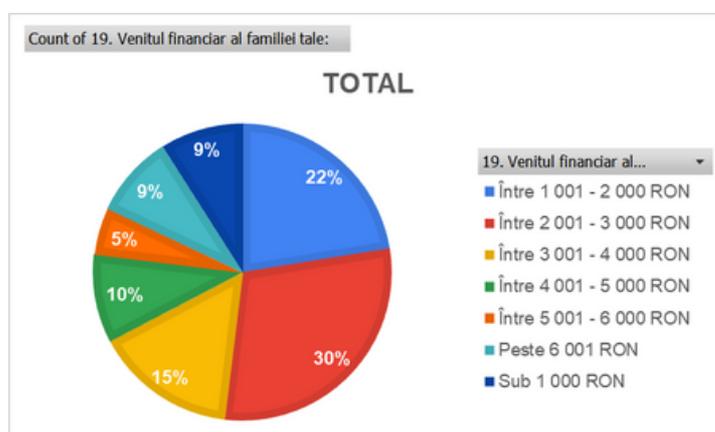
The elements that are part of the registration form include the identification data of the participants: name and surname, e-mail address, telephone number, location and Skype account. In addition, the form also contains questions about the current level of their high school education, the socio-economic status of the family and the future plans after graduation.

Socio-economic status of the selected students

Most of the students (30%) are part of families with a monthly net income of between 2000 LEI (\$487USD) and 3000 LEI (\$730USD), followed by 22% with an income of between 1000 LEI (\$207USD) and 2000 LEI (\$487USD).

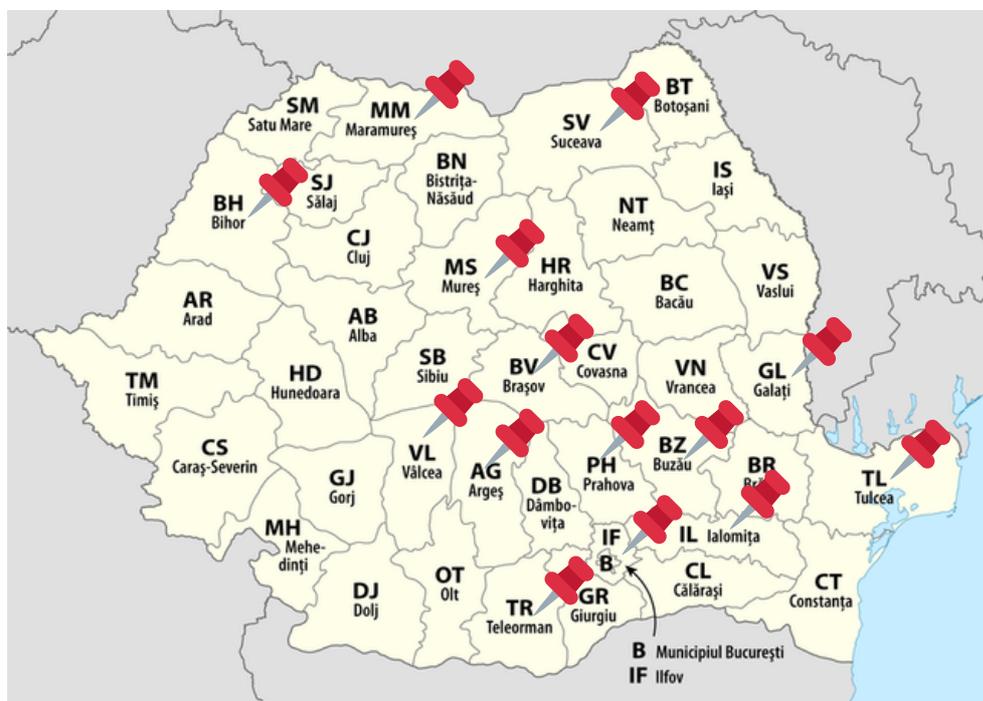
The chart shows a twice higher percentage for those who come from families whose monthly net income is less than 3000 LEI, compared to those whose income exceeds 3000 LEI (\$730USD) / month. Per capita, the income associated for a family member varies between 250 LEI (\$61USD) and 1000 LEI (\$243USD).

monthly net income / family



Regional Distribution

In the top three of the counties from which the majority of students were selected are Argeș County with a percentage of 12%, followed by Ialomița with 9% and a tie with a percentage of 8% each, Galați and Suceava counties.



