MAKE IT OPEN

Report on the operation of 10 hubs

Deliverable 4.2

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Introduction

The EU project Make it Open (MiO) aims at positioning schools, teachers, educators, students, and their parents as core components of the learning process, where synergies between science, entrepreneurship, creativity and innovation are created through what is known as Open schooling. In order to achieve this objective, Make it Open formed 10 national Open schooling hubs in several countries in Europe and beyond – Greece, Hungary, Israel, the Netherlands, Poland, Portugal, Romania, Spain, Sweden and the UK. The main objective of the hubs is to support schools in their transformation from traditional educational institutions to spaces of community well-being. This is done through and beyond the creation of various partnerships with parents, industry actors, non-formal learning organisations, policymakers and researchers. In order to encourage the uptake of the Make it Open methodology, the hubs provide mentorship to 150 schools in Europe and beyond during the school year of 2022/2023.

After an initial phase of preparation and establishment, during which the hubs were trained in the Make it Open methodology and tools, the hubs kicked off the recruiting and training of schools. Hubs positioned themselves as a support network ready to guide schools and teachers through their Open schooling journey.

The roads taken to support schools, implement Open schooling and forge partnerships were diverse and varied and considered local needs and resources. Adaptations were envisaged from an initial stage and are brought together in this document. This document begins by describing the guidelines and training that was provided to each hub to kick off the promotion of the project among the schools (section 1), the methods and tools developed to monitor the activities' implementation (section 2), the activities and strategies followed by each hub to engage schools (section 4) and the training provided to the teachers (section 5). In section 6 we present the achievements of the activities' implementation in terms of quantitative indicators and in section 7 the future steps planned in the following months leading to the end of the project (M36) and beyond. The report closes with the main challenges and learnings Make it Open gained through the operation of the hubs.

1. Hub guidelines and trainings

Over the past two years, the 10 Make it Open hubs have engaged and worked closely with hundreds of teachers and schools across Europe and beyond. Over time, they have grown into permanent support spaces capable of encouraging the transformation of schools into spaces of community wellbeing. To achieve this goal, hubs were provided with a set of initial guidelines outlining their overall objective, what they will do, and how they will function logistically and technically. These guidelines have been compiled in a strategic plan (D4.1) consisting of four chapters:

1. Phase 1: Preparation
2. Phase 2: Establishing the Hub
3. Phase 3: Building long term relationships
4. Other things to consider: evaluation and ethics

Each chapter provided a suggested step-by-step process, questions to reflect on, examples and tips. The strategic plan was intended as a framework that could be adapted and moulded to local needs and resources. Its development rested on the idea that there is not one best way to work with schools and forge partnerships with other community actors, but multiple ways. Adaptations were therefore to be expected.

In the initial preparation phase, the hubs were trained in the Make it Open methodology and project tools. These tools were essential not only to encourage and facilitate the uptake of Open schooling, but also to communicate and network about the project. 8 online training sessions were organised, each led by the project partner who developed the corresponding tool. The hubs coordinators were able to familiarise themselves with the information packs, the navigator and the Learning scenarios (LSs) tested with the piloting schools in Israel, the Netherlands and the UK. During session #6, the hubs coordinators were invited to reflect on the opportunities and threats that could have emerged when reaching out to and engaging with schools (Section 3). Last session focused on the evaluation of the work in the hubs. These two sessions were essential to kick-start the operation phase.

	Focus	Partner
#1	The Information Packs	Forth
#2	LS: Physics everywhere LS: Decision making LS: Exercise for thought LS: Energy research	BSMJ
#3	LS: Forces of nature LS: Dealing with waste	Waag
#4	LS: Food travels LS: Sounds around us	CSC
#5	LS: How clean is our air? LS: Zero waste school	Forth
#6	Engaging with schools	Ecsite
#7	The Navigator	Waag
#8	The Evaluation	CSC

Table 1: Hubs training sessions

2. Monitoring methods and tools

Several methods and tools were used to monitor the operation of the Make it Open hubs. Since the beginning of the school year, in September 2023 and up to now (M24-M32), we have held regular individual and group meetings aiming at understanding the progress and challenges encountered by each hub. This mix of individual and collective meetings, allowed the hub coordinators to learn from each other, get inspired and explore targeted solutions to common problems. While complying to a common timeframe given by the school year in which their activities were to be implemented, each hub followed its own internal timeline, adapting to the needs and availability of the schools involved. Sharing single experiences and doubts proved extremely enriching and allowed for new perspectives and solutions. The operation of the Make it Open hubs was also monitored through an internal newsletter, a set of documents such as Google forms and spreadsheets and the collection of success stories from the ground.

2.1. Monthly meetings with hub coordinators

Since the start of the activities' implementation in September 2023, we have held monthly online meetings with the hub coordinators. The aim of these meetings was to monitor the progress of each hub while at the same time creating a sharing space for all hub coordinators. During each meeting, we tried to address the following points:

- The progress of each hub on the activities' implementation;
- The plans and ideas of each hub on specific activities and events foreseen in the strategic plan for hubs or the description of action (e.g. strategies to reach out to external partners, plans on the national stakeholder event);
- The obstacles and barriers encountered in each phase and how to overcome them;
- The need for materials and resources to support the hubs or for the hubs to better help schools.

Some of these meetings were conducted in close collaboration with project partners working on Communication, Dissemination and Sustainability and on the Proof of Concept Methodology. This collaboration made it possible to understand what outcomes and messages the hubs wanted to disseminate so to make their work on the ground visible to a wider audience. It also enabled the hub leaders to better understand how to involve teachers and students in the evaluation process.

2.2. Newsletter "Echoes from the Make it Open hubs"

With a view to compiling all the information shared during the monthly meetings, we created an internal project newsletter entitled "Echoes from the Make it Open hubs". All newsletters were shared after the monthly meeting and saved in a single folder for quick and easy access. The newsletter structure followed the items addressed during the meeting (e.g. teachers' training programmes, reward and incentive for teachers) and included the contacts of the hub coordinators who took part in it. This allowed other hub coordinators to reach out to them and eventually ask for advice and suggestions.

All input on similar topics collected during different meetings/newsletters were centralised in a Padled divided into various categories such as "building teachers communities" or "engaging

with external partners". The link to the Padled was shared in the newsletter alongside a link to the meeting registration.

2.3. Data collection

To monitor project implementation, we also worked with quantitative and qualitative data. We defined the Key Performance Indicators (KPIs) and information needed to monitor project progress, developed data collection tools and shared these tools among the hubs coordinators. The main reference document of the hubs was the reporting sheet for hubs, where the hubs had to report on events and activities organised with the aim of recruiting teachers, training them in the various tools and providing support and follow up. It also contains information about the schools, teachers and students who actively participated in the project as well as the learning scenarios used and the experts involved. The hubs coordinators as well as the other project partners were also invited to compile a dissemination spreadsheet, where they reported on the communication and dissemination activities implemented to inform about the project and the audience reached. Another data collection tool at hubs disposal was a common folder where hubs could share additional resources created by each hub during different phases of the project.

2.4. Success stories

During several meetings, the hubs coordinators expressed their wish to promote the first-hand experiences of teachers and students involved in the project. These Open schooling stories from the ground are one of the most valuable assets of the project and we asked hubs coordinators to identify two successful examples each. These stories have the dual function of using storytelling as a communication means to increase public interest and engagement and that of inspiring other schools that have embarked on an Open schooling journey or have not yet done so. The stories (Annex A) were collected between M28 and M30 through a success story report template containing information on the type of school involved, the activities implemented and quotes from different participants. From M30 they have been rewritten in a more narrative style and featured on the News section of the Make it Open website as well as on the various communication channels of the OStogether network.

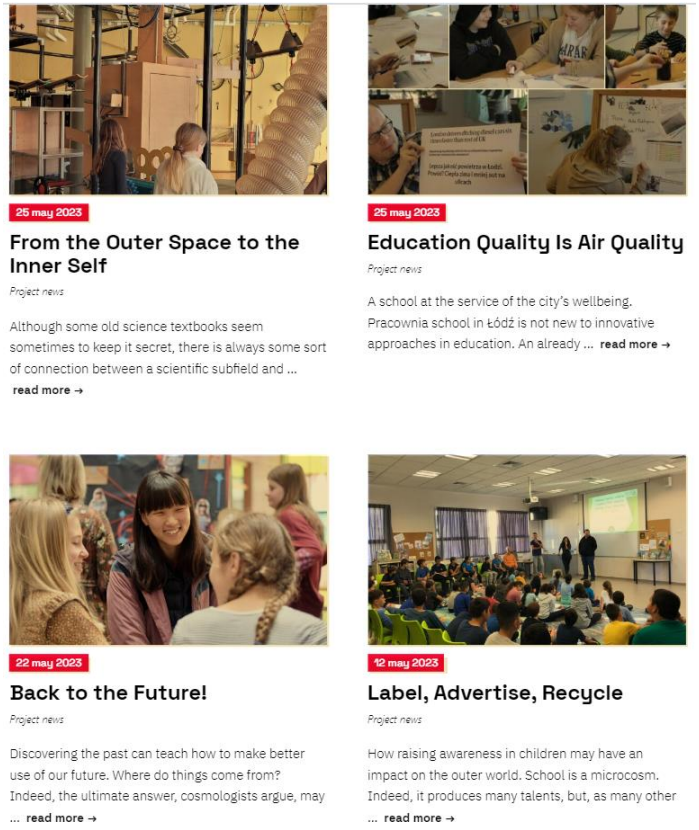


Figure 1: Examples of success stories published on the Make it Open website

As underlined in one of the success stories provided by the Swedish hub, the Make it Open methodology and tools really helped embark in a new post-pandemic journey. According to one of the teachers who took part in the project, during the pandemic, there was very little contact between the school groups and there was no opportunity to connect with the outside world. In spring 2022, the staff was discussing how important it was to open up and stretch the students' experiences beyond the school. In Nina's words, the school had a responsibility to compensate for what students didn't have access to from home. According to Nina Make it Open "came at the right time and has been an ideal solution for us".

