

SPEM – Schools Plastic Free Movement

621506-EPP-1-2020-1-IT-EPPKA3-IPI-SOC-IN

Erasmus+ KA3 – Support for policy reform

D 5.2 Guidelines for SPEM model implementation

Partners:



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DOCUMENT CONTROL PAGE

Document name and Deliverable:	Guidelines for SPEM model implementation (D5.2)
Document responsible Organization:	P07 - University of Burgos – UBU (Spain)
Document collaborating Organizations:	P01 – Istituto comprensivo di Bosco Chiesanuova – Polo Europeo della Conoscenza - Europole (Italy) P02 - Regional Directorate of Education Castilla y Leon – JCYL (Spain) P03 - Panevezys Provincial Educational Centre – PRSC (Lithuania) P04 - Make it Better – MiB (Portugal) P05 - Turkish Ministry of National Education - MoNE (Turkey) P06 - Friends of Education – FoE (N. Macedonia)

DOCUMENT HISTORY

Version	Date	Editor(s)	Changes
0.1	30/11/2021	Ileana Greca, Miguel Corbi (UBU)	Preparation of the first version
0.2	07/12/2021	Elena Milli, Stefano Cobello, Roberta Busato (Europole)	Feedback and comments
0.3	30/05/2022	All partners	Local activities and feedback
0.4	15/06/2022	Ileana Greca, Miguel Corbi (UBU)	Revised version after partners' contribution
05.	22/06/2022	All partners	Review and comments
1.0 Final version	01/07/2022	Ileana Greca, Miguel Corbi (UBU)	

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1 Introduction

Schools Plastic free Movement – SPEM is a co-financed project within the Erasmus + program (KA3-Social inclusion and common values) with the grant agreement number 621506-EPP-1-2020-1-IT-EPPKA3-IPI-SOC-IN. SPEM project aims at answer to the priorities of the European Commission to develop and implementing innovative methods and practices to foster inclusive education and promote common values, in particular enhancing the acquisition of social and civic competences, fostering knowledge, understanding and ownership of values and fundamental rights.

To address these priorities the project will develop and implement, through the creation of a movement of educational organizations, a new inclusive pedagogical model addressed to children aged 5 to 13 in particular to those at risk of marginalization and underachievement (migrant, disable, high potential and gifted pupils). In this way the project will develop an educational strategy to prevent early school leaving and to improve the motivation to approach the studies of STEM subjects and the scientific careers as a paradigm and tool for a social change to a sustainable future.

The challenge of this project is to inspire pupils so that they follow the idea of a possible scientific career from an early age to give their contribution to the protection of planet earth. SPEM, starting from the ecological consciousness that young people have shown in these years, wants to create a pedagogical approach that gives them the awareness that by studying they can change the world.

This deliverable provides instruction and guidelines for the teachers on how to practically implement the SPEM model introduced by the D5.1 Inclusive pedagogical model for gifted, migrant and disable students. SPEM model addresses three core themes: inclusion, behavioural change, and the pedagogical model that teachers can apply. This theoretical framework helps teachers to define a coherent inclusive pedagogical model for change behaviour at school, characterized by three steps: Problematisation, Understanding, and Action.

In the following pages the readers can find the decalogue for the SPEM model implementation and some required adaptations for the specific target groups. Furthermore, the deliverable presents good educational practices implemented by the partnership that can be replicated in different contexts or used as guiding examples.

2 Guidelines for teachers (Decalogue)

The main aims of SPEM educational model imply the change of the school environment, of the attitude of the participants, of the relational climate in the class, of the perspective of the children. All these objectives cannot be reached by the mere application of techniques, it is required a different way to approach the teaching-learning process.

Children have to be the protagonists of the research and discover, they have to feel heard and capable of discover new things. The teachers have to integrate the teaching methodologies presented by the SPEM inclusive model with their actual behaviour.

The main guidelines for teachers to follow when carrying out their sessions within the project SPEM are the next:

- ◆ Dedicate first efforts to create a good working environment. Students need to know each other.
- ◆ Keep a balanced integrated teaching method, gathering different subjects and linking all of them. Time enough to developed contents from different subjects must be provided.
- ◆ Include different ways of stimuli: visual, sound, and kinaesthesia.

- ◆ Familiar topics of the students must be addressed. Contents might be varied but they must be always close to the students.
- ◆ Set the session taking in consideration different roles within the same activity. This way, students can contribute with personal skills to a final and collective outcome.
- ◆ Guide the group prevailing the autonomy, creativity, critical thinking, and interests of the students. They need to feel the outcome as theirs.
- ◆ Diversity in the classroom should be understood as a tool for enriching the session, so that the teacher can rely on the strengths of everyone to favour the overall learning outcome.
- ◆ Keep away from stereotypes. The students must feel the chance to be themselves apart from other traits.
- ◆ Allow the development of self-concept, self-esteem, self-exigence and self-image on the students.
- ◆ Address lack of participation from a constructive point of view. Try to convince instead of command.

3 Adaptation for students

Every pedagogical model, and especially those promoting inclusion, requires flexibility in its application. The model should be open and adaptable to the different situation. Teachers themselves should be ready to shape the lessons according to the needs of their students and to change their plans also according to the daily situations or unexpected developments of the conditions.

While working with children at risk of underachievement due to different reasons, it should be taken into account to implement some specific adaptations.

General overview

- ◆ Regulate methodology depending on the specific needs of the participants, prevailing the autonomy in learning as much as possible.
- ◆ When working with conflicts resolution or finding out conclusions, placement of the clues can be adapted in a higher or lower obvious way, depending on the characteristics of the group.
- ◆ Information about polymers need to be adapted to the level of knowledge of the students.
- ◆ Set extra practice in case the students a reinforcement about something.