Prospects for the future of students after high school

Among the enrolled students, 82% intend that after graduating high school to follow Romanian universities and 18% see themselves employed in full-time jobs, following their passions (e.g. flight attendant courses, mechanic) or they just don't know what they will do at the moment. One of the points of view regarding how young people see the future is well articulated in the following paragraph:

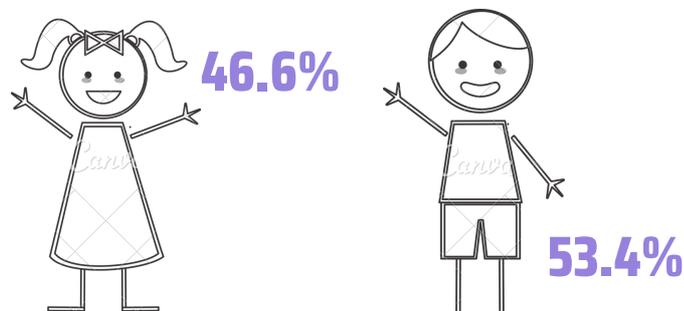
"After I graduate the bacalaureate exam, I want to attend a construction university so I will know that I have a secure future." (project project) participant).

"The free classes offered by Școala de Valori through the Growing STEM project helped me make connections that I had never made before. The first two examples that come to mind are: the first solved problem works theoretically but not practically. The teacher intentionally let me make mistakes to emphasize the importance of following the programming language version used. The second is about graphs, things that were badly explained in school but which the teacher from the tutoring classes explained wonderfully."

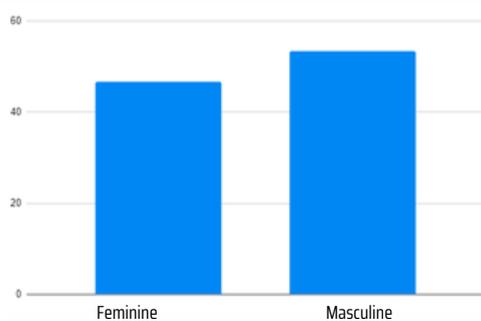
Justinian, participant (Informatics)

Gender & AGE distribution

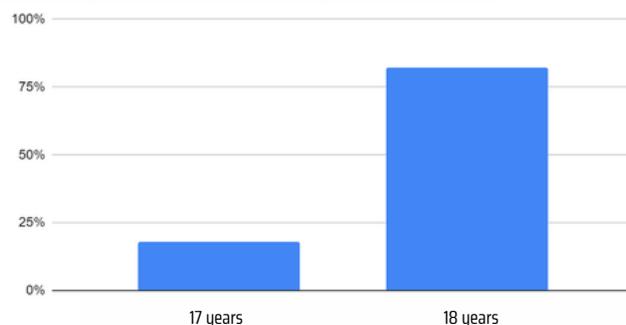
According to the gender distribution, 46.6% of the selected students are female and 53.4% are male. The age distribution shows that 18% of the selected students are 17 years old, and the majority (82%) of the selected participants are 18 years old.



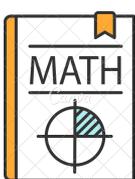
Gender distribution of the selected participants



Age distribution of the selected participants



Distribution of participants by subject



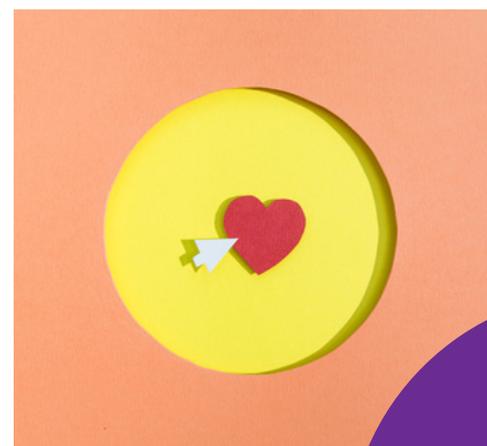
Mathematics
15 participants



Biology
10 participants



Informatics
5 participants



Project Implementation

KPIs

KPI 1: 100 teens registered	100	157	100%
KPI 2: 30-45 teens enrolled	30	30	100%
KPI 3: 5 partnerships with highschoools / organisations	5	5	100%
KPI 4: 21*7 seessions delivered	147	147	100%
KPI 5: 3 Living Library workshops STEM Role Models	2	2	100%
KPI 6 3 Value Based Education Workshops	3	3	100%
KPI 7 30 h individual counseling sessions	30	10	33%

We prepared a tutoring program to help 12th graders pass the Bacalaureate exam. The program consists of 21 tutoring sessions for each of the 3 STEM subjects: Mathematics, Informatics and Biology.