In Spain, one of the schools saw the project as an opportunity to involve students from a peripheral area. According to the teacher, Make it Open helped enhance students' cultural and emotional development, and allowed them to access resources usually available only in larger cities. With this type of initiative, teachers hoped to bring students closer to a new and innovative form of education.

A similar vision was shared by a middle school located in an urban area in Jerusalem. The school was motivated to join the Make it Open project to explore innovative approaches to teaching and learning, and to develop students' decision-making skills in the critical stage of moving from middle school to high school (9th grade). The school saw long-term benefits in empowering students to make informed decisions that would positively impact their personal and academic lives. The school was also excited to collaborate with other schools and experts from different European countries.

3. Activities and strategies followed to engage schools

In month 19, we held a series of hubs training sessions, one of the sessions focused on how to engage schools. The objective of each hubs was to involve 15 schools during the school year of 2022/2023. In this session attended by all 10 hubs, we tried to understand what strengths, weaknesses, opportunities and threats each hub might have encountered when reaching out to and engaging with schools. In response to the weaknesses and threats identified, we sought for common solutions. Below are some of the results gathered through a guided exercise conducted on the Miro collaboration platform. These results were common to several hubs.

Strengths:

- Good reputation and credibility for hosting qualitative educational programs
- Facilities to welcome teachers and students (exhibition space, maker space, etc.)
- Strong relation with existing networks, that could be leveraged
- Ongoing talks/Events/Extra schools' activities, where the project could be presented to existing or new contacts
- Previous experience in running hubs and providing training

Weaknesses

- Competition between the activities offered to teachers
- Project timeline: hard to reach the KPIs in one school year
- No budget to financially reward participating schools
- No connection with policy makers

- Lack of funding for external collaborations or additional materials

Opportunities

- In line with school curricula: strong need for hands-on activities
- Receptive teachers that are asking for this kind of activities, especially after 2 years of restrictions
- The project doesn't depend on the whole school being active, individual teachers can choose to participate
- An opportunity to grow schools and education network, especially for those who have fewer opportunities
- Making students feel that teaching is meaningful and relevant

Threats

- Lack of time and motivation due to uncertain geopolitical situation and potential new Covid wave
- Tiredness from multiple engagements: busy teachers and compact schedules
- Wide geographical spread of schools might result in difficulties for the training
- Project-based learning and cross subject are not in the agenda of existing curricula and no science clubs in most schools
- Schools are still recovering from pandemic

Common solutions

- Seek out to umbrella institutions: school boards, department of education, municipalities, parents' associations, etc. which might support with reaching out to external stakeholders
- Make it Open methodology can also be seen as an opportunity to not go back to normal and try different approaches while returning to schools
- As a first step, you can suggest to follow a light path only (min 4 learning units) and focus on a specific theme/topic that can be linked to school's ongoing activities
- Suggest to pick activities teachers have previous experiences with and topics that are linked to their curriculum

- Adopt a top-down and bottom-up approach by reaching out to both teachers and school staff

This exercise showed how the hubs had different strengths and weaknesses and how they could leverage on opportunities unique to their local context and position within the community. At the same time this conversation also allowed to identify some common solutions who could work across several hubs.

Below we present an overview of the different strategies adopted by each hub.

3.1. Greece

To reach out to schools, Science Communication (SciCo) presented the Make it Open project in several public events organised in their organisation, such as the Athens Science Festival. SciCo also held a series of online sessions open to all schools to attend. During these sessions, participants were introduced to the notion of Open schooling, to the Navigator and the Make it Open Learning scenarios and were invited to select those that they would have liked to implement. Throughout the year, SciCo leveraged on project's tools to spark interest and reach out to a higher number of teachers.

3.2. Hungary

Over the summer 2022, the Mobilis Science Center organised a conference and events in Győr for teachers where they presented and discussed the Make It Open project goals and methodology. Mobilis promoted the project in its monthly newsletters and held two-day summer activities and hands-on workshops for the interested teachers all over the country. These activities were followed-up by individual calls and emails with the teachers and school leaders who had expressed their interest. Mobilis supported the schools by providing mentorship and helping them to purchase some of the materials needed to implement the Learning scenarios.

3.3. Israel

The Bloomfield Science Museum Jerusalem (BSMJ) promoted Make it Open in several dissemination events held at the museum, national conferences, and an educational innovation centre in Israel. During the summer of 2022, the hub presented the Navigator and

the Learning scenarios to participants attending these events. The schools and leading teachers selected the Learning scenarios they wished to implement. Since September 2022, the Israeli hub has led monthly meetings online where all teachers discuss relevant topics. Each session focuses on a different issue, and specialists in the field participate in the sessions so that the teachers can learn from and consult with them.

3.4. The Netherlands

Waag (Waag) gave a teacher training as dissemination activity in Horizon 2020 project DOIT in 2019, teachers from Ir. Lely Lyceum and Montessori school De Regenboog attended. Waag gave this workshop in Amsterdam's neighbourhood Zuid-Oost where they would reach educators of less privileged learners. Their attendance in the workshop led to an interest in future collaboration with Waag in both schools, both situated in Zuid-Oost. They were on board in Make it Open from the proposal phase.

Waag developed the Amsterdam pilots with teachers, students, parents and neighborhood network of these schools. The evaluation of the pilot with Ir. Lely Lyceum showed opportunity for professional development with regards to Open schooling-related skills with their teachers.

In Waag's experience upscaling innovation is most successful when starting with a 'coalition of the willing', because they produce the most attractive outcomes which will attract peers to join and grow the adoption of the innovation from there.

Waag proceeded to 'recruit' teachers from the learning community at one of their events in March 2022 to join in Make it Open. In Between April and May 2022, six teachers from various Schools and Waag co-created a topic for the learning scenarios which the larger group of different teachers would develop in their schools.

3.5. Poland

The Copernicus Science Centre (CSC) presented the Make it Open project, its tools and methodology in several national and local events, lectures and workshops. During the biggest educational conference held in their science centre, CSC organised a set of Open schooling activities. The conference focused on diversity and inclusion and open schooling was presented as one of the possible solutions to achieve these goals.

3.6. Portugal

In the period from July to November 2022 the Lagos Ciência Viva Science Centre (CCVL) established several contacts by email with schools in the western Algarve region. Some meetings were held with a large group of teachers and a presentation of the project and the materials developed, the Navigator and the information packs, was made. During its meetings, CCVL highlighted how flexibility was one of the main assets of the project as Learning scenarios could have been adapted to different realities.

From December 2022 until February 2023, the entire class of teachers in Portugal unleashed a general strike in which the vast majority of schools were out of classes for a very long period. During this period, neither the schools nor the teachers were open to meeting, promoting and implementing the project.

To overcome these difficulties, CCVL tried to contact private schools in the Algarve to implement the project with smaller groups. It also met with groups of experimental science teachers to implement the Make it Open methodology in after school activities.

From March, the hub decided to adopt a different strategy, asking teachers for their help to validate a new methodology developed by an EU project. This speech was also used to approach and ask for the support of teachers with stronger relations with the centre. The Centro Ciência Viva de Lagos will make every effort to ensure that at least 4 learning units (one from each phase) will be tested by the maximum number of teachers with their students.

3.7. Romania

The Asociația Secular-Umanistă din România (ASUR) started to reach out to schools in May 2022. ASUR organised two hybrid seminars aiming at reaching schools located in different parts of the country. The seminars were attended by more than 50 participants each and were combined with several in person meetings with teachers in schools. ASUR also started a Facebook group to facilitate communication around the project with interested teachers.

3.8. Spain

The Museos Científicos Coruñeses (mc2) kick started its schools' recruitment process by organising meetings with small groups of teachers (5-7). During these meetings, mc2

introduced participants to the Make it Open project and methodology, leveraging on the adaptability of its tools to engage schools. Mc2 team of science educators provided an individual and tailored support and tried to understand teachers' needs based on their expertise and previous experiences. Mc2 also worked with the regional government and its formation department to reach out to new schools – especially primary schools which had more time in their curricula to be dedicated to the project.

3.9. Sweden

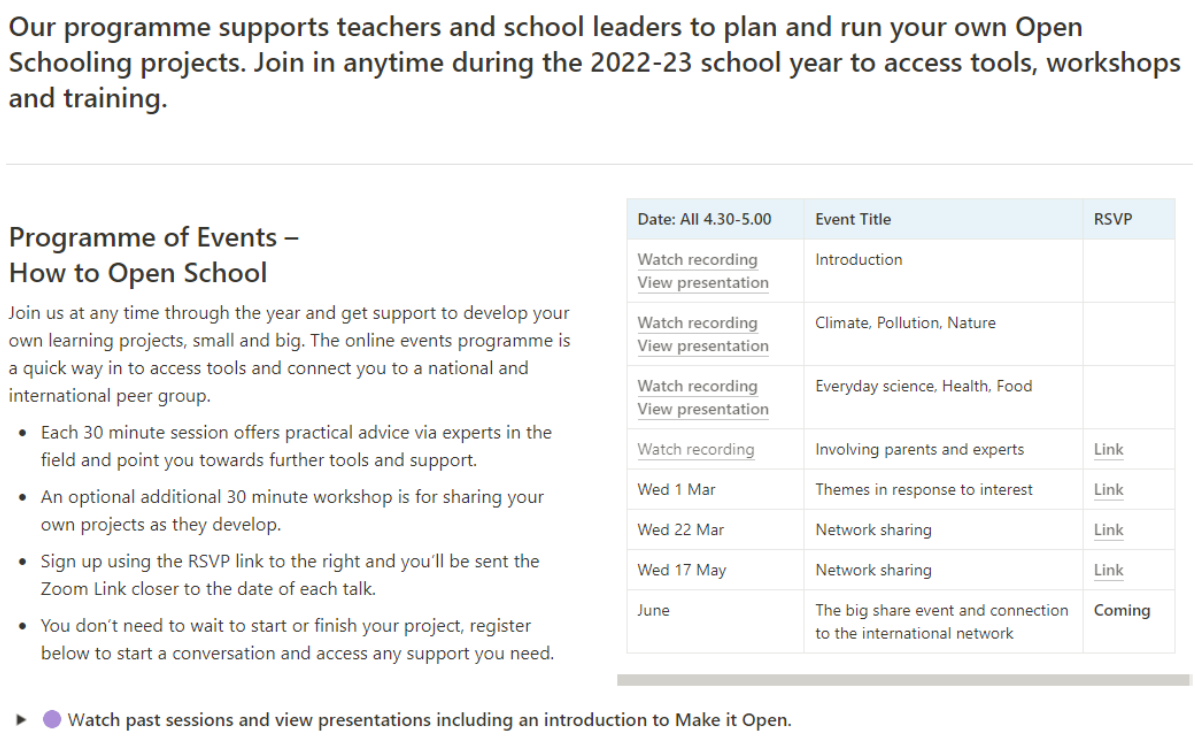
In August 2022, Tom Tits Experiment (TTE) launched its hub with an information session for teachers. More than 90 teachers registered for the digital event. Participants were asked to complete a survey indicating which of the Learning scenarios they were interested in pursuing first. TTE arranged one-on-one follow-up sessions with each school to plan their implementation of the LS in the classroom and provide extra resources such as direct links to the Swedish curriculum, resources in local language, and contacts to local experts. TTE also identified other local initiatives that aligned with MiO and collaborated to spread MiO through these channels. A group meeting for participating teachers was organised in the fall as part of a teachers' inspiration night. MiO was also a topic at a mandatory local professional development day for schools in Södertälje.