Low-income students

- ◆ Adapt the materials needed to enhance the use of those they have handy.
- ◆ Keep specially away from relating success to purchasing level.

Gifted students

- ◆ Consider shortening the time dedicated to possible theoretical explanations in the session and enhance the experimentation.

Immigrants

- ◆ Include useful skill developments for the integration and adaptation to a new environment.
- ◆ Take the original features and knowledge to enrich the global experience.
- ◆ Communication must be enhanced, so it would be a good idea to consider some time or method to facilitate communication.

4 Good Practices and examples

This section describes how the partners have applied the guidelines to develop several wonderful activities, that can be used in classroom while implementing SPEM inclusive model

4.1 Istituto Comprensivo di Bosco Chiesanuova (Italy)

In order to create the adequate educational environment to implement SPEM project in the schools, Istituto Comprensivo di Bosco Chiesanuova has organized a set of preparation activities carried out by experts in different fields. These has helped teachers and children to be better involved and understand the aims and the values of the Schools Plastic free Movement. The activities have been:

- Workshops of creative writing for children about environmental protection, that has introduced the children the topic and worked as an awareness campaign.
- Online teachers' training course on the micro-language connected to STEM and pollution, that provided participants from the project's countries with specific knowledge to ease the understanding of SPEM results and the communication among the different members of the Movement.
- High Green Tide (Alta Marea Verde) a team of trainers and young people that are implementing educational workshops in the classes to ease the creation of the research groups of young scientists that save the earth.
- Support by Clementoni Ltd by that has signed a free cooperation agreement proving toys to support the research and observation activities in class.

4.1.a High Green Tide - Alta Marea Verde

High Green Tide (Alta Marea Verde) is a team made by young people and trainers that promote the Schools Plastic free Movement in the primary and middle school. These experts implement workshops of two hours in the schools, to activate interest and enthusiasm for scientific activities whose main purpose is to protect the environment, in all its manifestations (the animal and plant world in the first instance). The workshops are an interactive and fun tool to accompany students towards an ever-deeper knowledge and awareness. They are like a "start process", that will involve children researching the best way to protect our environment. The pupils will have to organize themselves into High Green Tide teams and give themselves a specific name. From there on, their action will be entirely focused on finding solutions to the several problems that afflict our planet especially the reduction of plastic pollution. Over time, we will collect all their works that will be uploaded to a project's website page. The site page will be a reference point for all participating and non-participating schools, in order to have as many ideas and material as possible to involve children in actions all aimed at protecting the environment.

The main purpose of these activities that involve directly the children, is to let them discover certain processes in nature and the problems created by pollution. The main outcome of these workshops is the creation of teams of children (the AltaMarea Verde teams) that name themselves and keep researching for alternatives to plastic and for ways to protect the planet following the SPEM approach. The school will therefore be transformed into a space in which they decide how to save the world.

Examples of High Green Tide workshops:

Mother earth: workshop to find out what a greenhouse garden is (kit that will be left to the class) - creation of a completely biodegradable pot containing a plant to be treated.



Let's save animals: let's play with the Clementoni DOC robot to find out which animals are seriously risking extinction and why.

Zzzzz the queen of all insects: the bee! Let's discover this extraordinary animal, its habits and its magnificent gifts.

Water: we carry out experiments that make us understand the processes in which it is the protagonist and we try to understand why it is precious and must be spared! Let's create a book about water: what do we know about it? The rivers, lakes, glaciers of our area metamorphosis over time! We tell the changes that are affecting the water (desertification and rising seas).

Let's save the sea and its wonders! What's in the deep blue? What did we see on holiday by the sea, on the beach and in the water with goggles? Let's find out what lies between a crab and a jellyfish...

A breath of fresh air: the air is magical, you can't see it yet it's full of particles. How do we know what's in the air? And why is it important to know its composition? We play to discover the secrets of the air and our powers to make it "lighter".

◆ Guidelines for teachers

Thanks to these workshops the teachers will see directly how to promote the participative approach for the protection of the earth through engaging multidisciplinary activities on different topics. The teachers will also be inspired by the other activities collected in the project's website.

4.1.b Cooperation with Clementoni

Clementoni Ltd. Has signed an agreement with Istituto Comprensivo di Bosco Chiesanuova supporting the project's activities, for example by donating 100 boxes of environmentally sustainable toys and games that will be used during the High Green Tide activities.

4.1.c Teachers' training

Taking into consideration the transnational character of the project, it has been necessary to provide to all the future participants a starting point of the implementation of the activities. We have organized an online training course covering the micro-language and associated grammar on the

theme of environmental topics to allow participating schools and teachers to communicate with colleagues from other European countries about their activities and transfer the micro-language to children. The course has been divided into eight main topic areas (modern life, waste, energy, conservation, technology, climate change), each of which contains a number of sub-topics which provide the topics for the micro- language. Each lesson lasted 2 hours: 1.5 hours linguistic aspects of the topic + 30min discussion on a particular sub-topic.

The second training for teachers has been organized with the collaboration of the experts of Zero Waste Italy and it has foreseen 5 online lessons (2 hours each) about the reduction of waste. The course has given the teachers general knowledge and practical hints to be conveyed in their classes. The main topics have been:

- Analysis of the waste in classroom and Redesign of the activities.
- Snacks, plastics and packaging.
- Ecological Footprint, Consumption and Lifestyles.
- What Rare Earths are.
- Information meeting on the path defined with reference to the goals of the UN 2030 Agenda.



The main scope of these training activities is to improve the teachers' knowledge about environmental issues and to feel more comfortable in discussing about them in class, with a new participative approach. Especially the European course for English for the Environment has put the basis for the transnational movement, helping teachers in improving the language of communication among themselves and giving them the chance to meet colleagues from other countries to start transnational cooperation.