A tutoring session is represented by an online space where a professional teacher is lecturing a group of 4-5 students. Each tutoring session lasts for 2 hours. The lesson plan is comprised of the material the students need to study in order to be prepared for the Bacalaureate exam.

The 30 finalist students come from 19 different high schools in Romania. The high schools have different profiles: technological, theoretical, technical and economic.

The distribution of students in groups was made based on the results obtained in the initial test. The groups are composed of 4-5 students with a similar level of knowledge. The 30 finalist form a total of 7 groups for all 3 subjects. 7 groups multiplied with 21 sessions equals 147 sessions to be delivered.

In addition to the Bacalaureate preparation, we have prepared **a personal development program** for students, consisting of **3 value-based education workshops, 2 Living Library workshops and 10 hours of individual counseling**. The purpose of the program is to inspire students to discover their values and to train their potential and to develop social skills, to overcome emotional barrers, so that they are better prepared for the ever-changing future.

GANTT

Partnership Proposal Raytheon	14 Sep 2021	9 Oct 2021
Launch Registration Form	22 Oct 2021	6 Nov 2021
Participation Guidelines	10 Oct 2021	14 Oct 2021
Contacting the Tutors	30 Oct 2021	30 Oct 2021
Communication Campaign	1 Oct 2020	31 Jul 2021
Recruiting Participants	10 Nov 2020	30 Nov 2020
Updates on Growing STEM Web Page on scoaladevalori.ro	10 Nov 2020	10 Nov 2020
Testing initial level of the students / From the groups	15 Dec 2021	15 Dec 2021
#1 Value Based Education Workshop	12 Jan 2022	12 Jan 2022
#2 Value Based Education Workshop	19 Apr 2022	19 Apr 2022
#3 Value Based Education Workshop	5 Jul 2022	5 Jul 2022
Conducting the tutoring sessions	15 Dec 2021	21 Jul 2022
#1 Living Library Online Workshop : Role Models & Why STEM // Raytheon Specialist & Managers	15 Jan 2022	15 Jan 2022
#2 Living Library Online Workshop : Role Models & Why STEM	6 May 2022	6 May 2022
Mentorship program	15 Apr 2021	25 Jun 2021
Final evaluation of the students	11 Jul 2022	11 Jul 2022
Evaluating Impact	10 Nov 2021	20 Jul 2022
Project's Final Report	20 Jul 2022	31 Jul 2022
Disseminating Project's results	1 Jul 2022	31 Jul 2022

Personal development program

Value -based education workshop #1: Personal and Universal Values

The workshop took place online in 12th of January 2022, with 17 participants. During the workshop, the participants were introduced to the concepts of personal and universal (collective) values.

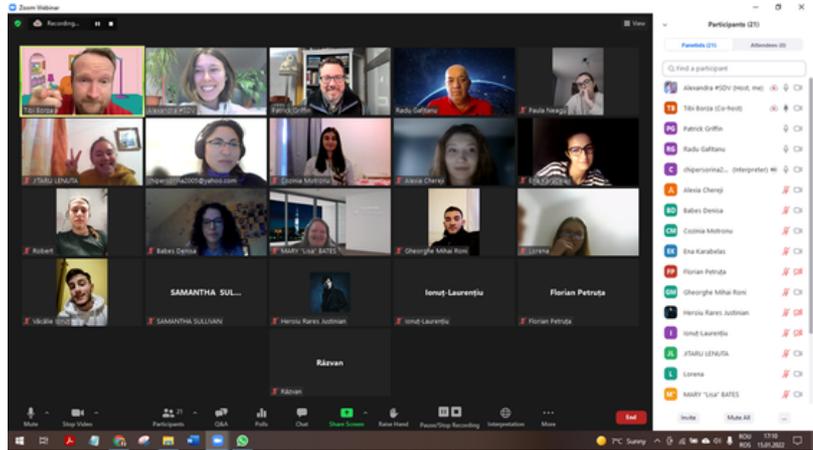
The main 10 personal values of the participants were identified during an interactive exercise.

The participants were introduced to the theoretical topic of personal and universal values based on Schwarz's theory.