3.10. The UK

Forth launched a number of actions to introduce UK teachers and school leaders to Open Schooling and support them in their Open schooling journey. An online programme consisted of a series of information sessions with external speakers on thematic topics. Further useful information was compiled in a dedicated website. Participants could join the programme at any time and contents of previous sessions were made available on the website. By leveraging its relationships with existing networks and partner organisations, more than 160 schools were reached during this phase.

However Forth struggled to convert more than a handful of schools into full participation; many teachers and schools were reluctant to embark on introducing new programmes, accountable to ongoing strikes alongside recent pandemic years challenges. In a change in tactics Forth created a set of short versions of LS's, modified to fit schools STEAM or STEM week formats and launched during British Science Week. This was successful in catalysing participation and

a total involvement of 520 primary school students and their respective families in Make it Open projects.



Our programme supports teachers and school leaders to plan and run your own Open Schooling projects. Join in anytime during the 2022-23 school year to access tools, workshops and training.

Programme of Events – How to Open School

Join us at any time through the year and get support to develop your own learning projects, small and big. The online events programme is a quick way in to access tools and connect you to a national and international peer group.

- Each 30 minute session offers practical advice via experts in the field and point you towards further tools and support.
- An optional additional 30 minute workshop is for sharing your own projects as they develop.
- Sign up using the RSVP link to the right and you'll be sent the Zoom Link closer to the date of each talk.
- You don't need to wait to start or finish your project, register below to start a conversation and access any support you need.

Date: All 4.30-5.00	Event Title	RSVP
Watch recording View presentation	Introduction	
Watch recording View presentation	Climate, Pollution, Nature	
Watch recording View presentation	Everyday science, Health, Food	
Watch recording	Involving parents and experts	Link
Wed 1 Mar	Themes in response to interest	Link
Wed 22 Mar	Network sharing	Link
Wed 17 May	Network sharing	Link
June	The big share event and connection to the international network	Coming

▶ Watch past sessions and view presentations including an introduction to Make it Open.

Figure 2: Forth online series of information sessions

4. Teacher training

After kick-starting the schools' recruitment process, each hub ran a series of training activities targeted at interested teachers and aiming at forming them into the Make it Open methodology and tools.

Some of the hubs opted for a tailored approach and decided to learn more about teachers' needs before planning the trainings. Their training sessions were therefore adapted to teachers' familiarity with Open schooling, their expertise and previous experience. Since the concept of Open schooling was new to some schools, some hubs decided to focus further on the theoretical and methodological aspects related to it.

Most hubs proposed both in person and online workshops to facilitate the participation of schools located in different areas of the country. Introductory sessions on the benefits of Open schooling and the goal of the Make it Open project were followed by hands-on activities during

which participants could explore and work on the Learning scenarios. Some hubs offered in-depth guidance through multiple Learning scenarios and tried to focus on those that were the most aligned with the school curricula. When possible, teachers who took part in the piloting phase were invited to share their testimonies and present the LSs they had developed. Clustering the Learning scenarios into thematic categories was often used as a trigger for teachers' interest in the programme (e.g. climate, nature, health, food etc.).

Hubs like Forth decided to switch their training workshops into a training programme which can be accessed online at any time. Forth developed a central portal specific to the UK hub activities and filmed a series of 5 short training videos titled "How to Open School": a resource for teachers to quickly understand how to be involved in the Make it Open project and run Open schooling activities.

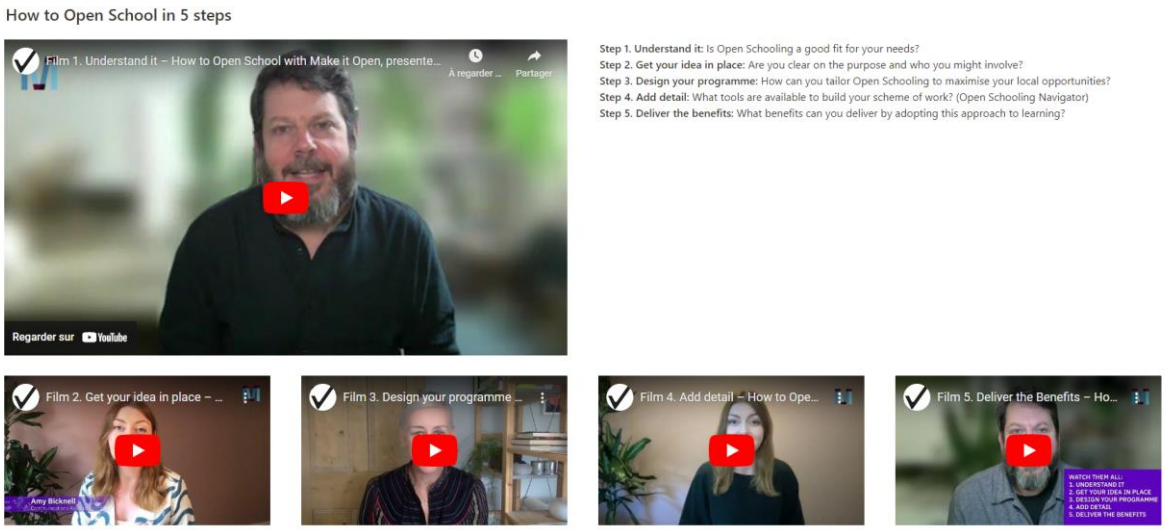


Figure 3: Forth training programme in 5 steps

Hubs like mc2 closely collaborated with local government representatives succeeding in including the Make it Open teachers' training into the official regional teachers' professional development programme.

All training sessions and workshops included a Q&A discussion to clarify participants' doubts and were followed, when possible, by individual meetings and calls aiming at providing tailored support.

5. Support activities and strategies

5.1. Collaborating with teachers:

Throughout the whole activities' implementation process, hubs acted as a support network and positioned themselves as a reference point for schools and teachers. For them it was crucial that the teachers felt confident enough to reach out and ask for questions or doubts.

Hubs emphasised the flexibility and adaptability of the MiO tools, underlining how 50% of the MiO approach sits into the activities (LSs) and the remaining 50% into the process, giving schools a certain margin of manoeuvre.

They advised teachers to start small, encouraging them to test the approach with 4 Learning units (LUs) first, and create their own LUs later. Teachers were invited to make the most of the MiO methodology with its building blocks and steps – the Learning units are concrete proposals and examples on how to implement Open schooling and teachers could really play with them.

Teachers were also advised to integrate the MiO materials in existing projects and were supported in identifying how the MiO approach and tools could best enrich them. TTE, for example, created a document linking the LS to the Swedish curriculum including links for more in-depth information, as well as useful instructions to various experiments/demos in Swedish.

Furthermore, the hubs translated all Learning scenarios and parts of the Navigator, allowing teachers to exploit the MiO tool to the fullest.

Hubs organised regular online calls and in person meetings to discuss schools' progress and issues. They also helped in tackling specific topics: how to engage external partners/ experts and parents (Forth) - how to use the museums and science centres as a resource to explore the LSs (BSMJ). Several hubs offered free visits to their premises to establish a stronger link between their work and the activities foreseen in the LSs.

A lot of "maintenance" work with phone calls and emails was carried out in-between online and in-person meetings.

5.2. Building teachers communities

As suggested in the hubs strategic plan, hubs were invited to organise teacher meet-ups with the teachers to exchange and seek advice from each other and the Hub leaders. Hubs coordinators followed different strategies to foster exchange and build teachers communities.

Waag, for instance, set up a Slack group for teachers in the Netherlands – an easy-to-use tool that allowed teachers to have access to all the questions raised and answers provided, rather than individual emails.

TTE created a Microsoft Teams room for the schools involved in the project with separate channels for each active Learning scenario used by teachers. This virtual support was coupled with in-person thematic meetings aimed at bringing all teachers involved in MiO in contact.

Most hubs adopted a similar approach, bringing together teachers and students from different schools working on the same topics and with the same interests. In general, teachers seemed really keen to get in touch with peers, especially when they spoke their same language.

5.3. Engaging with external partners

Cooperation with external partners is key in the implementation of an Open schooling project. When running and adapting Make it Open Learning scenarios, teachers were asked to actively involve different actors within the community like industry and civil society organisations, researchers, policymakers and non-formal learning educators. These external actors are not used to collaborating with schools and many of them are new to the concept of Open schooling. For this reason, the support of the hubs was crucial in guiding schools to forge new partnerships.

