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Cooperation for innovation and the exchange of good practices

STEM Education

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REPORT

Maths Inspiration

Letets Hristo Toprakchiev Secondary School

Bulgaria

14.10.2019 - 18.10.2019

## I. Introduction

The didactic process adopted for the LTT activities was the same used by the STEM teachers of the institute for the entire duration of the project. The effectiveness of the teaching strategies adopted was assessed in the hosting school and shared with the teachers of the STEM disciplines of the partner schools.

The LTT activities were planned according to the shared principle that the most effective teaching approach is a set of different strategies. The ones chosen for the LTTA Maths Inspiration in Bulgaria were:

- The use of short films and pictures taken by the students during cultural visits to present the topic to be treated;
- The analysis of presentation forms and the study of some contents, before proceeding with the workshops;
- The use of web tools available open source on e-learning platforms,
- The promotion of cooperative learning by organizing work in pairs and groups,
- The stimulation of students' curiosity by means of conclusive activities conceived as tasks of reality (e.g. to identify the golden angle in a building).

All these strategies were designed to meet the learners' training needs. During the LTTA Maths Inspiration, two international classes were formed, and a workshop was organized for each of the STEM disciplines chosen with the partners. Before the LTTA Maths Inspiration, the partners made sure that the identified topics were in line with the educational programs of each school and that at the end of each workshop the students could work together on a reality task. The STEM teachers of the partner schools were in the classroom or in the laboratory. They offered their contribution in monitoring the learning process and in providing their feedback in the subsequent verification meeting of the activity carried out. The LTTA program also included lessons on historical and social aspects of the hosting country, as well as visits and cultural activities, all of them in relation to STEM disciplines. During the week of the LTTA Maths Inspiration, the normal timetable of the lessons was changed in order to allow the participation of the largest possible number of teachers and learners of the hosting school.

## **II. Team**

The English teacher Tatyana Dimitrova and the Deputy Head teacher Teodora Taneva planned, prepared and organized the learning event “Maths Inspiration” at "Letets Hristo Toprakchiev" Secondary school concerning the project STEM. Their Maths and IT colleagues supported them in the sphere of STEM lessons. The team developed a plan and distributed the tasks for the preparation and implementation of the activities related to the organization. The teachers were responsible for specific tasks, their deadlines, timetables and implementation. The team defined responsible people for each of the tasks. During the period 14.10.2019 - 18.10.2019, the schedule for team meetings was changed from one workshop weekly into two per week. Good coordination among members has made it possible to plan and prepare in detail all aspects of the preparation of the learning event from the project plan.

Team members:

1. Maya Karamfilova – Head teacher
2. Tatiana Mladenova - Dimitrova - Coordinator
3. Teodora Taneva - Deputy Head teacher
4. Asya Venelinova - IT teacher
5. Maya Aleksieva – Maths teacher
6. Maya Georgieva - Accountant

## **III. Goals**

The objectives of the reality tasks in Maths Inspiration were:

- To increase students' motivation towards mathematics
- To improve the mathematical-logical and scientific skills of the students
- To develop the digital skills of students and teachers involved in the exchange
- To apply STEM disciplines to real contexts
- To improve flexibility and a proactive spirit in solving problems
- To improve language skills
- To support teachers in lifelong learning
- To encourage the personal development of students

Thanks to this exchange, the students and teachers had the opportunity to interact with peers and colleagues from different languages and cultures, and backgrounds.

More generally, the objectives of the exchange of students in this STEM project were:

- To increase the awareness of the European Union by promoting a shared European identity and its values
- To be aware of the good practices adopted in the partner schools
- To develop communicative skills
- To develop transversal skills, such as the ability to interact with people in a different cultural and social context and to adapt to various situations

## IV. Preparation

### 1. Accommodation of the participants

The project team from Bulgaria received lists of 25 people from Cyprus and Italy who would attend the Short-Term exchange in Bulgaria. There were 2 teachers and 10 students from Cyprus, 2 teachers and 11 students from Italy in the list.

There are no hotels or ways of accommodation in Bozhurishte. For this reason, the project coordinator researched hotels whose location was close by and convenient transportation to our city. Inquiries were made to provide bargains. According to the received offers, the team chose Bankya Palace Hotel in Bankya, where the four teachers from Italy and Cyprus, participating in the training event were accommodated.