Living Library #1 - Let's meet STEM Professionals

The workshop took place online in 23rd of January 2021, with 20 participants and 3 special guests. During the workshop, participants learned from professional engineers what opportunities and difficulties you may encounter in this career.



Living Library #2 - Let's meet STEM Professionals

The workshop took place online in 6th of May 2022, with 23 participants and 3 special guests. During the workshop, participants learned from professional engineers and tech specialists how to start a career in STEM fields, what are the most important skills to succeed in this industry and how to prepare for fist job interview.



Evaluating the results

Data Collection Methodology

In order to obtain relevant data about the project, we collected the participants' answers using Google Forms, through three online feedback forms, distributed at the beginning of the project, as well as in the intermediate and final phase of the project. The results obtained will be presented below, in the form of a descriptive analysis.

Type of data collected & measurement scale

1

Measurement scales that measures the degree of satisfaction about the organizational aspects, the educational content and the performance of the trainers/tutors

2

Measurement scales that measures the skills developed as a result of participation in the project and in the personal development program (Value Based Education and Living Library Workshops

3

Specific questions on participants' future plans

The following measurement terms were used to ensure the objectivity and comparability of the data in the questionnaires:

1

Questions with predefined answer options (single answer or multiple answer)

2

Questions with dichotomous answers such as: yes / no

3

Scales with 5 Likert response variants: completely dissatisfied / dissatisfied / neither dissatisfied, nor satisfied / satisfied / completely satisfied

4

Open-ended questions

The research focused on the essential aspects of the project, namely:

1

Efficiency: objectives, results, progress achieved by the target group participating in the project;

2

Relevance: the impact of training on the target group;

3

Indirect effects: unexpected effects due to participation in the project.

Tutoring program

The tutoring program contains **147 tutoring sessions for 7 groups of students** for all the **3 subjects (Mathematics, Biology and Informatics)**. During the program, students progress was monitored by teachers using tests to evaluate the performance.

Students' situation after initial evaluation

Although the grade with which the participants entered the program was between 6 to 8 (general average obtained in high school), after the initial evaluation a significant difference was noticed. In some cases, the students' real level of knowledge was much lower.

The minimum grade for passing the Bacalaureate National Exam is 6, so, according to the table above, 61.5% of the students enrolled in Mathematics and respectively 55.5% in Biology were at risk of failing the Bacalaureate exam. The situation was much better at Informatics, where just 20% of the students enrolled in the program were at risk of failing the exam.

	Nume și Prenume	Disciplina	INITIAL TEST	FINAL TEST	BAC GRADE	P/F
1	Pup Daniel	Biologie	2.5	3.4	2.8	FAILED
2	Rosu Marius	Biologie	8	9	9.9	PASS
3	Mote Letitia Teodor	Biologie	8.5	9.9	9.8	PASS
4	Cristea Maria Alexa	Biologie	2	3.3	3.5	FAILED
5	Besliu Daniel	Biologie	8.5	8	9.3	PASS
6	Popa Cristian Andre	Biologie	2	4.1	5	FAILED
7	Mușel Constantin R	Biologie	7.1	8.8	8.2	PASS
8	Ionita Andrei	Biologie	2.1	3	2.55	FAILED
9	Căldăraru Ioana	Biologie	3	5.2	5.7	FAILED
10	Musoiu Catalina	Biologie			RETRAS	DROP OUT
	AVR		4.86	6.08	6.31	
	Nume și Prenume	Disciplina	Initial Test	Final Test	BAC GRADE	P/F
1	Chereji Alexia	Matematica	7.1	9	8.65	PASS
2	Rizoiu Stefan	Matematica	2.5	3	3.25	FAILED
3	Neagu Paula	Matematica	6.3	7.6	6	PASS
4	Ghiurco Ioana Ma	Matematica	6.6	7.1	7.9	PASS
5	Babeș Denisa	Matematica	5.7	6.8	6.95	PASS
6	Varga Robert	Matematica	7	9	8.4	PASS
7	GHEORGHE ALEX.	Matematica				DROP OUT
8	Stanca Ionuț-Lau	Matematica	5	5.7	6.65	PASS
9	Cristea Eugenia	Matematica	5	4.3	5.4	FAILED
10	Iarca Andrei	Matematica	2	2	2.8	FAILED
11	Ivan Raul	Matematica	2	2	2.6	FAILED
12	Văcălie Nicolae Io	Matematica	3.1	3.4	5.5	PASS
13	Anitescu Maria Co	Matematica	6.5	7.9	8.2	PASS
14	Stanciu Iuliana G	Matematica	5	6.8	6	PASS
15	Florian Petruța	Matematica				DROP OUT
	AVR		4.91	5.74	6.02	
	Nume și Prenume	Disciplina	Initial Test	Final Test	BAC GRADE	P/F
1	Motronu Cozina	Informatica	6.8	9	8.85	PASS
2	Popoiu Daria	Informatica	7.9	8.9	9.65	PASS
3	Sîrbu Florian	Informatica	5.3	6.8	6.55	PASS
4	Heroiu Rares Just	Informatica	8	9	8.1	PASS
5	Stoinoiu Alexand	Informatica	8.7	9.4	8.1	PASS
	AVR		7.34	8.62	8.25	