◆ Guidelines for teachers

The training has been organized online to open the participation to teachers and educators from different areas, thus reaching a wider public. The training has been recorded and are both available online for the teachers that join the project in a second time.

4.1.d Workshops of creative writing for children

Istituto Comprensivo di Bosco Chiesanuova in cooperation with Del Miglio Editor has organised a 4 months training course for students of primary and middle school on creative narrative writing

about the environment and its protection. The 8 meetings have been held online for 2 hours each, during the normal school time. At the end of the course the students have produced their stories that have been collected and published on a book that has been publicly distributed.

The main objective of this activity, was to introduce children and students to the important topic of environmental protection. The involved students have started to look at the world with different eyes, learning how to describe their experience and to identify possible solutions. This first stage has supported the multidisciplinary approach to the inclusive teaching of environmental protection.

◆ **Guidelines for teachers**

The consulting of an expert editor has provided the teachers with important advices on how to stimulate the children in the writing. The recording of the training course will be available on SPEM.

4.2 Consejería de Educación - Junta de Castilla y León (Spain)

To actively involve educational centers, students, teachers, families, NGOs...we have promoted a series of activities that have allowed us to create a network of centers and institutions that become aware of their present and future role and responsibility in both personal care, the people around them and the environment in which they live. Together with the school's agreement we have framed the movement in what children have called Environmental School Councils.

4.2.a Environmental school councils

Each school involved on the project creates an environmental school council. Each center establishes the number of members that form part of its environmental council, made up mainly of students and who have the advice and participation of one or more teachers.

The number of students on the council is variable to adapt to the situation and particularities of each center. In early childhood and primary education centers there is usually a representation of one student for each course. In Secondary Education centers, there is an average of 3-4 students per level.

The students have internal meetings, they started to meet once a week and they are in charge of sensibilization, promoting and disseminating actions of care, awareness and changes in relation to the improvement of sustainability, reduction of plastic waste and other waste, energy saving and care of environment.

Once a month or each two months 2 representatives from all environmental school councils meet together (by now they meet online) to discuss and share activities, problems, campaigns, proposals they are making and developing in their schools. They share their experience and the knowledge with other children and teachers. These online meetings support and enrich the sense of community among the Plastic free movement schools.

The main purpose is to raise awareness in the educational communities about the problem of plastic and pollution and the need of an environmental change. It is also a main purpose to give children and young people voice and the opportunity to be protagonists of change through their creativity, stimulating their critical, active and conscious citizenship sense.

Workshops developed within the Councils:

Videoforum

For the first approach and sensibilization about the problem of plastics. When we started to use plastic (1950s which means plastic is a very new material), why do we use so many plastics? The proposal is watching some videos like these examples (there are many videos we only show a couple of them):

<https://www.youtube.com/watch?v=7fDTArZdkaM>

<https://www.youtube.com/watch?v=h9Lw2wpZEwE>

and later establish a debate with some questions: do you think plastic is a problem? How do you think plastics arrives to the oceans? Is it possible the pollution in the oceans affect us as human beings? Do you think is it possible to eliminate plastic from our life? Would it be it easy? Did you learn something new after watching the videos?



Oceans pollution, the microplastics

The most dangerous species in the seas. <https://www.youtube.com/watch?v=hoD3ghHqqg8>
<https://www.youtube.com/watch?v=Z0ANa7Gpz6Y>

How plastics and microplastics affect the seas and oceans, does microplastic arrive to our home? How? Where do we find microplastic in our daily life?

Ecoauditory

Research about the waste at lunch. It includes the measure of the kind of waste schools have during the break time: plastic, paper, glass, aluminum, organic, other. Once the situation is “diagnosed”, children will decide action commitments in order to reduce the waste (particularly of plastics in the educational center) and encourage the participation of the entire educational community in the implementation of some of these improvements.



Graphic design workshops

In order to children be autonomous on the sensibilization campaigns teachers teach them basic notions for making a poster, creating an infographic, uploading pictures/videos on Instagram and other social media teenagers use.



Create and cultivate schools' gardens

Many schools have started their school gardens and we are promoting the collaboration of elderly people who can help children both in the care and in the planting of the crops (service learning methodology).



A treasure: the bees

A group of children have research about the importance of bees in the world and in the ecosystems, how to promote their welfare, the power of pollination, how to avoid their disappearance.



Ecomobility

In collaboration with some municipalities, some schools have started to promote the use of the bicycles. “To school by bike” supports children, teachers, and families to change the car for the bike for going to school. School enabled a safe area where children and teachers can leave their bikes while using the bicycle contribute to improve the quality of the air, less traffic jams and the presence of children in the streets makes friendlier cities.

The guardians of the river

A group of children have enhanced part of their action on improving the quality of water, keep clean the river banks and promotes zero waste routes.

Teachers’ (intercity) working groups

Change the methodological and know-how, involve colleagues and promote innovative and inclusive proposals is often a hard work so we found necessary to provide all teachers a place where to share and to support each other so either if they started to work alone in the school or if more teachers or the whole school was involved in the Schools plastic free movement they could feel accompanied. On the working group they also shared the materials linked with the Environmental school councils so they can enlarge the ideas, methodologies, activities they were using.

◆ Guidelines for teachers

presence or online meetings among environmental schools’ councils from different centers in different cities are essential to create the sense of community and the sense of power of change. Children are very proactive once they have the space and time for it and they become and feel an action group, an unstoppable movement that convolves families, friends, other schools, municipalities, senior centers, sports clubs and so on.