The 21 students, coming from the other countries, participating in the mobility were accommodated in the families of children from the "Letets Hristo Toprakchiev" Secondary School. Meetings were held with class managers from the high school stage. They aimed to explore families who have the opportunity, conditions and consent to accept students. After interviews with parents where they were aware of the responsibilities and accommodation requirements, the project team addressed the families of:

1. Gabriela Yankova	12 <sup>th</sup> Grade	Sofia Bolognese from Italy
2. Gabriela Botseva	12 <sup>th</sup> Grade	Sara Bracalante from Italy
3. Simona Traykova	11 <sup>th</sup> Grade	Ester Del Borrello from Italy
4. Martin Tsankov	11 <sup>th</sup> Grade	Pietro Di Laudo from Italy
5. Valentin Georgiev	12 <sup>th</sup> Grade	Federico Di Lello from Italy
6. Milana Petrova	11 <sup>th</sup> Grade	Ludovica Giorgetta from Italy
7. Milena Zlatkova	11 <sup>th</sup> Grade	Lucrezia Pia Macchia from Italy
8. Teodora Georgieva	11 <sup>th</sup> Grade	Caterina Minissale from Italy
9. Filip Katardzhiev	12 <sup>th</sup> Grade	Marco Pio Ramundi from Italy
10. Mariyan Bogdanov	12 <sup>th</sup> Grade	Valerio Tinari from Italy
11. Dimitrina Stoichkova	12 <sup>th</sup> Grade	Martina Vicoli from Italy
12. Dara Rangelova	9 <sup>th</sup> Grade	Chrysallida Aresti from Cyprus
13. Ekaterina Atanasova	10 <sup>th</sup> Grade	Amoura Elisabet from Cyprus
14. Kalinka Asenova	10 <sup>th</sup> Grade	Kakalioura Theodora from Cyprus
15. Margaret Petrova	10 <sup>th</sup> Grade	Irene Lazarou and Erini Zacharia from Cyprus
16. Petya Georgieva	10 <sup>th</sup> Grade	Stelios Paphitis from Cyprus
17. Viktoria Yordanova	9 <sup>th</sup> Grade	Leandra Eystathiou from Cyprus
18. Vasko Marinov	9 <sup>th</sup> Grade	Andreas Triantafyllos from Cyprus
19. Svetlin Petrov	11 <sup>th</sup> Grade	THOMAS Papaefstathiou from Cyprus
20. Daniel Todorov	9 <sup>th</sup> Grade	Giannakis Leonidou from Cyprus

## 2. Events organization

### EVENTS ORGANIZATION

№	Event	Organizer	Aim
1.	Teachers accommodation and transportation	Tatyana Dimitrova Teodora Taneva	to experience the LTTA Maths Inspiration; to share professional skills; to improve English language skills; to exchange career and working experience; to compare attitudes and values
2.	Bulgarian School project team meetings + welcome meeting	Tatyana Dimitrova Teodora Taneva	to develop project stage; to organize events and activities; to present the LTTA Maths Inspiration; to present school and community; to coordinate the activities; to reflect and give feedbacks; to handle the stage; to improve collaboration
3.	A community center visit	Tatyana Dimitrova Teodora Taneva	to present the local community, traditions and customs; to inform about the town and local sites; to disseminate the STEM project activities and work to the community;
4.	Sofia Tour Activity Maths and Architecture	Tatyana Dimitrova Teodora Taneva	to observe the city architecture and define connection to STEM subjects; to prepare materials and photos for video activity; to gather information for the activity Maths and Europe; to share European values; to improve language skills; to link STEM subjects to daily life; to create partnerships and friendships; to increase learning motivation in STEM subjects;
5.	Physics Lab visit in the American University, Blagoevgrad	Tatyana Dimitrova Teodora Taneva	to link Physics to daily life; to create positive attitude to Physics; to increase learning motivation in STEM subjects and particularly in Physics; to present scientific learning environment; to present career paths and opportunities; to entertain the learning process;
6.	STEM Teachers meetings	Tatyana Dimitrova Teodora Taneva / Filotelo Di Laudo	to evaluate project stage; to plan events and activities; to present the coordinator's issues; to reflect and give feedbacks from previous stages; to handle the project implementation and development; to improve collaboration;
7.	Faculty of Chemistry and Pharmacy visit in Sofia University Saint Kliment Ohridski	Tatyana Dimitrova Teodora Taneva	to observe and experience Chemistry and scientific experiments; to provoke positive attitude for learning Chemistry; to provoke critical and out of the frame thinking; to increase motivation for learning STEM subjects; to link the practice to theory and to