Students progress / Subject

The general average of the test grades obtain during the evaluation process within the tutoring program

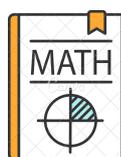
Mathematics	Initial test 4.9	Final test 5.7	Baccalaureate exam 6.03
Biology	Initial test 4.8	Final test 6.0	Baccalaureate exam 6.3
Informatics	Initial test 7.3	Final test 8.6	Baccalaureate exam 8.2

The students' progress is observed in all the subjects: Informatics, where the average increase between the initial test and the baccalaureate results is 1.28 points, followed by Biology with 1.22 points and Mathematics with 0.8 points.

As a result of the tutoring program in the project, the baccalaureate exam pass rate is 66.6%.

The average participation rate at the tutoring sessions was 70%.

General average per subject - Baccalaureate exam results



Mathematics
6.03



Biology
6.3



Informatics
8.2

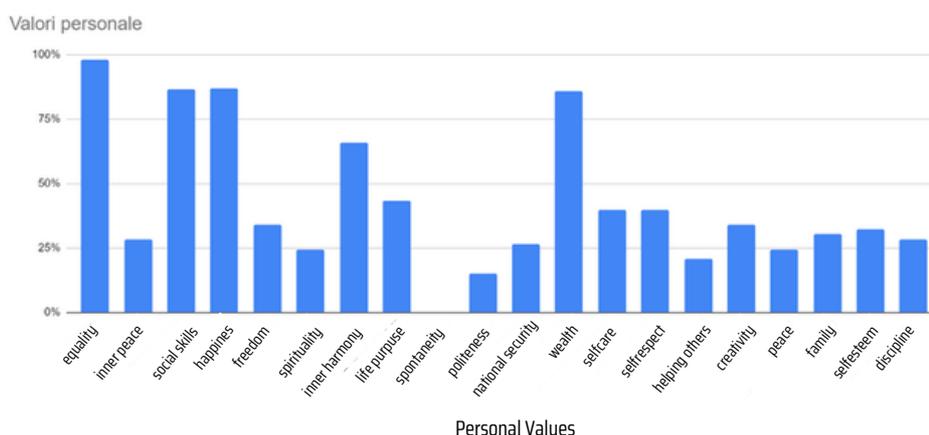
General average overall project based on all grades in all subjects: 6.86

Personal development program

On average, the participation rate in the personal development program within the project is 64.00%. The feedback forms were completed, on average, by 20 participants out of the 30 participants, thus the completion rate being 66.6%.

Skills developed

As a result of the Value Based Education workshops, the beneficiaries appreciate to a very high extent improving on the following values: equality, wealth, happiness, inner harmony and social skills.



