TINK@school

TINKering for sustainability at school

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A4.1 Selection of toolkit activities and eco-system target groups

Greece-Iceland-Italy-Netherlands

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Based on per country reports

Contents

Preface - About this document

This document was compiled after the Partners Meeting in Athens (Feb 2024), when all the main outcomes of WP3 concerning the Tinkering for Sustainability Toolkit, namely the:

- The Methodological Guide (A3.1)

This toolkit serves as a guide for anyone who wants to start developing Tinkering activities on sustainability. It consists of a brief description of the Tinkering methodology, ideas how to infuse Tinkering with sustainability education and how one can get started on developing their own Tinkering activities.

- The Tinkering Activities (A.3.2)

Eleven comprehensive plans for tinkering activities aimed at students from upper primary and lower secondary school level.

- The Facilitation Guide (A3.3)
  This guide provides additional resources for the eleven activity plans. In this document we included general information and extra tips for the facilitators, for example: additional tips on guiding the activities, a glossary and suggestions for materials.

After the above documents have been finalised and the Partners were mutually trained on all the newly designed Activities, they were in position to reflect on:

- which activities are most suitable to implement;
- for which target groups; and
- under what circumstances, in each country.

The Partners also discussed on the format for the training that should be based on the needs and preferences of the target audience. Although the core of the training content is the same, some variations are possible from county to country depending on the context, for example one country may choose to include also students in the training (e.g. Netherlands, Iceland, Greece), another may choose repetitive few hour-long seminars (e.g. Netherlands, Italy) and another the format of a longer multi-day format (e.g. Greece, Iceland).

As we will see in the following paragraphs, each country followed a different path in their implementation, following however a common architecture in our school implementations and trainings.

The countries are presented in Alphabetical order.

Selection of Activities - Greece (MIO-ECSDE)

An important goal for designing the training that took place in Greece (April 2024) was for our **participants to try out experientially as many Activities from the Toolkit as possible**, and in order to do that we opted for a two-day long workshop (lasting 7 training hours in total). Considering that our main target group is primary level teachers (see next paragraph), we decided to prioritise those Activities from the Toolkit that:

- match well the Greek primary level curriculum,
- could be tried out as a hands-on, or alternatively as a demo by the trainers
- could "fit" in the schedule of the intended training

Moreover, considering that none of the participants of the training had any experience in the tinkering methodology, we designed the training **with a progressive difficulty level**. We began with easy to do activities ('Tink your name', 'Balancing sculpture'), that could "hook" the participants and make them feel comfortable and then moved to more challenging activities (Moving Scarecrow, Shadow Art, Stop-Motion-animation).

"Tink your name" as an ice breaker

The introductory ice breaker activity was the 'Tink your name / yourself' activity, because:

- it can be completed in only 10 minutes
- it enables a creative and fun use of time while waiting for people to gather,
- it makes those who are inexperienced to feel at ease and not intimidated by Tinkering,
- it familiarises attendants with two main 'station-tables' we use in Tinkering, that of i) materials, and ii) tools.

Another aspect we considered in the design of the training was **the group dynamics**. We wanted teachers to experience what Tinkering feels like, when working solo as well as in small groups of two or three. So, for each Activity different group size combinations were tried out.

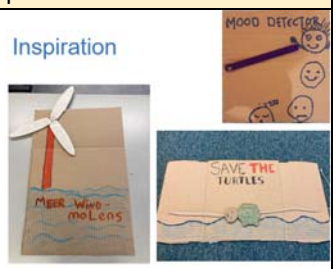
Despite the chosen long format of the training, it was impossible for our participants to try out all the Activities of the Toolkit experientially, so some of them were shown as demo. The sequence of Activities included in the training and the duration of each is shown in the following table.

As it becomes evident from the table, the participants of the Training were exposed to all of the Activities of the Toolkit (six Activities through a hands-on workshop, and five through a demo). The instructions that were given to participants for all Activities actually followed the same "pattern" using a PPT with minimum text and many photos, in order to stimulate and inspire them.