4.3 Panevėžio Rajono Švietimo Centras (Lithuania)

In order to create the adequate educational environment to implement SPEM project in the schools, PRSC has organized a set of preparation activities carried out by experts in different fields. These have helped teachers and children to be better involved and understand the aims and the values of the Schools Plastic free Movement. The activities were:

- Creative workshops for teachers to introduce project goals and opportunities to include project activities in long-term teaching plans.
- Online teachers’ training course on the micro-language connected to STEM and pollution, that provided participants from the project’s countries with specific knowledge to ease the understanding of SPEM results and the communication among the different members of the Movement.
- A movement **I am Friendly to the Nature** was created in Lithuania. 8 schools, 15 teachers, 300 students and their parents in total have joined the movement. A detailed plan for the implementation of activities was prepared, all the schools have implemented it during years 2021-2022.

4.3.a I am Friendly to the Nature

The rise of climate change is a global challenge. As individuals, we each have a responsibility to change how we live on a day to day basis to reduce the further onset of dangerous climate change. We can all play our part together and then many small changes will multiply into a large contribution. Therefore, it is necessary to act immediately, to promote a complete change in people's daily habits, to protect the environment, our health and the future of humans and many living organisms on the planet. The movement I am friendly to the nature stems from the need to teach future generations. The aim of the movement is to raise awareness among young people about the impact of plastic on the environment and give them the opportunity to get creative and be the main actors of change. Students/children of a school or any educational institution that become part of the movement have to commit to choosing a number of plastic items (as the beginning of the transformation process) to be replaced by other alternative materials of their own invention (recycled, sustainable, eco-friendly) to become permanently used in education. The ideas emerging around the world will be shared on a certain platform. The team of the movement I am friendly to the nature consists of teachers-volunteers who promote the ideas of the Schools Plastic Free Movement in the pre-primary and primary schools. The team created a plan. The general programs of pre-school, pre-primary and primary education in Lithuania were analyzed. It was discussed with the teachers which specific activities and lessons can be included to involve students to develop SPEM competences. After the analysis of the documents different activities were presented to the students and school communities:

Experimental activity "How is it decomposed?"

The research was done. Students buried things from different materials like newspaper, paper gift bag, plastic (fast-decomposing) bag, ordinary plastic bag, wooden and rubber items, glass, piece of cloth in the school grounds. The hypothesis was risen which objects will not be found after half a year. After six months the objects are excavated and their decomposition is analyzed. Conclusions are drawn.

◆ Guidelines for teachers

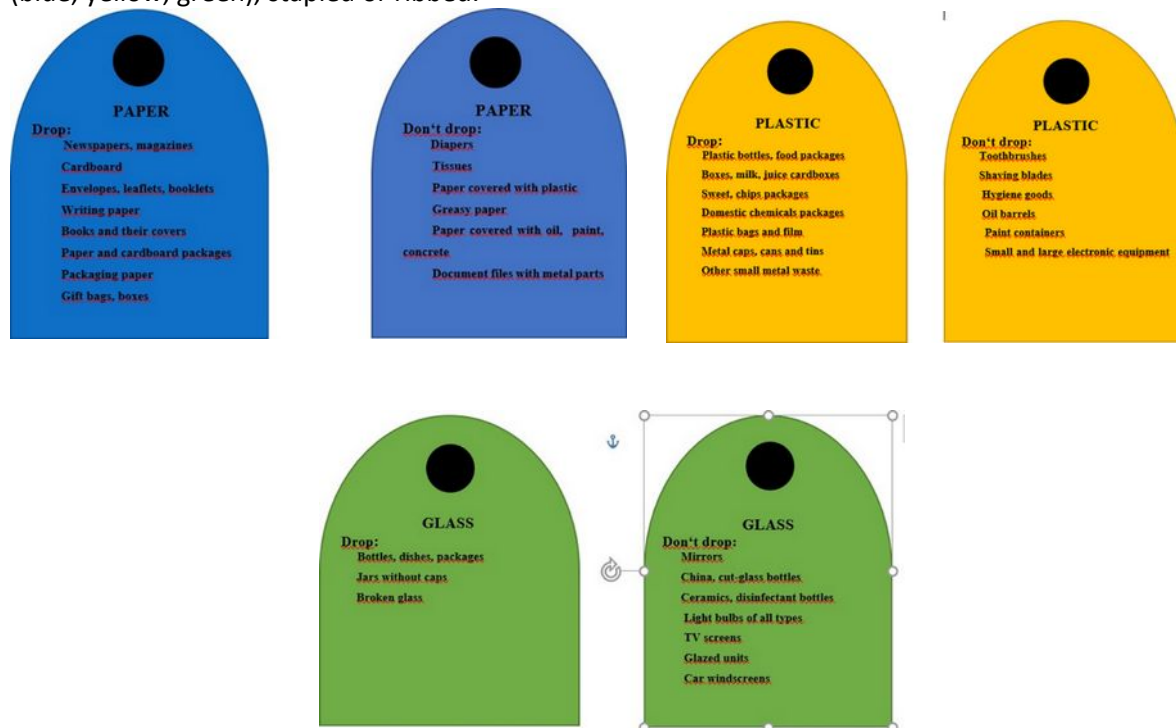
Don't forget the place where the students buried the objects. Discuss how long it takes for different materials to decompose.