			show the practical benefits of studying STEM subjects;
8.	Plovdiv Tour activity Maths in the city	Tatyana Dimitrova Teodora Taneva	to link the tourist hotspots in the City of Plovdiv to Maths; to solve Maths problems; to get definitions to Maths terms; to connect Maths to Engineering; to inspire learning Maths; to learn about various landmarks and attraction in the city of Plovdiv; to visit tourist places and share cultural values; to integrate knowledge from history, culture and Maths with researching skills by using English; to integrate the youths from different countries and develop pair work; to enhance critical thinking
9.	Europe and Maths Activity – Interactive Test	Tatyana Dimitrova Teodora Taneva Asya Venelinova Stanislava Pototska	to learn more about European countries, partners of the project STEM; to become aware of the importance of Maths; to work in teams; to solve test in an interactive way; to share cultural values, national and European identities
10.	Maths Lesson - Maths Inspiration: Finding the area of stereometric shape	Maya Aleksieva Tatyana Dimitrova Teodora Taneva	to deepen the knowledge and skills of students to find faces on the surfaces of the rotated bodies included in the school programme; to form skills for analysis, interpretation and evaluation of the results obtained in the model; to deepen logical knowledge and skills by increasing the role of thinking in the learning process at the expense of reducing theoretical information; to show the connection of mathematics with other subjects or situations in everyday life; to form a positive attitude towards mathematics, creating interest and motivation for students
11.	IT Lesson - Using SketchUp - a 3D modeling computer program for a wide range of drawing applications	Tatyana Dimitrova Teodora Taneva Asya Venelinova	to create 3D models of landscape architecture; to form skills for analysis, interpretation and evaluation of the results obtained in the model; to deepen ICT skills by creating own models; to show the connection of ICT with the situations in every day; to enrich the methods of thinking and developing observation, imagination and concentration of thinking; to form a positive attitude towards computer studies, creating interest and motivation for students.
12.	LTTA Closing Event, Bankya Palace, farewell party, certificates	Tatyana Dimitrova Teodora Taneva	to share the project results] to increase communication among the different stakeholders of the project (parents, teachers from the school not taking part in the workshops);

			to interact with peers; to receive certificate of attendance
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## V. Results

- Methodology of a Maths lesson - Maths Inspiration: Finding the area of stereometric shapes
- Methodology of an interactive activity – Maths in the city
- Methodology of a computer based test as an interactive game “Europe and Maths”, organized as an IT competition
- Methodology of IT lesson - Using SketchUp - a 3D modeling computer program for a wide range of drawing applications
- Video, which contain photos from the training events "Architecture and Maths"
- Dissemination of the project activities in the school community
- Communication in English and enhanced communicative skills
- Participant Certificates
- Feedback questionnaires to monitor and improve the project

## VI. Challenges or difficulties encountered during the LTTA in Bulgaria

**During the LTTA in Bulgaria the school project team faced and successfully dealt with the next two challenges:**

1. Teachers in STEM subjects – Maths, Physics, Technologies and Science in Letets Hristo Toprakchiev secondary school don't speak English. In order to overcome the linguistic problems during the LTTA, English teachers together with STEM teachers create and translate the lesson plans and methodologies in English and present them during the workshops
2. After the arrival of the students from Cyprus, a child refused to stay in the pre-determined host family and wished to move to the house where his friend was accommodated. The school project team took a decision to make a change in the preplanned accommodation list and to solve the problem.

## VII. Dissemination –events, activities, informative materials and etc.

### **Dissemination of the project, results and goals in the school community**

- Presentation of a pedagogical council
- Presentation of parent meetings
- Presentation in classes
- Making information boards
- Publishing information on the school's website
- Publications about the project on the school's website and on the project's Facebook page
- Meetings with students
- Working school groups to prepare students for participation in learning events
- Working meetings of the project team

### **Dissemination of the project, results and goals outside the school community**

- Presentation of information to the local community through the community center in the town of Bozhurishte and the municipal administration

- Presentation of the project in meetings with pedagogical specialists from other educational institutions, in the town of Bozhurishte
- Communication with partners in the person of Sofia Tourist Information Center, American University in Blagoevgrad, Faculty of Chemistry and Pharmacy, Sofia University, OI Old Plovdiv
- Providing advertising materials to partners from the visited sites of the project
- Preparation of an article for a local newspaper and online media
- Production of advertising materials with the project logo

We believe that the main tools and channels have been used for successful dissemination of the Maths Inspiration project activities - making personal contacts, organizing meetings and discussions, electronic materials published on the Internet, preparing reports, articles, presentations, making promotional materials presenting the project. - leaflets, promotional pens, bottles and notebooks with the project logo.

### **VIII. Contribution of the partners to the LTTA in Bulgaria**

During the LTTA in Bulgaria Maths Inspiration, all partners contributed to the project stage according to their responsibilities. All students and teachers worked according to the fixed schedule of activities and stages, deadlines and tasks to perform, stated at application form and discussed during the teachers' meetings.