	Activity	Duration	Format
Day 1 of training	Tinker your name	10 min	Hands-on "ice breaker"
	Balancing sculpture	~40 min	Hands-on workshop
	Save the plant bag	~ 40 min	Hands-on workshop
	Moving Scarecrow	~ 40 min	Hands-on workshop
	Solar panel moving scarecrow Tinker a Rain Collector Tinker a Green Decoration	15 min	Short presentation and demo of possible outcomes
Day 2 of training	Shadow art with marine litter	~40 min	Hands-on workshop
	Kinetic sign for the environment	~ 40 min	Hands-on workshop
	Stop motion for Sustainability	~ 80 min	Hands-on workshop
	Tinker with old toys Tinker a sustainable calendar	10 min	Short presentation and demo of possible outcomes

The "Workshop pattern" that was followed in most Activities included these six steps:

- STEP 1: Introductory slide: Title, Group-size, Duration
- STEP 2: Scope: Start brainstorming in plenary
- STEP 3: Inspiration through 5-6 pictures /videos of possible results
- STEP 4: Give the prompt: Keep it open
- STEP 5: Allow time for groups or individuals to Tinker
- STEP 6: Conclusion, Check the creations & take feedback | End with "How-to-tips" for facilitation

STEP 1: Introductory slide, Title, Group-size, Duration	**STEP 2**: Scope Start brainstorming in plenary	**STEP 3**: Inspiration through 5-6 pictures /videos of possible results
		
STEP 4: Give the prompt Keep it open	**STEP 5**: Tinkering time for groups or individuals	**STEP 6**: Conclusion, Check creations , take feedback | "How-to-tips" for facilitation
		

The same pattern/steps were followed also for the Activities that were not tried out but demonstrated to the teachers, so that they would be exposed and inspired by seeing possible outcomes. Even though the Step 5 was skipped in these Activities, the "How-to-do" Tips of Step 6 were explained.

1. Ecosystem Target-groups in Greece

Admittedly, in primary education there are more possibilities for students to conduct interdisciplinary projects as usually the students have the same teacher for all (or most) of the subjects. In secondary education, teachers are more pressed with the official curriculum, have less flexibility, and might feel a need to connect the Tinkering activity to a specific curriculum theme. That is why primary education teachers was chosen as the main target group for the trainings in Greece. In line with the stakeholders mapped during the first phase of the project (A.2.4), two target groups were identified:

a) Teachers of primary school level who can put the content of the Tinkering Training immediately "to practice" with their students, and
b) Environmental Education / Education for Sustainable Development (ESD) professionals, that can act as "multipliers" being themselves trainers of teachers, and school-network facilitators.

The two-day long training workshop, due to its experiential hands-on character is designed to serve a number of around 20 participants in order for them to be able to work individually and in small groups. These participants can provide immediate feedback, by completing the training evaluation form, and they will be "discretely monitored" while implementing the tinkering activities to their classes. Indeed, during the period after the training, some them have notified us of tinkering through photos and videos (see posts in the project's **Facebook page**)

Another implementation activity took place in Greece, after invitation from the teacher of the 70th Primary School of Athens, that is also Associate Partner to the project. This time the target group was students.

c) Students of 3rd Grade (~10 years old)

On the occasion of the end-of-school year ceremony, the teacher decided to do a tinkering activity for parents and students together. For this reason, and after she implemented an easy tinkering activity on her own (Tinker your name), MIO-ECSDE, was invited to implement two activities with the students (Balancing Sculpture and Moving Sign), so that the students would feel confident in running themselves a tinkering activity with their parents during the ceremony.