Presentation of the methodological-visual aid "colored containers" to the pupils of grades 1-2 of the Institution

Organization of activities "Colored Containers". While watching the video, the students found out why the Earth is sad and how the students can help it. The participants of the activity performed the practical-research activity "Sorting waste". Each participant had to find out which colored container is suitable for their garbage to be thrown. The students sorted out paper, plastic, and glass easily, but where to throw a toothbrush, a cracked porcelain cup, CDs, batteries, light bulbs, outdated medicines, worn sports pants? It is a difficult question... The students put most of the waste in the yellow container. Hence, plastic is consumed by humans the most. In one day, enough disposable cups are used around the world to cover the entire Earth! At the end of the activity, the students were presented with the methodological and visual tool "Colored Containers" of the Erasmus+ KA3 project "Schools Plastic Free Movement" organized by the Panevėžys District Education Center and invited them to protect the Earth.

◆ Guidelines for teachers

Useful links: Plastic pollution: <https://www.glis.lt/?pid=170> <https://www.youtube.com/watch?v=HQTUWK7CM-Y> Materials: 20+4 sets. Every set contains: 3 cardboard double-sided A4 cards (blue, yellow, green), stapled or ribbed.



Experimental activity "labeling of packaging"

Students examined plastic packages and found out their labeling. Labeling the packages makes it easier to separate and collect the correct plastic waste. The students learned that certain combinations of letters (PET, PVC, HDPE...) and numbers (1-19) are used to label plastics. To examine packages the students used magnifying glasses. How fun it is to feel like real researchers! While completing the research data table, the students noticed that most bottle caps are made of HDPE, which is denoted by the number no. 2. This type of plastic has good chemical resistance and is used in the production of shampoo bottles, garbage bags, shopping bags, butter and margarine containers, household cleaner bottles, and yogurt containers. Students discovered that this type of plastic waste is used to make drainage pipes, washing liquid detergent bottles, oil bottles, floor tiles, outdoor furniture, benches and even the pens they use to write with every day!

◆ Guidelines for teachers

The teacher has to be familiar with the labeling system. <https://www.zaliasistaskas.lt/pakuociu-zenklinimas/>

The materials required: magnifying glass. The discussion: why do we need a magnifying glass? Why do elderly people choose not to sort the rubbish?

A creative activity "create a game"

After researching plastic bottle caps and their labeling, students performed a creative activity - they created board games that use collected plastic bottle caps. Some games are designed to develop calculation skills ("Mathematical Actions"), others – to deepen knowledge of the world ("Journey

around Lithuania", "The One Who Knows", "Wild Wests", "Nature's Path"), the third – for sports and health ("Olympedis", Sporty"), others – for memory training ("Remember", "Memory", "Find a mate for the animal"), for entertainment ("Guess and recognize", "Catch the mouse", "Snake", "Block"). Now the students not only play in the classroom or in the library, but also invite other school students to join.

◆ Guidelines for teachers

Take time to allow children to play the games they created and enjoy the activity. Explain the children that it is not necessary to buy new games, they can reuse what had been used.



4.4 Make it Better (Portugal)

Make it better has prepared several short activities, ideal for improving students' understanding, awareness and their commitment for a better planet. They were implemented with kids, in the context of the regular classroom.

4.4.a Construction of ecopoints

This activity is intended to raise students' awareness of recycling habit. It was developed one month during nature science classes, each class lasting about 90min.

The students created ecopoints, using cardboard boxes; plastic bottles, glues, scissors, images for interpretation of the ecopoints. To create the packs and cardboards, cardboard boxes painted yellow or blue were used, with images of packaging that can be placed in the pack and cardboard, respectively. To create the pylons, empty water bottles, lined and wrapped with images of piles that can be placed there. Students liked the activity because *"they think and create"*.

◆ **Guidelines for teachers**

Before the construction of the ecopoints, it is important to make students aware of the relevance of the recycling. Also, they should be encouraged to find the best location for putting them.

4.4.b Cleaning actions in outer space

This activity is a follow up of the previous one, deepening students' engagement for improving our environment. All the class is involved in creating a clean and pleasant outdoor space to play with, promote non-pollution of outer space; encourage the correct use of dustbins and ecopoints in outer space. The students went out into outer space and for several mornings cleaned the outside space of the school, sorting out the various types of garbage.

◆ **Guidelines for teachers**

Although many students liked the activity, others did not, possibly related to the fact that "cleaning" wasn't seen as a task they have to do. It would be interesting to discuss with kids before beginning who will feel uncomfortable doing the activity and why. Encourage them to propose alternative actions to create a clean and pleasant outdoor space to play with.-

4.4.c Nest building

This activity is related with the previous one, motivating students to have animals and plants in the school's outdoor enclosure. The objectives of the activities are the preservation of biodiversity in the school space as well as the promotion of biodiversity at school and in the village. In order to reach these objectives, students had to build nests for birds. To build some nests the students took a walk in a garden to collect straws, leaves, branches and other existing materials and possible to integrate into the nests.

● Already in the room, began to wrap the various branches, branches, leaves and create the shape of a nest, until they managed to stay firm and able to put on the outside. Students liked this activity because they construct nests and they think that they can help to keep the biodiversity at school.-

◆ **Guidelines for teachers**

The set of these three activities help students to gain knowledge and awareness of their environment as well as of their roles in creating a better place for all.

4.4.d Development of posters for awareness and sustainable management of waste, water and energy

The objective of this activity is to raise students' awareness of sustainable waste management, as well as sensitize students/school community to the importance of recycling and rational use of water and energy. For developing this activity, students began with research on sustainable waste management, energy and water as well as recycling and its importance, ways to sensitize people, etc. Later, they discussed ideas, put together best practices and prepared a poster on the school's website. All students liked the activity.

◆ **Guidelines for teachers**

It would be interesting to discuss with the students in which format (paper or digital) and through which channel, they think their posters will be more effective as well as ecological.

4.4.e The brigade eco-schools in action

This activity is a follow up of the previous one. Given the knowledge developed, this activity has as objective to sensitize and involve all students in the rational and more moderate use of water and energy; and to promote the correct use of waste disposal.