When collaborating with external partners, teachers were advised to make sure what their goal is and if their work aligns with the school's vision and project. Understanding expectations and roles was the first step into a new partnership.

To facilitate partnerships, hubs leveraged on their existing networks and organised meetings between teachers and non-profit organisations and companies. They also offered workshops to teachers to improve their communication skills to reach out to external partners.

External guests to the project were also invited during hubs meetings to provide teachers with a different perspective and allow them to meet experts and discover existing programmes and events.

To create new synergies and exchange with a wider audience, hubs also built on existing opportunities: the Great Science Share for Schools in the UK, the opening of a new building at the Copernicus Science Centre, the opening of a new room by the municipality in Portugal.

Speaking at national conferences, holding seminars and publishing in science teachers' magazines was also a way to get in touch with potential partners and widen the project's reach. These various initiatives were also highlighted in each hub social media.

TTE, for instance, started the spring term with the publication of a Make It Open article in a national publication for STEM teachers in Sweden followed by its acceptance as a seminar speaker introducing Open schooling at a national conference in May for collaborations between schools and society.

Make It Open

Text: Tiffany Alnefelt, Tom Tits Experiment

Solenergi är en av de ledande förnybara energikällorna i Sverige, men hur påverkar solpaneler miljön? Detta var en av många tankeväckande frågor som togs upp av elever i årskurs 5 på Mariehällsskolan i Stockholm när hållbarhetsexperten Johan Tiselius från företaget Infranode kom för att diskutera förnybar energi med klassen. Besöket organiserades av Tom Tits Experiment i Södertälje som en del av ett EU-initiativ för att främja *Open Schooling* på skolor över Europa.

Open Schooling syftar till att utveckla elevernas förmåga att använda kunskap i verkliga sammanhang och förstå värdet av naturvetenskap och teknik i deras liv och i samhället. Genom att involvera olika intressenter i undervisningen, såsom familjer, experter och lokala organisationer, kan eleverna få möjlighet att se hur deras lärande relaterar till verkliga problem och utmaningar i samhället. Detta kan hjälpa eleverna att få en mer holistisk förståelse för ämnet och öka deras engagemang och motivation för att lära sig. Open Schooling kan också hjälpa eleverna att utveckla kritiskt tänkande, problemlösningsförmågor och samarbete genom att arbeta med verkliga projekt och utmaningar. Det kan också ge eleverna möjlighet att få inblick i olika yrkesområden och potentiella karriärvägar kopplade till naturvetenskap och teknik.

Elever på Mariehällsskolan byggde olika fordon som skulle kunna användas i framtiden. I bilden ovan visas en träskåhåt med djursensorer och eleverna resonerade kring ett hållbart drivmedel för båten. Foto: Tiffany Alnefelt

Utveckla kontakter

I den svenska läroplanen står det att "Läraren ska medverka till att utveckla kontakter med organisationer, företag och andra som kan bidra till att berika skolans verksamhet och förankra den i det omgivande samhället". Open Schooling i sig är inte något nytt koncept, men det är ett verktyg för att stödja lärare i att skapa en mer aktiv och engagerande undervisning.

Tom Tits är en hubb för Open Schooling i Sverige som är en del av projektet Make It Open, finansierat av EU:s Horizon 2020 forsknings- och innovationsprogram. Syftet med projektet är att främja engagemang i naturvetenskap och teknik med fokus på att påverka samhället. Som en del av projektet har en Open Schooling Navigator utvecklats – en databas med 16 undervisningsteman utarbetade av lärare från 10 olika länder, som enats om att dessa teman är relevanta för elever inom naturvetenskap och teknik samt för den fortsatta utvecklingen av lokala samhällen.

Exempel på arbete med teman

Varje undervisningstema har följande struktur:
Kortfattad information --->
Kunskapsinhämtning --->
Skapa ---> Dela

Strukturen strävar efter att ge ett mer djupgående förhållningssätt till ämnet och ta lärandet utanför klassrummet. Se följande exempel på hur två skolor i Sverige arbetat med olika teman.

Tema: Utforska energi – Mariehällsskolan, årskurs 5

Kort information: Läraren presenterade ämnet och introducerade olika förnybara energikällor.

Elever på Rådmansö skola skissade på och byggde sedan olika sorters bilar – gummibandsbil, rättfällebil (bilden ovan) och ballongbil. Klasserna fick presentera sina konstruktioner för varandra, testa bilarna samt diskutera mekanismerna som driver dem framåt. Foto: Nina Berglund

Kunskapsinhämtning: En expert om investeringar i hållbar utveckling i Norden besökte klassen och ledde en diskussion om förnybara energikällor i Sverige.

Skapa: Eleverna fick bygga prototyper av framtidens fordon och resonera kring energikällor och framtidsinnovationer. De byggde även en simulering av vindkraftverk, programmerade och fick felsöka koden. Detta moment handleddes av Tom Tits med Lego Spike Essentials.

Dela: Bilder och beskrivningar från de olika momenten under undervisningstemat delades med övriga klasser och föräldrar via sociala medier som en katalysator för vidare diskussion.

Tema: Naturens krafter - Rådmansö skola, årskurs 4-6

Kort information: Läraren gav en introduktion till temat kring krafter, rörelser samt konstruktioner.

Kunskapsinhämtning: Eleverna fick möta professor Staffan Yngve från Uppsala universitet som pratade om naturens krafter. Under en dag ledde Tom Tits workshops på skolan där eleverna fick bygga och programmera konstruktioner i Lego Spike Essentials. Eleverna fick även bygga och testa tryckluftsraketer. Temat avslutades med att eleverna besökte science centret där de fick utforska utställningen med fokus på mekanismer.

Efter eleverna på Mariehällsskolan hade byggt, programmerat och felsökt sina vindkraftverk fick fantasin flöda medan de testade alternativa designer. Foto: Tiffany Alnefelt

Skapa: Under temat fick varje klass på mellanstadiet designa och bygga en specifik sorts bil – gummibandsbil, rättfällebil och ballongbil.

Dela: Eleverna fick presentera sina bilar för de övriga klasserna och resonera kring deras konstruktion och de olika mekanismer som driver dem framåt.

Elever på Rådmansö skola byggde tivolispel i Lego och testade olika mekanismer. Foto: Nina Berglund

Övriga teman

Övriga teman i Make It Open Navigator inkluderar **Kreativ avfallshantering** där eleverna undersöker nedskräpning av miljön, lär sig om beteendedesign och utvecklar lösningar för skolan.

I temat **På två hjul** samlar eleverna data om luftföroreningar i närheten av skolan och utforskar alternativa, hållbara transportalternativ.

Mer om Make It Open

Läs mer om Make It Open och de 16 temana i Navigatorn. Dessa resurser är tillgängliga för alla lärare och översatta till nio språk, inklusive svenska. Där kan du även justera eller utveckla ditt eget tema.
Open Schooling Navigator

Kontakta Tiffany Alnefelt
tiffany.alnefelt@tomtit.se
för mer information eller för att delta i projektet som pågår under vårterminen 2023.

Figure 4: TTE article on Make It Open in a national publication for STEM teachers in Sweden

6. Indicators

The progress of the hubs during the project implementation was also measured through a series of qualitative indicators. In the following table, we show the target indicators as well as the numbers and percentages achieved so far (M30).

Stakeholder group	Total reach	Achieved	% Achieved
Schools	150	156	104%
Teachers	700	589	84%
Students	24000	14774	61.5%
Family members	12000	10664	88.9%
Industry and Civil Society Organisations	200	366	183%
Researchers	100	154	154%
Policymakers	200	160	80%
Non-formal learning educators	200	230	115%

Table 2: Key performance indicators

Overall, we consider the results in this table to be quite positive. Despite the many challenges encountered in different countries – such as the post-pandemic school set-up and school body strikes – the hubs are making good progress in achieving the KPIs initially set. The Make it open project and its methodology have been implemented in 156 schools. As hubs continue to recruit new schools and implement new strategies to overcome the obstacles faced, we expect more schools to join the project. In the coming months, schools will continue to work on additional units of the Learning scenarios, involving more teachers, young people and external partners. When it comes to external partners, we register a very good involvement of Industry and Civil Society Organisations, Researchers and Non-formal learning educators. In

these cases, the number achieved exceeded the target ones. On the other hand, hubs found it harder to engage family members – they often do not have the time to be actively involved in school projects and their degree of involvement often stops at being aware of activities and excursions organised by the school and needing their approval. To support hubs address this challenge, we dedicated a hub meeting to parental engagement and the hub coordinators also took part in an inspiration session of the OStogether network organised in cooperation with Parents International. During this session, hubs familiarised with existing strategies and programmes that could be leveraged to reach more family members. In addition to this, hubs also shared messages concerning the project via schools' newsletters and Facebook groups consisting of parents of the pupils involved.

The data in table 2 will be subject to change in the coming months and the final data will be included in the final report. We are confident that the KPIs initially set will be met.

7. Next steps

Now that we are only a few months away from the end of the school year, we see the need to continue with the following activities:

- Continue to support hub coordinators in their attempt to engage additional schools in the project, placing particular attention to those contexts where a number of barriers are hindering hubs from involving at least 15 schools.
- Continue to hold hubs monthly meetings and individual calls to provide a coordinated solution to common issues and support hubs with their specific issues.
- Continue to encourage schools and teachers to use the Make it Open resources as valuable tools to connect with other schools and create a network of teachers working on the same topics.
- Support hubs in the implementation of their national stakeholder events (M31-M33), defining clear objectives and guiding them in their preparation phase.
- Continue the work of collecting useful resources and success examples so that other hubs could benefit from single experiences and materials created for single cases.
- Continue the work of creating useful resources at project level to provide visibility to the work carried out on the ground (e.g. video testimonies, stories, news etc.) and

inspire other teachers who will want to adopt the Make it Open methodology in the future.