According to the LTTA's agenda, each partner performed the planned activities and took part in the lessons, activities, meetings and events. For the successful development of the LTTA partners collaborated and contributed to the stage Maths inspiration in the following fields:

- Presenting the project to the school and parent communities, local educational institutions and education control bodies.
- Working on each of the projects activities.
- Participated in activities, conversations and workshops during the LTTA
- Made analysis of the results achieved during the project work
- Monitored project work on the school level
- Took part in the decisions concerning the agenda and the necessary changes in the plan
- Created materials, made researches and wrote methodologies
- Discussed and shared project aims tasks and activities
- Conducted activities for project popularity among local and regional level
- Supporting the cooperation among partners
- Feedback and evaluation of the project

### **IX. Communication - Bulgarian organizer interact and coordinate the LTTA**

At the application stage, we implemented cooperation and communication through on-line contacts, emails, and Skype meetings. After the approval of the application, the coordinator of the project created the Facebook page and a group of the project STEM Education. We guaranteed successful communication by appointing one more contact person next to the coordinator in each institution, whose main responsibility was to facilitate communication among the local participants and to deal with any problems as soon as they occurred. During the first training event in Italy the project coordinator Carla Orsatti, suggested the usage of Whats App as a channel of communication among the participants in the project.

During the preparatory stage of the LTTA in Bulgaria, the school project team held several meetings and workshops with the students and teachers taking part in the LTTA in Bulgaria. Meetings were the best opportunity to discuss the preparatory activities, ways of travelling, accommodation, working programs and activities during the LTTA. The team developed plans and allocated tasks for the preparation and implementation of the activities. Each of the members was responsible for specific tasks, linked to deadlines for implementation and planned activities in

the training programs. The excellent communication among students and teachers allowed us to reach the project goals without stressful or unplanned obstacles or challenges.

At the last phase of the organization of the LTTA in Bulgaria, communication and transmission of information took place every week and, even daily. We held several meetings with the coordinators from Italy and Cyprus via Skype, Zoom and WhatsApp. Bulgarian team sent in advance to the coordinators information concerning following:

- A detailed financial plan
- A visit plan with a detailed agenda and a timetable of the workshops
- A list with logistical details, directions, accommodation
- lists with the host families for students and their contact details
- Instructions and ways of transportation in Sofia, Bulgaria
- travel guide of Sofia
- Useful tips for staying in Sofia, Bulgaria, safety rules

During the LTTA, participants communicated directly, face to face. The project team monitored and supported the implementation of the activities during the workshops and lessons in order to overcome cultural and linguistic barriers among the participating students. The team spread the detailed program and materials for the workshops among all the participants. The lessons, plans and documents were sent to the teachers in advance. All the instructions were given clearly both in spoken and written way. There were teachers meeting in the end of each day for sharing information, commenting on the workshops and planning.

## **X. Participants' Feedback**

- The importance of transnational meeting for sharing cultural values
- Achieving the aims of LTTA Maths inspiration
- Necessity for improving students' motivation for taking part in project activities
- Desire and motivation for teachers to take part in LTTAs
- Sufficient communication among partners
- Good accommodation
- Good planning and well-done activities during the meeting
- Well-organized meeting agenda
- Development of the language skills

## **XI. Impact**

The LTTA in Bulgaria has mainly impact on:

- **The school community**

The activities and workshops held during the LTTA in the school, provided opportunities for the school community - teachers and students - to work in out-of-class forms, such as project-based learning, problem solving, and interdisciplinary learning. The Bulgarian team determined the sustainable positive impact on the school community and the participants in the learning event in:

- developing critical thinking
- developing foreign language competencies
- communicating in intercultural environment
- acquiring digital skills competences
- improving the skills related to preparation and planning the methodologies of the workshops
- increasing skills for comparison and analysis of the achieved results and giving feedbacks



**• Students participating in the learning event**

Students had the opportunity to acquire and expand knowledge about other countries and people, as well as share European common values and cultural heritage. Taking part in a learning event enhanced motivation to participate in European projects.

During the training event in Bulgaria, students were accommodated in families of children from the host school and had the opportunity to experience the way of life in the visited country.

They participated in joint activities with students from all three countries and communicated in English. The students also shared experiences and impressions, visited important sites for the host country related to the topic of the project.

All participating students in training events received a certificate of attendance from the host school.

**• Students from the host school**

Improvement of the organizational skills of the students for preparation and implementation of activities for receiving and conducting a training event with participants from other countries.

Developing communication skills in intercultural environment when accommodating children from partner countries in homes.

Improving communication skills in English and overcoming cultural barriers

**• The school hosts the training event**

Improving the image of the school and European dimension

Acquiring experience for implementation, monitoring, and control over the management of an international project.

Establishment of partnerships with organizations, informal partners on the project

Promoting school work at an international level

Creating a project team

Motivating pedagogical specialists

Integrate learning content into different lessons

Improve the foreign language skills of pedagogical specialists