The eco schools brigade has organized teams to monitor waste, light and water and travel the entire school in search of the faults. After that, they created sensitization signs for the rational/moderate use of energy and water. These signs were placed in strategic points. All classrooms and toilets were left with flames of attention for saving water and/or energy. Raising awareness and educating the school community, its families and the surrounding community for the circular economy is a constant goal.

◆ **Guidelines for teachers**

All students liked this activity very much because they felt they could act and produce a real change in the school.

4.4.f Love the Planet

This last activity was motivated to sensitize students/school community to the importance of take care of the planet. Its objectives are fostering the adoption of increasingly sustainable behaviour and raise awareness of the importance of caring for the planet.

As part of Valentine's Day, 14 February, ABAE | Eco-Schools Program launched the challenge "Declare yourself to the planet!", inviting everyone to celebrate this day and to promote everyone's awareness of the importance of caring for our planet and adopting increasingly sustainable behaviors. Some of our students participated in, producing letters with personal messages about the importance of caring for the planet.

◆ **Guidelines for teachers**

As suggested in the theoretical framework, it is important to generate good emotions in order to produce changes in our behaviors. Writing a letter is a wonderful way to engage students in expressing their feelings.

4.5 Friends of Education (North Macedonia)

In order to create the adequate educational environment to implement SPEM project in the ambassador schools of the project, the organization Friends of Education has organized a set of preparation activities carried out by teachers in several schools in North Macedonia. This has helped teachers and children to be better involved and understand the aims of the Schools Plastic free Movement. The activities have been implemented through organizing two events:

- Small actions can lead to big change (find creative solutions): the main goal of organizing this 1-month event was to raise awareness for the presence of plastic in everyday life and to find creative solutions for the replacement of plastic.

- Finding about the problem of plastic pollution through picturebooks: the main objective of this activity was to give the power to students through storytelling to present their ideas about preventing pollution.

4.5.a Small actions can lead to big change

This event included several activities implemented in a period of 1 month. In these activities were involved students from middle school. This activity was organized both in urban and rural schools. Students from different social and ethnic backgrounds were included. The main objective of these activities was to encourage the creative thinking of the students to find creative solutions to the problem with plastic and water waste.

1. Lecture: Plastic everywhere.

Teachers involved in each of the schools organized a lecture about the presence of plastic in everyday life. They present different examples of plastic using in the objects of everyday life and how these impact the environment. Through a video and statistical data, it was presented the impact that plastic had on the environment and humans' life. Local eco activists were invited to present their work to the students. They talked about local issues regarding plastic and what kind of actions they took to raise the awareness of the local community. Different examples of small actions that lead to big changes for replacement of plastic from around the world were presented.

Resources:

- <https://vimeo.com/ondemand/strawsfilm?fbclid=IwAR1mGHmbdTh7K7k5SACUf6qfieTTtFenyhSRy-14qoG5XPXj3gc3daxozRk>
- Finalists National Geographic Society:
<https://www.nationalgeographic.org/funding-opportunities/innovation-challenges/plastic/finalists/>

2. Workshop: Creative solutions

Following the presented topic of the lectures organized in each of the schools, teachers organized workshops with the students. They gave a task to the group of students involved in the activities to find their own solution for replacement of the plastic material with alternative one and to give solution for the local issues like water waste. Students came up with different and creative ideas. Each group of students was led by the slogan "Small actions can lead to big change".

One group made extraordinary pieces of jewelry using materials like clay and macaroni and they colored them.

The second group started a campaign for raising awareness of the mass use of plastic by creating creative posters.

The third group made "Drop by drop" watering system for watering their school garden.



◆ Guidelines for teachers

It is important, if possible, to involve the local community, associations and families. to participate to the activities together with the students. The awareness campaign can also reach the attention of the media, increasing the impact.

The activities have to be organized according to age groups and groups of interest. Furthermore, adaptations have to be sought to ensure the inclusion of children and parents with special needs. For example using the sign language for deaf participants.

4.5.b Finding about the problem of plastic pollution through picturebooks

This event included several activities implemented in the second semester.

The main objective of this activity was to give the power to students through storytelling to present their ideas about preventing pollution. To raise awareness of the students that they have power to make big changes in society with their own deeds, through identifying with positive characters. To integrate the project activities with the teaching material i.e. curriculum of different school subjects.

1. Story telling

Teachers organized one day event titled “story telling day”. They presented different stories and picture books to the students. This activity was integrated into their language lessons. They talked about storytelling and how students can develop their own story. Also, this activity was integrated with the art lessons where teachers taught students how to make picture books. The topic of the presented stories was pollution. Students had several activities in order to understand the process of creating their own story and understanding the pollution by retelling the story, discovering the cause of pollution, expressing their feelings about this issue.

2. Let's make a story

Inspired by the activities during the story telling day, students were organized in pairs to work on development on their own story. The topic of the stories that the students wrote was pollution around us. Students in each school created stories and they were inspired to organize eco actions for cleaning the local polluted places and to create art works from collected plastic and other waste materials. The main idea was for students to identify themselves with superheroes from picture books and to become more encouraged to act in the environment.

Resources:

<https://www.youtube.com/watch?v=4ts-2hFq18w>

https://www.youtube.com/watch?v=IR_9-iF_mYg&t=91s

Picture books and stories: <https://1drv.ms/u/s!AjK7mZh44R8z4EOmjhtcroKju4tw?e=NO0YcQ>

Art works: <https://1drv.ms/u/s!AjK7mZh44R8z4Ff21YpxJF8C3zBP?e=Jq3d9y>

Eco action: <https://1drv.ms/u/s!AjK7mZh44R8z4FgO8gb8P6GBZpFo?e=rYDyOf>



◆ Guidelines for teachers

The teachers should find appropriate stories and examples related to the project objectives and integrate them with the particular curriculum of some school subjects. The stories have also to be adapted according to the students' interests and abilities such as writing, drawing, programming, role playing.