- Continue to collaborate closely with other Work Packages (WPs):
    - WP3: for any doubts related to the use of the Navigator and its sustainability after project's end;
    - WP5: for a successful evaluation of the teachers and students who took part in the project;
    - WP6: for the creation of communication tools to promote hubs' work on the ground.
- Continue to showcase hubs' and schools' work at national and European level events. Hubs coordinators, teachers and external stakeholders will be invited to share their direct experiences as well as the benefits and challenges of embarking in an Open schooling journey.

8. Challenges

The involvement of such a large number of schools in so many different countries was a challenge and confirmed what was already highlighted in D1.1 What is Open schooling:

> *"The initial research identified a wide variety of open schooling programmes, and revealed that schools and partners need significant support in devising, shaping and planning their open schooling projects."*

We prepared and supported the hubs in the different stages of activities' implementation. When kick-starting this process, we soon realised the complexity of implementing Open schooling projects in 10 different countries. We became aware of how there was no one-size-fits-all solution and that our strategy needed to be adapted to single needs and resources. Each hub faced local and national challenges such as changes in the school system, the rigidity of school curricula and the internal bureaucracy within each school. Other cultural challenges such as familiarity with Open schooling and readiness to implement such a methodology added to those already mentioned. Throughout the school year 2022/2023, the hubs were

confronted with an educational landscape that was coming out of two years of pandemic and had to readjust to a new reality – often with limited resources. The context in which the hubs had to operate was not always ideal, but each hub leveraged on its strengths and new opportunities to advance as best it could in the various phases of the project. The Portuguese hub efforts to engage schools, for instance, was significantly undermined by the strikes that were unleashed by teachers between December 2022 and February 2023. Nevertheless, the hub tried to overcome this difficulty by turning to private schools and reaching out to teachers and schools that had already collaborated with them in the past. A similar situation was faced by the UK hub, where strikes are still ongoing and teachers are reluctant on implementing new programmes. To better address schools' needs and difficulties under these challenging circumstances, the hub developed some shorter versions of the Learning scenarios and succeeded in involving more than 500 students.

9. Lessons learnt

The continuous follow-up and support provided to the hubs in recent months has shown how different solutions to the same problem are possible. These solutions are strongly linked to the cultural, social and political context in which they are conducted. For instance, often the willingness of the teaching staff to take part in such projects is hindered by the lack of time and resources, too rigid curricula or the difficulty to involve external partners. In this regard, the support of the hubs, has had a great impact in addressing such challenges. For instance, leveraging on hubs' existing opportunities and networks was key to expand schools' partnerships. Despite the number of resources available at project level, several hub coordinators emphasised the extent to which the guidance provided by the hubs was appreciated and necessary to run the project. Not only did they allow for the expansion of the schools' partnership network, but also for approaching the teaching process from a different perspective. To ensure that this knowledge is not lost, hubs such as BSMJ in Jerusalem will provide trainings to similar realities in other municipalities so that they can create their own local hubs. Many hubs will continue their relationships with the schools and experts involved, seeking for example to involve them in projects of a similar nature, as in the case of Forth for the EU Levers project. The project tools will continue to be used locally, e.g. by creating a local version of the navigator or by allowing the publication of some learning scenarios on third-party platforms. Forth for instance drew on its collaboration with the science education group of the University of Manchester to publish some learning scenarios on their resource platform.

Overall, all hubs agree that flexibility was key in the successful running of the project. In several cases, teachers were involved from the very beginning of the process in identifying possible obstacles and needs, helping hubs to readjust their strategy. In the future, the hubs see this collaboration continuing in a less structured manner and simplifying the level of participation. The testimonies collected so far show the enthusiasm and interest of the teachers, students and other stakeholders in being part of an Open schooling project and give hope that this first year of experimentation will be followed by new Open schooling activities and new and enriching partnerships with other key actors within the community.

Annexes

Annex 1: Make it Open success stories

Make it Open success stories (Greece)

	Success Story #1
Country	Greece
City	Athens
School name	Costeas Geitonas School (CGS)
Number and profile [1] of teachers involved	6 * 5th grade primary school teachers
During school time or after	During school time
Topic(s) addressed in the project	Sound, physics, wellbeing

[1] Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. The school

CGS is one of the largest private schools in the outskirts of Athens, situated on a hill in Pallini. CGS has been part of the International Baccalaureate (IB) for the last few years and has a focus on hands-on, multi-disciplinary learning. Although it does not have any previous experience in open schooling, it welcomed this programme with great enthusiasm.

2. The school in the project

One of the main drivers of the school to participate in Make it Open was the Open Schooling Navigator and its good fit with the IB Primary Years Programme. More specifically, the IB works with Units of Inquiry, during which students inquire about a specific theme under a hands-on, multidisciplinary approach, which is similar to the approach of Make it Open. More specifically, the school was already running a Unit of Inquiry on Sound in the 5th grade, which is also part of the national curriculum in the lesson of Physics, so the Learning Scenario "Sound around us" offered an opportunity to further enrich and update the current approach with new, interesting and interactive activities.

3. The Make it Open approach

a. Prepare

The theme was chosen by the 5th grade teachers, in collaboration with the Academic supervisor and the IB PYP Coordinator. It was chosen because it had a good fit with a current unit of inquiry and the 5th grade national curriculum.

b. Brief

Teachers used the introduction to sound found in the Navigator as well as a provocation, in order to capture student's attention and introduce them to the matter. As sound is something that students can easi;y relate to as it is in their everyday life, they onboarded the programme immediately and welcomed it with positivity.

c. Research

Students researched the various levels and sound with the decibel meter on tablets and mobile phones in various places of the school yard and the school campus. This offered them an interactive activity, while at the same time made them understand the large range of sound levels and the dangers that come with this. Given that this was an unusual, interactive activity, the students thoroughly enjoyed it, which was also obvious during the Student Led Conference, where students choose activities to share with their parents and discuss their progress, as most students chose this activity to showcase.

d. Create

Each student took part in a group, with which they created a presentation either in digital or a physical form about the outcome of their research. They collaborated with each other so they could find the best way to export the most useful results. The outcome mainly involved the creation of posters.

e. Share

Before, during and after the project the students were so excited that they were looking for the most appropriate way to share their results to the whole class. They made presentations and shared their learning with the whole class. Their presentations were posted outside the classroom, so the whole school could read their learning outcomes. In addition, many students decided to share this activity as one of their favourite ones with their parents, during the Student Led Conference.

4. **Feedback from participants**

	Feedback from participants
Teachers	The project was very helpful. We needed some new paths for our teaching methods.
School leaders	We are always trying to find new ways to bring new scenarios to our classes, so the program Make it Open was extremely useful.
Students	I am so excited that I had the opportunity to work in a way so that I get to learn by doing!
Hub leader	We have worked with this school before multiple times, however this programme was especially welcomed as it was an excellent fit with their current programme, whilst at the same time enriched their teaching and learning experience. The fact that they will try to repeat it next year with more activities and more learning scenarios, proves its success.

Make it Open success stories (Hungary)

	Success Story #1
Country	Hungary
City	Sárvár
School name	Nádasdy Tamás Primary School in Sárvár Vas Megyei Szakképzési Centrum Sárvár Tinódi High School
Number and profile of teachers involved	2 teachers 1 physics and mathematics teacher (head of working group) 1 biology and chemistry teacher
During school time or after	both: 4.a: in class and in the afternoon, 11 science faculty: mainly in class
Topic(s) addressed in the project	- Nádasdy Tamás Primary School of Sárvár: Physics everywhere - VMSzC Tinódi High School in Sárvár: Energy research

Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**
   The schools are located in Sárvár (small schools in a small rural town of 15,000 inhabitants with a student population of around 300 pupils and a few tens of teachers). The high school has a well-equipped STEM lab ("Öveges" lab), 3D printers. Their partner institution, the Barabás György SZC Barabás György Technical Vocational School of Vas County, has a well-equipped 3D printing lab ("DKA" lab). Building on this lab, they have been running science labs with the surrounding primary schools (11 partner institutions) since 2013. The neighbouring Gárdonyi Géza Gárdonyi Primary School in Sárvár offers science training for 8th graders in biology and chemistry for 2 hours per week. And for two years, in cooperation with the Sárvár Tourism Technical School, the VMSZC Barabás György Technical Vocational School, the Nádasdy Ferenc Museum, and the Forestry Science Institute, Szombathely Forestry Ltd., they have been offering programmes on the Hussars, the Royal Bavarian treasure and renewable energies. The Make it open project is new for them, but they are very enthusiastic.

2. **The school in the project**
   They would like to deepen their knowledge of the basics of experiential education, an approach to learning that is different from classroom teaching. They would network consciously, approaching the Mobilis Experience Centre in Győr, a school of regional importance, and other participating schools. Their long-term plan is to make their laboratory a talent management factor for the whole region. They hope to receive mentoring and learn new methods from the programme.

3. **The Make it Open approach**

   a. **Prepare**
      Tamás Nádasdy Primary School: Physics everywhere
      Tinódi High School in Sárvár: Energy research
      The topics were chosen by Attila Takács, who knows the students, on the suggestion of the Mobilis Experience Centre. Partners and experts are also organised by Attila Takács with Eszter Mágócsy-Völgyi, a teacher.

   b. **Brief**
      The teacher discussed it with the parents at a parent-teacher meeting, and then she and the children went out to play with the students on the playground.

The high schoolers had a harder time with the fakultation. They already had problems with the subject matter (”Why should we study science?”) and had little motivation for the project at the beginning. But this changed later.

c. **Research**

As they do not study physics, the young students (Physics Everywhere) have already been to the Tinodis lab twice as a primer: first to do an experiment on accident prevention in the playground (egg throwing), and then to learn about the basics of physics in a playful science play house with the physics teacher. The enthusiastic presentation by the Mobilis Experience Centre and the interactive games were a great help in their discoveries.