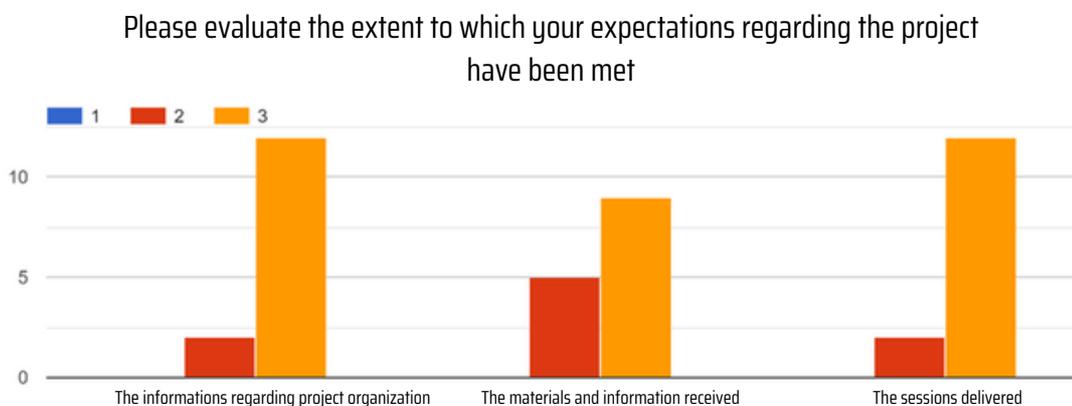
84.62% of the participants developed their ability to communicate after the personal development program and 15.38% did not. Through the persuasive communication workshop, the participants learned about the types of communication: verbal, nonverbal and paraverbal communication, the latter influencing the way a message is transmitted the most. Also, they have mastered the ways of expressing each type of language, and for a correct understanding, it is necessary to reformulate the messages that others send or to ask clarifying questions in case of confusion. The participants got used to the concept of feedback and learned how to give feedback in an effective way.

Project organization

To the question “Please evaluate the following aspects related to the Growing STEM project, on a scale from 1 to 5 where 1 means that you are “ Completely dissatisfied ”, and 5 that you are “ Completely satisfied ”, in terms of the following criteria:

- registration in the program,
- the information received regarding the development of the program,
- the implementation period,
- the attitude of the people with whom they interacted during the program, but also
- the benefits obtained,

56.00% of participants were Completely satisfied, 36.00% - Satisfied, 5.3% showed a neutral perception and 2.7% gave an unsatisfactory answer regarding the organization of the project. Thus, in a significant proportion, the participants appreciated the way in which the project was carried out, in terms of the following indicators:



Educational content

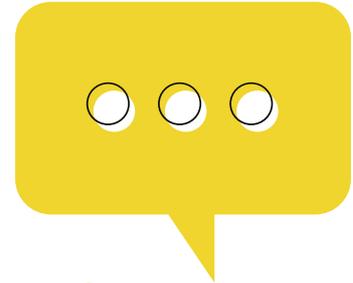
1 out of 2 participants appreciated that they were satisfied or very satisfied with the performance of the tutor, but some aspects were also suggested that the beneficiaries have in order to be able to assimilate the information more effectively, such as: "To make us understand certain concepts in a new way (to use other approaches than the classical ones used by teachers in the classroom)." - project participant; "To empathize more with us." - project participant; "To provide more resources for the study outside of meditation classes of concepts that are not included in the curriculum." - project participant).

Living Library Workshops

Skills acquired by participants \$ testimonials

information about
the cyber domain

We learned a wealth of information: from the current state of the cybersecurity industry, to missile defense systems and their history - project participant



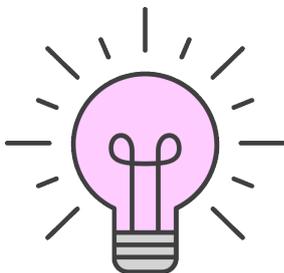
the advice and information provided by the engineers, by the fact that it is useful that the career choices made are based on passion and that it is important to work hard to fulfill your goals

"The workshop made me realize that I have to make a choice based on passion."
"I believe that the story of each Living Book helped me to keep my courage because I understood that through hard work I can fulfill any dream."
".... I understood that through work, determination and desire you can have everything you want."



personal
development

They put my "wheels to work" in thinking much more deeply about some things". - project participant;
They made me think about what I am like, there were some very well thought out questions!
They helped me set my goals and get to know myself better



receiving good advice
professional
achievement and
perseverance

"The information provided helped me a lot, coming up with different ideas about certain things. The tips I got were also very helpful. I had a lot to learn." - project participant
1. The earlier you start your STEM career, the easier it will be later; 2. To become good in the field you have to practice constantly; 3. You can get a degree in the field at any age;" - project participant

"I feel privileged that I had the chance to take part in a meeting held by Școala de Valori and due to that I could listen to some of the most successful engineers who I could have ever known."



GROWING STEM IS ORGANIZED AND IMPLEMENTED BY SCHOOL OF VALUES ASSOCIATION AND FUNDED BY RAYTHEON MISSILES AND DEFENSE USA.

“I learned that interacting, encouraging and communicating a lot with others is important. This type of support it helps them build their way towards success. In addition, only by helping others and communicating properly I can grow and develop. I will work more as a team member, because I understand that this is somewhat inevitable if I want to be successful. ”