It can be useful to raise the awareness on the environmental issues to organize public presentations to show the students' work.

4.6 Ministry of National Education (Turkey)

4.6.a Watch out! Plastic bottle

This activity was carried out in a lower-secondary school in Ankara. 120 students participated in this activity. 11 or 12 year-old kids actively took part in this activity which is on the use of plastic. A meeting was held with the students and they were given the task of research and presentation on the following topics.

- Historical development of the use of plastic.
- Types of plastic products used in daily life today.
- Microplastics and their harms.

- Reducing the use of plastic.

After a week of research time, the assigned students presented their research to other students. Students who listened to the presentations were asked for solutions and suggestions to reduce the use of plastic.

As a result of research and discussions it was understood that:
too many plastic bottles and bags are thrown away.

- Single-use plastics pollute the nature.
- Use of plastic in their school can be reduced with taking some measures and complying with some recommendations.

Posters and an awareness board were prepared in the school to take attention to reduce the use of plastic.

Inner purpose of this activity is to raise awareness of the students about the use of plastic, environmental pollution as a result of the plastic materials and microplastics, and to let them think about how to reduce the use of plastic.



Posters prepared by students

◆ Guidelines for teachers / Organizations

During this activity active participation of the students was aimed to reach effective learning outcomes. Therefore research and presentations were carried out by students under guidance of their teachers and all students were encouraged to use their problem solving and critical thinking competences. It was observed that most of them eagerly participated in the discussions and shared their ideas and concerns about the environment.

4.6.b Age of plastic

This activity was carried out in a primary school in Ankara. 20 students between 8 and 10 years old participated in this activity.

A set of tasks were shared among the students and they sought answers to the following questions:

- What is plastic?
- Can we imagine a life without plastic?
- What is the place of plastic in our life?
- When did plastic enter our lives for the first time?
- What are the types of plastic used in daily life?
- What are the harms of plastic?
- How can we reduce the use of plastic?

After doing research and sharing the acquired information with their peers, they sought solutions to the problems related to their own topics through discussions in the classroom. And then they prepared posters to raise awareness in the school. Finally, they discussed how to reduce the use of plastic and shared some example materials that could be alternatives to plastic products.

The purpose of this activity was to raise awareness about the use of plastic and the relationship between plastic and environmental pollution.



◆ Guidelines for teachers / Organizations

During the activity most of the students were very curious and very enthusiastic. In particular, we saw that some students are very sensitive about the environment and plastic use. In the group discussions they were very eager to talk about their own topics and to share the new information they learned with their friends. It is useful to distribute the research topics among the students and share the findings in the group discussions in the classroom. Group discussions and producing posters together contribute to interactive learning.

First of all, the 120 students (11-12 years old) who will work voluntarily in the project were determined.

A meeting was held with the students and they were given the task of research and presentation on the following topics. Subjects assigned for presentation and research;

- Researching the historical process of use of plastic.
- What are the plastic products used in daily life today?
- Why is plastic harmful? What is microplastic?
- How can we reduce the use of plastic?

The assigned students presented the presentations they prepared as a result of the research to their friends.

As a result of our research;

- Most plastic bottles and bags are thrown away.
- Single-use plastics pollute the nature.
- It has been determined that the use of plastic in our school can be reduced with the measures and recommendations to be taken.
- Students who listened to the presentation were asked for solution suggestions to reduce the use of plastic.

Posters and an awareness board at the school were prepared to reduce the use of plastic.

It was decided to implement the recommendations to be taken in the future and to encourage students not to use single-use plastics.



4.7 Universidad de Burgos (Spain)

In order to create the adequate educational environment to implement SPEM project at schools, Universidad de Burgos has organized a set of activities, organized in two extended didactic sequences, developed and carried out by experts in natural and social science education, arts education, mathematics education and sports education. These activities help children to be better involved and understand the aims and the values of the Schools Plastic free Movement. Also, UBU have developed some guidelines regarding evaluation.

4.7.a Didactic sequence “a plasticized planet”

This workshop was carried out with two groups of students in the fourth grade of Primary Education (9- 10 years old), the sequence consisted of four sessions. This didactic sequence begins with the story of young people working for the planet, one of them, a teenager, is involved in designing ways to cleanse the oceans from microplastics. The following three sessions developed the “understanding” part of the pedagogical model developed in SPEM project. The first session, entitled “Recycling plant”, aimed to pass on knowledge of plastics and microplastics to the students, so that they become aware of the existence of microplastics and experiment and discover microplastics in water. The second session, “Plastic islands”, was intended to raise awareness of the existence of plastic waste in nature and its consequences, to raise awareness of the importance of reusing, reducing, and recycling plastics and to experiment with procedures to understand how nature works and the effects of human actions. The third session is an escape room, “Mr. Plastic’s shop”, which seeks to settle the contents previously worked upon in fun and challenging environments and to experiment to find two true and one false statement related to plastics. Finally, for the “action” part

of the model, in the fourth and last session, “Leave your print”, a shadow theatre was performed to handle audio-visual resources and create dissemination material. A short video inspired by a story related to the knowledge acquired in the previous sessions is also planned in class. All this, with the aim of developing critical thinking.

The main purpose is to raise awareness in the educational communities about the problem of plastic and pollution and the need of an environmental change. It is also a main purpose to give children and young people voice and the opportunity to be protagonists of change through their creativity, stimulating their critical, active and conscious citizenship sense.