The secondary school students (Energy Science) have already encountered this topic (as they are in grade 11 - 17 years old) in both physics, biology and chemistry lessons. In addition, the energy crisis is still ”on tap”... They are feeling the consequences (18 oC in the classrooms) ... Here again, the physics demonstration and the wind turbine model building lab exercise from the Mobilis Interactive Experience Centre were a great help.

d. **Create**

Their school also plays a sub-regional role, with 11 primary schools in closer or closer contact. They have closer relations with the Gárdonyi Primary School in Sárvár and the Nádasdy Tamás Primary School in Sárvár. The Gárdonyis come to their lab every week to do science experiments in biology and chemistry. They were the ones who participated in the opening event of their science faculty’s ”Energy Research” project: the mural-montage unveiling. They organised joint activities with the Reeddys: we played together in the ”egg toss” exercise at the Mobilis Interactive Experience Centre. The other schools built and refined a wind turbine model in the ”In the footsteps of the Renewables” renewable energy lab exercise. This involves building rotors and measuring voltage and current values using the protocol learned in the Mobilis Experience Centre. The experience is gained in Győr and transferred during these exercises.

e. **Share**

They have not created a website, but a FaceBook open group (under upload).
https://www.facebook.com/groups/1618552761935652

Partly because they don't have any serious website editing skills or ambition, and partly because they are not very good with related-indicators: t.i. 8 students with 16 parents, 32 grandparents, average 8 siblings. This would be 56 indicators if parents were involved. They have been found to virtualise interpersonal interactions: keeping in touch with relatives through an open Facebook group. But this way there is a chance to fulfil their commitment with likes, comments, attached audio, video files. Unfortunately, the local media won't run their articles because they are not newsworthy.
Note: our articles and slideshows are published on our school's website, FaceBook group. Links are below:
https://www.sarvaritinodi.hu/hu/370.html?article_id=2328
https://www.sarvaritinodi.hu/hu/370.html?article_id=2330
https://www.sarvaritinodi.hu/hu/370.html?article_id=2336
https://www.sarvaritinodi.hu/hu/370.html?article_id=2351
https://www.sarvaritinodi.hu/hu/370.html?article_id=2359
https://www.sarvaritinodi.hu/hu/370.html?article_id=2363

4. Feedback from participants

	Feedback from participants
Teachers	Colleague 1: "When is the next playhouse?" Colleague 2: "When can we come next?"
School leaders	"Thank you!" "Thank you for the invitation, we would like to come anyway.
Students	Student 1: "You remind me of my grandfather, Mr. teacher!" Student2: "The cake was delicious, we will come next time!" Student3: "Next time we'll make the best roti!" Student4: "Rube Goldberg machine 4 ever!" Student5: "The best experiment was when they drove a nail into Nati's head..."
Families and caretakers	They'd like to collect your opinions on our Facebook page.

	Success Story #2
Country	Hungary
City	Győr

School name	The Kálmán Öveges Practical Primary School of Széchenyi István University
Number and profile of teachers involved	3 persons 1 biology-geography teacher 2 head of class
During school time or after	during school time
Topic(s) addressed in the project	Zero waste school

Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

The Kálmán Öveges Practical Primary School of Széchenyi István University is a partially independent, non-faculty training school of the University. As part of the system of practising institutions linked to teacher training, our school considers multi-level quality education an important task.

The school, located in the centre of Győr, in the neighbourhood of a public park, was built 125 years ago with the same purpose. The present building complex was completed in 1993. Our institution is a primary school for grades 1 to 8, with two classes per grade and a total of 16 pupils. There are currently 450 pupils and 36 teachers.

The management of the institution is made up of the headmaster, deputy headmasters, heads of sections and heads of working groups. The structure and organisation of our working groups, with the support of the Principal, differs from the traditional division. The Eco-school Working Group, the Talent Working Group, the Image Working Group and the Sport and Leisure Working Group are responsible for the optimal and efficient management of the educational work of the institution.

The training school provides practical training for the full-time teaching students of the Faculty according to the training programme of the Apáczai Csere János János Faculty of the Széchenyi István University in the proportion of the number of student groups and teacher trainers that can be included in this form of training.

The school has been awarded the title of "Eco School for Life", "Non-violent, Health-Conscious School", "Consumer Awareness School", "Happy School" and is a registered School of Excellence. We pay special attention to talent management in our institution. Our Year 7 pupils take part in annual diagnostic local examinations. Pupils can choose between English and German. We also successfully prepare our students for the intermediate English language exam. We offer a wide range of specialized courses in sport, arts and science.

The school has an active Student Council, an advocacy and advocacy organization for students, and a Parents' Council.

Our school does not have any special equipment, no lab, no 3D printer, so we are particularly happy to cooperate with the Mobilis Interactive Experience Centre, as it allows us to introduce many new tools, methods and technologies to our students.

2. The school in the project

Our school has participated in several national and international projects related to the environment and sustainability. Our pupils have been keen to participate, motivated by the imaginative, creative and creative freedom they have been given to work beyond the boundaries of their subjects and classrooms. We hope that we can offer similar experiences to our current pupils, while at the same time developing their different competences.

3. The Make it Open approach

a. Prepare

The project theme is Zero Waste school.
The theme was chosen by the head of the eco-school working group because it fits perfectly with the school's environmental education programs and our main objectives: to strengthen eco-school awareness, to educate for ecological awareness, to educate for healthy lifestyles, to educate for conscious consumption, and to integrate the practice of sustainable development into the mindset and lifestyle of the students and into the daily life of the school.
The partner/expert was invited by the head of the Eco-Schools working group. The expert was Dr. András Halbritter, Associate Professor at the Department of Natural Sciences, Faculty of Apáczai University, Széchenyi István Széchenyi, who gave a lecture and a demonstration on organic farming, ecologically sustainable gardening and school gardens in the ecological garden of the Faculty of Apáczai.

We watched a video about municipal waste, how a landfill works and how it is built:
https://www.youtube.com/watch?v=1_bk-KJBS9M

b. Brief

How did students get introduced to the topic? What were the first reactions of the students?
The students of class 7 were interested and curious, and were introduced to the project in the class teacher's lesson. The topic was familiar to them, as we had already dealt with the protection of the

environment in several lessons (geography, biology, chemistry, class teacher) and in many school events and programmes outside the classroom.
The real challenge for them was that now we were not just talking about the topic in general terms, but they had to get very hands-on and actively involved in the tasks. This is a higher level of responsibility and certainly a challenge for some students.

c. Research

The students in the class formed 3 working groups according to the 3 main themes. This made for an efficient team, each with a well-defined and individualised task. Each group has a group leader, partly chosen by me and partly volunteered for the task. Our 3 main themes:
Food waste
Plastic waste
Paper waste
The catering waste group is responsible for the operation of the composting house/indoor composter. To do this, they first had to familiarise themselves with the operation of the indoor composter, and then explain its use and importance to the other students. They are currently putting together a power-point presentation which will be shown in each class. The school fruit scheme mainly provides apples and pears, which our pupils enjoy eating. However, the apple tubes are thrown in the rubbish bin, even though they could be turned into compost. We would like to offer a solution with the indoor composter.
This group was asked to interview the kitchen staff and they found that we waste a lot.
Two class teachers agreed to make dried apples with the pupils in their classes. A juicing machine is available for this purpose. Since our school is participating in the School Fruit Scheme, almost every week there are apples left over that have not yet gone bad but are already wilted, which the children will not eat raw but are happy to eat dried.
The plastic waste group studied the production and types of plastics, recycling possibilities and the damage plastics cause. They are currently putting together a power-point presentation on this which will be shown to all classes. We have collected several crates of plastic waste, and this group is now tasked with finding out what to make with them. It is important that it is usable, imaginative and that we can make it ourselves.
The paper waste group looked at where paper waste is generated in our school. At first it wasn't so clear, we had to clarify what is paper waste, as paper contaminated with grease, oil, body fluids can only be municipal waste. They did some research, looking at the contents of the bins (wearing mouth masks and rubber gloves, of course). They found

that students produce very little paper waste, but adults produce a lot: offices and teachers' rooms generate most of the paper waste. They are currently looking at ways to reduce paper waste.

d. Create

/

e. Share

The working groups have not yet reached the sharing stage, which will only take place in the coming months.

4. Feedback from participants

	Feedback from participants
Teachers	The teachers at the lower school are looking forward to the 7th grade students demonstrating the indoor composter to the children.
School leaders	The school principal fully supports the implementation of this theme.
Students	The 8th grade class was the first to use the juicer, with skillful girls cutting up the apples and everyone enjoying the dried fruit.
Experts / External partners	Associate Professor Dr András Halbritter was happy to take on the role of expert, and his commitment to the students was exemplary, in addition to his knowledge
Families and caretakers	The Vice-Chair of the Parents' Council will be kept informed about the progress of this theme.

Make it Open success stories (Israel)

	Success Story #1
Country	Israel
City	Modiín
School name	Ha'ela
Number and profile of teachers involved	1 science teacher with no previous experience in OS, a little experience in Maker education and a lot of experience in

	students' research projects. 2 more homeroom teachers who accompanied the activities and helped.
During school time or after	during school time
Topic(s) addressed in the project	Dealing with waste

(*) Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. The school

The primary school is situated in an urban area in Israel. The school has a well-equipped science laboratory and a computer lab with internet connectivity. The school has been open to new teaching approaches, and the teachers are always looking for new and innovative ways to engage the students. This school is new to open schooling, and the Make it Open project was their first opportunity to explore open learning.

2. The school in the project

The school chose the Make it Open project to introduce the concept of Open Schooling and behavioural design to their students. The project was designed to make students aware of the problem of littering and to encourage them to think about solutions to the problem. The Make it Open project offered a supportive framework that allowed the teachers to try out an open learning approach in the classroom.