Indeed, we did try out the Balancing Sculpture activity with the students, but the Moving Sign was only demonstrated, as we run out of time, and instead the students made it at home, and brought to school their works the following day. Unfortunately,

the end-ceremony was cancelled, as the last day of the school year (13 June) all schools of Athens were closed, due to a heatwave.

d) Students of 8th grade (~ 14 years old), [scheduled]

As part of an Erasmus+ KA1 mobility, two rounds of visiting eighth-grade Swedish students are anticipated in Greece in October and November of 2024. During their stay, MIO-ECSDE will combine a beach clean-up (Day 1) with a Tinkering Activity (Day 2) involving the wastes that were collected. In each round 30 students with 5 teachers are expected to take part in the activities. These Implementations will be documented the project's webpage and/or Social Media (Facebook)

Target group	**Number**	**Context**
Teachers / museum professionals	20	Training, April 2024
ESD professionals / trainers	3	Training, April 2024
Students of 3rd Grade	15	End of school year ceremony, June 2024
Swedish Students of 8th grade	30	KA1 student mobility, in October 2024
Swedish teachers of 8th grade	5	(as above)
Swedish Students of 8th grade	30	KA1 student mobility, in November 2024
Swedish teachers of 8th grade	5	(as above)

Selection of Activities – Iceland (UI)

At the TPM in Athens (Feb 2023) the consortium discussed the activities and decided that all activities are suitable for the toolkit and can be used in the training and dissemination activities. The consortium also discussed about a recommended format for the training, starting with a long Tinkering Activity which should showcase the experience of Tinkering to a participant, and then elaborating on sustainability in the classroom and its connection to Tinkering.

In Iceland we want to focus our training on two activities that are open and offer a wide range of options in terms of implementation as well as easy to manage in one session. Of course, many of the activities in the toolkit fit that description but our focus is on one long activity, ***Stop motion*** and one shorter, ***Tinker a moving sign***. The training session will include also a short introduction of all the 11 activities that are in the final toolkit, so that the participants can have an overview.

1. Ecosystem Targetgroups

For the training session in Iceland we have identified **School of education students** as our main target group. The school of education (SoE) at the University of Iceland is the leading institution in education studies and teacher training in Iceland. It leads various projects in schools at the pre, primary -and secondary level with opens possibilities for dissemination of the Tinkering method.

For the Icelandic training sessions, we want to take advantage of the School of education's proximity to teachers- and leisure studies students at university level and introduce the tinkering methodology to them. These students can use tinkering with target groups - children, either in classrooms or in after school programs. Many of the students at the School of education are already working with children in elementary school, preschool or in various after school programs so it is possible for them to implement and use the tinkering experience in relation to their work right away. We plan to collaborate with their teacher (adjunct, professor) and discuss how the training can benefit students and be useful for them in the course “Leisure and children”.

Here is a description of the course in the university course catalogue (**Link, in Icelandic language**). As said in the catalogue the main subjects of the course are leisure activities for children aged 6-12 in a broad sense, where the main pedagogical perspectives are discussed with this age group in mind. The subjects of the course include democratic practices in working with children, different aspects of education, criteria for quality in leisure activities, safety and welfare issues in leisure activities, the importance of play, multiculturalism and inclusion, communication and critical thinking, arts, culture and creative work and leisure activities with diverse groups of children. We feel that the training session will benefit the students as the tinkering

method can be a playful experience related to many aspects of education in both formal and informal education settings.

Since the tinkering method is unknown to the university's teaching staff, it is important to share information with them and discuss how to adjust the program to the needs of their students. It is also important to see how the students might be able to combine the tinkering training session and methodology to the course material and assignments. Through the training session we hope to get input on the activities, tinkering materials and setup for further evaluation of the project's final outputs. We also hope to get the teachers/professors input on how the students used the tinkering training in their studies, assignments and in work with children.

Our aim is to get to 30 students in a classroom at the university, for half a day.

2. Training plan and execution

Target group	**Number**	**Where**
University students and their teacher in their course "Leisure and children"	30	University of Iceland, School of education - March 2024

Five of the participants from that classroom than used the tinkering training as a part of a sustainability project in Nordplus seminar in April 2024 with 20 other students and 8 teachers from four universities (University College Absalon in Denmark, Mid Sweden University, Mykolas Romeris University Lithuania and University of Gothenburg), achieving a dissemination of the Tink@school project outside the project countries.