◆ Guidelines for teachers / Organizations

This sequence was developed with a group of gifted students in an extracurricular activity and the detailed description can be found at <https://schoolplasticfreemovement.org/es/activities/>. It is worth stressing that students were really motivated during the sessions, and have evaluated their improvement in understanding the problem of plastics and their commitment and very high.



4.7.b Didactic sequence “detectives for sustainability”

Carried out in two groups of 10 fifth and sixth grade Primary Education students (11-12 years old). This sequence also consists of four sessions. “Plastic identification” is the title of the first session where our use of plastic is problematized. In this session, students identify plastics from everyday life, become aware of the importance of reusing, reducing, and recycling plastics and differentiate the types of polymers according to their application, density, physical appearance and flame behaviour. In the next two sessions, students learn more about plastics. So, the second session, Plastic hunt, is about students acquiring knowledge of what constitutes a polymer and differentiating between biopolymers and artificial polymers, creating a biopolymer and becoming aware of the uses and advantages of using polymers of natural origin. In the third session, an escape room called “The *polys*” is constructed where students learn the contents previously worked upon in a fun and challenging environment and experience the creation and properties of different polymers such as wafer, Kevlar, polypropylene, and nylon. In the fourth and last session, the “action” is taken through creativity. In “Detectives for sustainability”, audio-visual resources are used to create material for dissemination, in this case a *gif related to the knowledge acquired in the previous sessions. As in the previous case, the idea is to develop and to promote critical thinking.

The main purpose is to raise awareness in the educational communities about the problem of plastic and pollution and the need of an environmental change. It is also a main purpose to give children and young people voice and the opportunity to be protagonists of change through their creativity, stimulating their critical, active and conscious citizenship sense.

◆ Guidelines for teachers / Organizations

This sequence was developed with a group of gifted students in an extracurricular activity and the detailed description can be found at <https://schoolplasticfreemovement.org/es/activities/>. It is worth stressing that students were really motivated during the sessions, and have evaluated very high the improvement achieved in their understanding of the problem of plastics and their commitment.



4.7.c Evaluation tools”

Different strategies could be used to evaluate the effectiveness of the different activities, in terms of the improvement of the children’s knowledge as well as their attitudes towards inclusion and STEM subjects.

◆ **Evaluation of teachers' appreciations through an observation sheet:**

this includes issues related to organization (classroom distribution, groupings, *etc.*), times (loss or lack of time in the different activities), theoretical issues (students' understanding of the contents, need for reduction, extension or changes, *etc.*), methodological issues (possible changes on how the activities are carried out) and issues specific to the group (critical nature of the students, participation/interaction, aspects of inclusion/diversity, *etc.*).

◆ **Questionnaire on the use of plastic¹:**

we used the questionnaire of Ferdous and Das (2014). The test has three dimensions, knowledge, attitude and behaviours, with five, six and four items, respectively, and a five-point Likert-type scale to indicate the degree of agreement (Annex I). It provides useful insight into possible attitudinal and behavioural change among children and knowledge-related changes.

◆ **Perceptions Inclusion Questionnaire (PIQ) student version** (Venetz *et al.*, 2015):

composed of 12 Likert-type scale items, each with four response scales. The questionnaire serves as a tool for measuring three dimensions of subjectively self-perceived inclusion in school: emotional well-being at school, social inclusion in the classroom, and academic self-concept. It is designed to be used by students from third to ninth grade and can be self-administered.

◆ **Student Attitudes Toward STEM (S-STEM) Survey** (Unfried *et al.*, 2015):

validated for use in grades 4 through 12, the S-STEM survey is administered to measure changes in student confidence and efficacy in STEM subjects, 21st century learning skills, and interest in STEM careers. The survey consists of four dimensions, Math, Science, Engineering and Technology, and 21st Century Learning, with eight, nine, nine, and eleven items, respectively, posed with a five-point Likert scale to indicate degree of agreement. It also has another twelve items on future work, this time with a four-point Likert scale to indicate degree of interest. The survey results helped to arrive at decisions on possible improvements to the program.

5 Annex 1: Questionnaire on the use of Plastic

With the following questionnaire we want to measure your opinion about the use of plastic.

- To do this we will use the Likert scale method, whereby you will have to indicate the degree to which you agree or disagree with the statements presented, with 1 being strongly disagree and 5 being strongly agree.
- You should circle the option that most generally corresponds to your thinking.



Name: _____

Gender: I am a boy ☐ I am a girl ☐

Age: _____

Course you have just finished: _____

		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
KNOWLEDGE	"Re-use" of the plastic bag is good.	1	2	3	4	5
	Awareness is essential for saving our environment from the plastic hazards.	1	2	3	4	5
	In the ground, plastic materials are sustain long time and decrease the soil quality.	1	2	3	4	5
	Chocolate and biscuit wrappers can be thrown away anywhere because they have no effect on environmental pollution.	1	2	3	4	5
	To keep the environment beautiful we need to be free of plastic products.	1	2	3	4	5

		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
ATTITUDE	It is not right to throw plastic products any- where after use.	1	2	3	4	5
	People should be aware of the use of plastic products.	1	2	3	4	5
	Plastic thrown by the people does damage the environment.	1	2	3	4	5
	Plastic products are more user friendly than any other products.	1	2	3	4	5
	Everyone needs to aware of use of plastic products	1	2	3	4	5
	School environment can be plastic free	1	2	3	4	5
	We should not throw away all the used plastic materials rather than recycle.	1	2	3	4	5
	We should REUSE the plastic bags.	1	2	3	4	5
	We should replace the plastic bags with jute or other bags.	1	2	3	4	5
	It is not essential to give a plastic bag while we buy something from the shop.	1	2	3	4	5