3. The Make it Open approach

a. Prepare

The topic of the project was chosen by the teacher. She felt that littering was a pressing issue that needed to be addressed in their school and community. The teacher invited experts from the local municipality to participate in the project and share their expertise on the topic.

b. Brief

5th and 6th grade students participated in the project. The students were introduced to the topic through a brainstorming session where they shared their thoughts on the issue of littering. The students were excited to learn more about the topic and eager to find solutions.

c. **Research**

The students researched the problem of littering by collecting data on the types of waste found in the school cafeteria and the amount of waste generated each day. They also conducted interviews with their fellow students and teachers to understand their attitudes towards littering. A representative from the sanitation department in the municipality gave the students a talk about the work of his department. To enhance their research, they visited the regional landfill and waste management facilities. The students also visited the Bloomfield Science Museum in Jerusalem, where they experimented with problem solving, simple sensors and recycling plastic.

d. **Create**

Based on their research findings and the skills acquired in the science museum, the students designed and built a solution to be tested in the school cafeteria. They created an innovative system of bins with labels indicating which types of waste should be disposed of in each bin. They also created posters and flyers to persuade their fellow students to throw away waste items in the correct manner. They incorporated the Make Pedagogy by using a collaborative approach to design and build the solution, and by considering the needs and preferences of all students.

e. **Share**

During the school science fair, the students presented their research findings and the solution they designed to the school principal, teachers, and their fellow students. They also shared their findings with the local municipality, who appreciated the students' efforts in addressing the issue of littering in the school and community.

4. Feedback from participants

	Feedback from participants
Teachers	"We were impressed with the level of engagement and creativity shown by our students during this project. It was exciting to see them working together to design and implement a solution to such an important issue."
School leaders	"We are proud of the students' initiative and enthusiasm in tackling the issue of littering. This project has given them an opportunity

	to apply their learning in a real-world context and make a positive impact on their environment."
Students	"We learned a lot about the problem of littering and how it affects our environment." "We enjoyed working together to design and build a solution that could make a difference."
Experts / External partners	"We were impressed with the level of research and creativity shown by the students in tackling the issue of littering. They demonstrated a deep understanding of the problem and developed an innovative solution that could be replicated in other schools and communities."
Families and caretakers	"We were proud of our children for taking the initiative to address an important issue in their school and community. It was inspiring to see them working together and making a positive impact."
Hub leader	"It was great to see the enthusiasm and dedication of the teacher and students in this project. The Make it Open project provided a supportive framework for the school to explore open learning, and we hope to see more schools in Israel take advantage of this opportunity."

	Success Story #2
Country	Israel
City	Jerusalem
School name	IASA – The Israel Arts and Science Academy
Number and profile of teachers involved	1 science teacher with no previous experience in OS, a little experience in Maker education and a lot of experience in students' research projects. 2 more homeroom teachers who accompanied the activities and helped. in addition, 1 arts teacher worked with the students on the physical models.
During school time or after	during and after school time
Topic(s) addressed in the project	Decision-Making

Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

The middle school is situated in an urban area in Israel. It has a well-equipped computer lab and access to other technological tools, such as tablets and smartphones. The school offers various special programmes, including advanced classes in mathematics, science, and technology. The school has some experience with open schooling, having participated in other similar projects in the past.

2. The school in the project

The school was motivated to join the Make it Open Project to explore innovative approaches to teaching and learning, and to develop students' decision-making skills in the critical stage of moving from middle school to high school (9th grade). The school saw long-term benefits in empowering students to make informed decisions that would positively impact their personal and academic lives. The school was also excited to collaborate with other schools and experts from different European countries.

3. The Make it Open approach

a. Prepare

The topic of the project was chosen by the teachers and the students together. They decided to focus on decision-making, as it is a critical skill that affects every aspect of life. The teachers invited experts in psychology, neuroscience, biology, computer science, and mathematics to participate in the project. They also organised a visit to a computer science exhibition at the Science Museum to learn about how computers learn and make decisions.

b. Brief

The students were introduced to the topic of decision-making through a presentation by the teachers, which included real-life examples and simulations. The students were asked to share their own experiences of making decisions and discuss the factors that influenced their choices. The students were excited to learn more about decision-making and the brain.

c. Research

The students conducted research on decision-making by interviewing their parents and other adults about significant decisions they had made in their lives. They also played simulation games to understand the impact of different factors on decision-making. The students visited experts who specialise in decision-making to learn more about the process. They also explored decision-making in the natural world through independent learning.

d. Create

The students were asked to create a physical model representing any decision they chose. They worked in groups and were supported by the arts teacher. The students used different materials and technologies, such as 3D printers, to create their models. The Make Pedagogy was integrated into the project, as students were encouraged to collaborate, experiment, and iterate on their designs.

e. Share

At the end of the Learning Scenario, the students presented their finished products in the form of round-tables to other students, parents, and experts from the school and the nearby elementary school. The students shared their research findings, the strategies they used to persuade fellow students to make correct decisions, and the decision-making process they followed to create their models. Throughout the learning scenario, the students reflected on their learning by creating a big Zine wall.

4. Feedback from participants

	Feedback from participants
Teachers	The teachers reported that the project was challenging but rewarding. They appreciated the opportunity to collaborate with experts and other schools from different countries. They also saw significant growth in their students' decision-making skills and their ability to work independently and collaboratively.
School leaders	The school leaders were impressed by the quality of the work produced by the students and the level of engagement and enthusiasm shown throughout the project. They saw the project as a success and a positive reflection of the school's commitment to innovative and inclusive education.
Students	The students were excited to learn about decision-making and enjoyed the opportunity to work with experts and other students from different schools. They appreciated the hands-on approach to learning and the chance to use technology and other tools to create their models. They felt proud to share their work with others and to see the impact of their decisions on their peers.
Experts / External partners	The experts and external partners were impressed by the level of engagement and creativity shown by the students. They saw the project as a positive example of how innovative and inclusive education can empower students to make informed decisions.

Families and caretakers	"We were excited to see our children engaged and motivated in their learning. It was impressive to see what they created and learned through this project."
Hub leader	"The middle school did an excellent job implementing the learning scenario on decision-making. It was clear that the students had a deep understanding of the topic and had developed important 21st century skills through the project."

Make it Open success stories (the Netherlands)

	Success Story #1
Country	The Netherlands
City	Amsterdam
School name	Huizermaat, Huizen
Number and profile of teachers involved	4
During school time or after	During school time
Topic(s) addressed in the project	Circulair acting

Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

The Huizermaat is a school where they would love to do more with technology, making and research. They are currently building a lab with 3d printers, research working labs and technical materials. For this project this lab wasn't available yet and we worked in the art-classroom. It's a technasiumschool where students can choose to work on the course Research & Design. In this course they work project based. The students are level VMBO and they are in their first year.

2. **The school in the project**

The school wants to teach their students more about real life issues and complexities in society. They joined this project because they think this goal can be reached by working with partners outside the school.

3. The Make it Open approach

a. Prepare

The subject is your circular neughbourhood and the future of craftsmanship. This subject is chosen by teachers and education specialist at Waag during multiple sessions on location.

b. Brief

The students are a bit confused because they are not used to this kind of projects. They struggle with 'deliverables'. When am I finished and when do I get a grade? But once they are used to the openness of the subject they really like the interviews with the makers in their neighbourhood and they are very proud of what they created.

c. Research

Are there any 'makers' in my neighbourhood? Why are makers important for a neighbourhood? Am I a maker? What does making bring me?

d. Create

They worked through the design thinking process by presenting the process in a creative way. The students all worked in groups on a product. The products differ but the students were especially very proud off what they made. 'It is more special then something I bought because I know what effort it cost to make this'.

e. Share

The students all present their products, process and instructables to Waag and the makers they've worked with. Some of them will present their work on the event at the end of May.

4. Feedback from participants

	Feedback from participants
Teachers	'The students and I found it difficult to really get out of the classroom and think out of the box but it brought us new kinds of materials, working strategies and insights in more complex problems.'
School leaders	
Students	'When I make something, it makes me proud and I want to be more careful with it'.

	'There aren't so many makers in my environment and that worries me. What happens if everything is made in factory's and nobody knows how to make a chair by hand?'
Hub leader	'It's great to see that these students are really good in developing and making a product. They really have gained insights in the process of making and the need for makers in the neighbourhood.'

	Success Story #2
Country	The Netherlands
City	Castricum
School name	Bottehoef
Number and profile[*] of teachers involved	4
During school time or after	During schooltime
Topic(s) addressed in the project	Makers in the neighbourhood of the school

[*]Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

A beautiful area, a bit rural and close to the beach. It's a school specialised in technical education for all levels. The students are in their 3d year and used to doing research.

2. **The school in the project**

The school wants to work with partners from outside of education to address reallife complex issues from society.

3. **The Make it Open approach**

   a. **Prepare**

      The students are looking for makers in their town that they can help (sometimes by pr and sometimes by more meaningful activities)

   b. **Brief**

The students were very enthusiastic about makers in Castricum. They have found a mushroom farmer and one group is developing a special local maker-tour in the area. The students were very creative in developing the mapping process into a presentation. One of the groups made a shovel to all of the makers in Castricum as a presentation of the first part of their process.

c. Research

They interviewed local makers in Castricum, researched through internet and also had philosophical conversations about the value of making for them.

d. Create

The students created 3d maps, a shovel and a beamed presentation and are going to make the final product now.

e. Share

They share their learnings by presenting to Waag and some are selected to present their work at the final event in May.

4. Feedback from participants

	Feedback from participants
Teachers	'The students are 'on' and eager to find out more about local makers in Castricum'
School leaders	
Students	'I like it that I know more of my own environment now'. 'I think we have an interesting businesscase and can't wait to present our tour to the municipality'.
Hub leader	'The students are very creative and I think it's interesting that they are very used to developing project that suppose to 'make money'. The students have interesting conversations about mass production and cheap products vs local markets and sustainability.'

Make it Open success stories (Poland)

	Success Story #1
Country	Poland

City	Łódź
School name	Private School „Pracownia”
Number and profile (*) of teachers involved	2
During school time or after	During & after school time
Topic(s) addressed in the project	Ecology, Air quality, Research for the local community

(*) Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. The school

Non-public school located in Lodz. Lodz is a former industrial city located about 100 km from the capital Warsaw. Students themselves choose what they want to learn, there are no bells in the school, no traditional 45 minutes lessons. There is a lot of space to work with the project method.

2. The school in the project

The school carries out many projects involving the local community, parents. They see great value in this.