The practice was well received and showed how the students were able to connect what they learned about tinkering in practice, hold their own workshop, implement tinkering in assignments and take part in communicating tinkering methods with Icelandic educators.

Selection of Activities – Italy (Bartolomeo)

During the Transnational Project Meeting (TPM) in Athens (Feb 2023), the consortium agreed that all activities in the toolkit are suitable for use in both training and dissemination efforts. The consortium also discussed on a proposed format for the training sessions begining with an extensive Tinkering Activity designed to immerse participants in the Tinkering experience, and continuing with exploring sustainability topics in the classroom and their connection to Tinkering.

In Italy, at the Montessori public middle school in Milan, the focus will be on two activities that are versatile and manageable within a single session: Tinkering a Scarecrow and Tinkering a Water Collector. These two activities were chosen based on the successful implementations during classroom testing.

1. Ecosystem Target groups

For the training session in Milan, we identified the target group: teachers at the Montessori public middle school. This school is renowned for its innovative educational practices and strong emphasis on experiential learning, making it an ideal setting for implementing the Tinkering methodology.

The middle school setting allows for the Tinkering method to be introduced to teachers across various subjects. The aim is to integrate Tinkering into different disciplines, leveraging the Montessori school's emphasis on hands-on, student-centered learning. The teachers will be encouraged to incorporate Tinkering into their lesson plans, providing students with a playful yet educational experience that enhances critical thinking, creativity, and problem-solving skills.

2. Training plan and execution

The training involved 15 teachers, each teaching different subjects ranging from mathematics to music. The session began by explaining the entire project, with an overview of all the activities carried out up to that point, and a brief overview of all 11 activities of the Toolkit. The focus then shifted to the activities experimented with in the Milanese classrooms: water collector and scarecrow, demonstrating the practical application of Tinkering in sustainability-related projects. This was followed by hands-on experimentation with a tinkering activity inspired by the two classroom-tested activities. The session concluded with the presentation of each teacher's work and a final discussion.

Target Group	Number	Where
Middle school teachers across various subjects	15	Montessori public middle school, Milan - May 2024

3. Post-Training Implementation and Feedback

At the end of the Training session, the 15 teachers completed the evaluation questionnaire. This allowed us to gather their observations and comments, as well as their interest in applying the Tinkering methodology in various academic contexts. We collected information on how the Tinkering method can be seamlessly integrated into the Montessori curriculum and its impact on student engagement and learning outcomes.

4. Expected Outcomes

The outcomes of the training in Italy can be summed up as follows:

- **Increased Awareness:** Teachers across various subjects became familiar with the Tinkering methodology and its benefits.
- **Enhanced Skills:** Students can develop critical thinking, creativity, and problem-solving skills through hands-on activities.
- **Curriculum Integration:** Teachers explored ways to incorporate Tinkering into their lesson plans across different subjects.
- **Sustainability Focus:** The project highlighted the connection between Tinkering and sustainability, encouraging eco-friendly practices.

5. Conclusion remarks for Italy

The Tinkering training at the Montessori public middle school in Milan was a successful pilot, demonstrating the applicability and benefits of the Tinkering method in a middle school setting. The feedback and outcomes from this session will be invaluable for refining the Toolkit and expanding its implementation in other educational contexts.

Selection of Activities – Netherlands (NEMO)

At the TPM in Athens (Feb 2023) the consortium discussed the activities and decided that all activities are suitable for the toolkit and can be used in the training and dissemination activities. The consortium also decided on a format for the training. It starts with a long Tinkering Activity which should showcase the experience of Tinkering to a participant. Then the training elaborates on sustainability in the classroom and its connection to Tinkering. Lastly the trainees dive into the facilitator's role in a shorter activity.

For the Dutch training sessions, we want to showcase the activities that will best fit the Dutch curricula based on the target group and could have a versatile application in the training schedule.

Most suitable for the Tinkering experience part of the training:
Tinker a scarecrow
Upcycling old toys (If you have enough time)
Shadow-Art with trash
Balancing sculpture
Tinker a kinetic sign
Tinker sustainable decoration

Therefore, we want to modify the training activities based on the educators' needs and wishes. This is why we decided to include activities that can be executed in whole (as the activity plan dictates) or in part in a smaller, modified version. This version could be modified in the wording of the prompt or in the materials given. For example, the sustainable bag activity could have a prompt that asks the participants to tinker a material that you might make a bag from or could have materials that help to efficiently construct the bag. These variations help the educator to facilitate the tinkering activities in both long- and short-time margins.

Though the curricula of the Dutch primary and secondary schools are connected, they might take different approaches on how to teach a subject like sustainability.

In primary education there are more possibilities for students to conduct interdisciplinary projects as the students have the same teacher for the different subjects. The shadow art activity might be more applicable to primary school based on the emphasis on the connection to the students' daily lives and learning goals regarding natural phenomena such as balance and light for making the sculpture but it is applicable also to the secondary school curriculum through physics courses.

In secondary education, teachers might feel a need to connect the tinkering activity to a specific theme as their classes are specialised per subject. However, the activity might provide chances for the teacher to work in an interdisciplinary way. For example, the kinetic sign activity could be used as an interactive approach to portray climate change processes for chemistry, biology and art courses in both primary and secondary education.

Furthermore, in the Netherlands there is often one teacher per 30 students in formal educational settings. In the selection of the activities, we took the feasibility of facilitating the activity alone into account.

Museum education is not directly bound to the national curriculum, we also want to incorporate the activities that would fit multiple themes and would not be limited by their prompts. For example, in the stop motion activity the theme of the stop motion film is not set but can be decided by the group itself. The process that is described in the activity plan are based on what actions the students need to take to make a stop motion film, but do not dictate what topic for their film the students should choose.

Taking the target groups for the training and the flexibility of the training into account, we decided to include the activities that are applicable to a multitude of themes in the curriculum and could fit in both activity slots of the training schedule. Therefore, we have decided on the following activities: 'Shadow art with (marine) litter,' 'Tinker sustainable decoration', 'Tinker a sustainable bag', 'Tinker a scarecrow', 'Tinker a kinetic sign' and 'Stop motion'.

In each training we will look at which activities best fit the target group, but overall the intention is to follow this preliminary plan:

For Primary school:

- Long activity: Shadow art
- Short activity: Sustainable decoration

For Secondary school:

- Long activity: Kinetic sign
- Short activity: Stop motion in two frames

For (Museum) educators:

- Long activity: Shadow art
- Short activity: Stop motion in two frames

1. Ecosystem Target-groups

For the training activities we have identified three target groups: students, teachers/after-school care, museum professionals and other informal educators. We plan to host different sessions for each target group.

The individual workshops for students will let them come into contact with tinkering in an easily accessible way and have a higher impact through the students' personal experience. With these workshops we can also get input from teachers and facilitators to further evaluate the activities. And hopefully interest them in the training and/or the activities. The goal is to reach 20 students with the workshops.

For the teachers and formal educators, we plan to hold three-hour tinker training sessions in which we treat subjects on general tinkering and sustainable tinkering, including 2 to 3 activities that fit in their curricula. The teachers will also evaluate the training. We plan to reach 15 teachers in the training sessions. After the training, we will monitor 2 teachers/educators in their own implementation of the tinkering activities. The teachers will conduct two activities in their classroom and evaluate the process, answering questions on how likely they think they will use the rest of the toolkit and how they address sustainability in their classrooms through their teaching practices. We plan to contact the teachers that shared interest in a training during our dissemination activities.

Lastly, we plan a training session for museum professionals and informal educators. This training session will have the same content as the training sessions for teachers, but with different activities based on their educational context. The educators will also evaluate the training. We plan to reach 10 educators through the training sessions. We will monitor two educators in their implementation in their institution and evaluate the process, answering questions on if and how it is possible to implement tinkering in their institution. We plan to reach the museum professionals through the VSC, the Dutch association for Science Museums.

Target group	**Number**	**Where**
Students	15	After school club
Teachers/after school care	20	Training in NEMO
Museum professionals	10	Training in NEMO