3. The Make it Open approach

a. Prepare

The students themselves suggested the topic. Air pollution, air quality is an important topic in Poland in autumn and winter. Smog is a very popular phenomenon. Students learned what causes it. They analysed maps of the city, the nearest neighbourhood.

b. Brief

In order to understand what causes traffic jams in the immediate area, the students created a mock-up of buildings and streets in the immediate area. They also observed the movement of cars at different times of the day, counting cars.

c. Research

When are the biggest traffic jams around our school? Does the number of cars affect air quality? Where was the highest air pollution?

d. Create

Measurement system measuring PM2.5 and PM10 dust concentration based on Micro:bit microcontroller. After determining the busiest hours, the students built devices using the Micro:bit microcontroller to measure the concentration of particulate matter in the air. They conducted measurements in the immediate area.

e. Share

The students have prepared a public awareness campaign. They presented the results of their research. The high air pollution was related to the high car traffic in the area. They encouraged parents, residents in the area to use public transportation, shared rides and cycling.

4. Feedback from participants

	Feedback from participants
Teachers	This project has greatly involved the youth. They came and asked when the next step would be
School leaders	
Students	We can have an impact on air quality. We have noticed that in a car there is often only the driver. We marked our daily route to school on a map and try to combine commutes.
Hub leader	A very good research project using microcontrollers. Well asked questions, well analyzed results. The whole thing concluded with a social campaign.

	Success Story #2
Country	Poland
City	Sosnowiec
School name	Primary School no. 38

Number and profile (*) of teachers involved	1
During school time or after	During & after school time
Topic(s) addressed in the project	Ecology, Research approach, water quality, research for the local community

(*)Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

Elementary school located in Silesia - an industrial region of Poland (for years we have seen much more activity of schools from that region in our projects and programs). Students from grades 7, 8 of elementary school (12 - 14 years old). School well equipped with basic laboratory, analytical, IT equipment. For years participating in competitions, projects and programs with success. Previously they have not implemented anything related to OS.

2. **The school in the project**

The school sees value in involving the local community, parents, and businesses in its projects. This increases their attractiveness and shows young people how to put knowledge into practice.

3. **The Make it Open approach**

    a. **Prepare**

    The topic was suggested by the students. It deals with the quality of tap water in different places. The question/problem is related to their immediate area. The district in which the students live was built many years ago, water is supplied to the apartments through old pipes. The students want to see if this affects the quality of water in the homes.

    b. **Brief**

    Students learned about the ingredients of drinking water in supermarkets. They prepared and tested the operation of a TDS sensor they built to measure the concentration of dissolved substances in water. They also checked where their city's drinking water is taken from.

c. Research

Is the water in our taps identical? How many substances are dissolved in drinking water? Does the age of the building (and pipes) affect the amount of dissolved substances in the water?

d. Create

The students created a TDS sensor (based on a microcontroller) that can measure the amount of dissolved substances in water. They verified the correct operation of such a sensor and made improvements.

e. Share

The research results were presented at the regional E(x)plory competition. They allowed the students to advance to the next stage. They will present their results at the national level.

4. Feedback from participants

	Feedback from participants
Teachers	
School leaders	I am proud of my students. They suggested the research themselves. With my help they were able to carry it out. They won the regional research project competition and moved on to the national stage.
Students	Our research is interesting. We haven't seen similar research before. We were able to build a measuring device ourselves.
Experts / External partners	An innovative approach to the problem. Students are able to talk about it in an interesting way.
Hub leader	We are proud of the project, its reception by the competition jury, and we keep our fingers crossed for the next stages of competition.

Make it Open success stories (Romania)

	Success Story #1
Country	Romania
City	Bucharest
School name	Genesis College

Number and profile of teachers involved	3 (the school principal + two primary school teachers)
During school time or after	During school
Topic(s) addressed in the project	Physics

Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

Genesis College is a private school located in Bucharest. Students have access to physics, chemistry and biology labs, but they lack a fab lab as well as tools or specific equipment such as a 3D printer. From time to time, they engage in open schooling activities, but without a specific focus on this approach.

2. **The school in the project**

Genesis College is an IB accredited institution. As such, it is interested in enhancing its open schooling activities, with an accent on maker education.

3. **The Make it Open approach**

To demonstrate how MiO could help them enhance open schooling, we agreed to run a pilot project for pupils in the fifth grade.

The instructor is one of us (Toma Patrascu) and we are going through various MiO Learning Scenarios, applied as such or customised ("*Our Moving World: Physics Everywhere*", "*Forces of nature*" and "*Let It Rain*", for the moment). The learning is disseminated among all the students of the school by allowing them to witness and take part into testing the various structures / devices built during the LSs.

At the end of April, all the students will take part in field trips to museums and will visit a couple of research institutes.

The school intends to use the knowledge gained through this pilot project to further extend the use of the MiO approach.

4. **Feedback from participants**

Feedback from participants

Teachers	”We’ll definitely talk with our colleagues about these lessons!” (a teacher, after attending the demo)
School leaders	”Would you mind giving a demo for the fourth graders and their teachers, too?”
Students	”You’re the coolest teacher!” (my favourite quote, of course 😊) ”What’s the next project they will be working on?” (asked by an older student, envious of the fifth graders taking part in the MiO pilot programme)

	Success Story #2
Country	Romania
City	Bucharest
School name	Liceul Teoretic ”Școala Europeană București”
Number and profile[*] of teachers involved	17 (the school principal + primary school teachers)
During school time or after	During school time
Topic(s) addressed in the project	Physics, Biology

[*]Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. The school

SEB is a private school located in Bucharest. Students have access to a science lab, but they lack a fab lab as well as tools or specific equipment such as a 3D printer. From time to time, they engage in open schooling activities, but without a specific focus on this approach. The organisation that took part in the project is the primary school section of SEB.

2. The school in the project

The management team of the school wants more focus put on the science education classes. Also, they try to impress on the teachers the need for hands-on activities.

3. The Make it Open approach

The first step was a meeting with all the teachers, where we presented the MiO approach and we discussed at length the various Learning Scenarios available.

Next, assisted by their respective teachers, we have run hands-on activities for all of the 16 classes of the school, activities inspired by several MiO Learning Scenarios *("Biodiversity around us*", "*Forces of nature*" and "*Let It Rain*"*).* Using the experience gained through this programme, SEB will start integrating the LSs into the curriculum.

In the near future, sometime in May, the school plans to hold a science fair where it will showcase the results of the MiO inspired projects

4. Feedback from participants

	Feedback from participants
Teachers	"I've checked the Navigator and those Learning Scenarios are very interesting!"
School leaders	"The kids were thrilled! We are very interested in working together with you in the future!"

Make it Open success stories (Spain)

	Success Story #1
Country	Spain
City	Ferrol
School name	IES Saturnino Montojo
Number and profile of teachers involved	1 Technology teacher 1 Physics and Chemistry teacher 1 Mathematics teacher
During school time or after	During school time
Topic(s) addressed in the project	Physics in an interdisciplinary way

Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

Secondary school in an urban setting. They have a technology workshop and a physics and chemistry laboratory. They will use makey makey cards.
They participate in the programmes "inclusive talents" (attention to functional diversity), "proxecta" (equality), "Terra" and "Bibliotecas Correspondentes" (libraries). They use some of the elements of the Open Schooling philosophy, but this is their first project within MiO.

2. **The school in the project**

Among their motivations are initiating a way of teaching that is motivating for the students. In order to do so, they receive facilities from the school and the environment.
They hope to see the students' motivation grow as they see the connection with the real world. Competence learning. They think it is fantastic to put theory into practice.

3. **The Make it Open approach**

a. **Prepare**

This scenario was chosen because it is appropriate for the subjects and students of the working group concerned.
The decision was made by the group of teachers
The teachers were in charge of inviting the experts. The confirmation of the studio architect from A Coruña is pending.

b. **Brief**

The project was presented in class.
The students received it with positive attitudes, enthusiastic about changing the place of study and leaving the centre.

c. **Research**

They investigated angular velocity in the school playground.

d. **Create**

They will create explanatory cards/panels for the rest of the students of the school. Card with Physics, Geometry, etc. of the playground
The Maker pedagogy was included by going to the technology workshop, makey makey cards to study the impact of the material on the fall (they do not have the tool that the LU is talking about).

e. **Share**

Explanatory visits to other centres in the surrounding area

Web of the centre
In the centre itself with an exhibition of the panels in the corridors.

	Success Story #2
Country	Spain
City	Ferrol
School name	IES Sofía Casanova
Number and profile (*) of teachers involved	1 Technology teacher 2 Biology teachers
During school time or after	both
Topic(s) addressed in the project	Biodiversity in Ferrol and surroundings

(*)Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

This is an urban secondary school with a technology workshop and a biology laboratory. They participate in the "inclusive talents" programme dedicated to the integration of people with disabilities.
They are not new to Open Schooling activities, but this is their first LE in MiO.

2. **The school in the project**

Their motive for participating is to work on projects in an interdisciplinary, different, personal way.
They will like to achieve a better motivation of students, teamwork and enthusiasm of the students.

3. **The Make it Open approach**

a. **Prepare**

The theme of the project is Biodiversity in the areas around the school. The teachers chose a topic appropriate to the interests of the pupils in the working group.

b. **Brief**

The topic was presented and explained in the classroom. The pupils were enthusiastic about the proposed school field trips for sampling and building elements in the workshop.
They contacted the mother of a child that works as a gardener to act as an expert.

c. **Research**
At Christmas they looked for seeds and planted them. They have them germinating in the laboratory and classrooms.
They worked together with families for sampling during Christmas holidays.

d. **Create**
*They created a Padlet locating sam*ples by zone.
They built planters made out of wood
They explore the maker pedagogy by working in the technology workshop and using the tools to make the planter.
They adapt the LU looking for alternatives. for example, they made the planters by their own way.

e. **Share**
They don't have nets, so they don't use to post their activities. They only post in the science club.
They are planning to assist to the "Día da Ciencia na Rúa", the fair organised by mc2 in May, with an expected assistance of 15.000 people

4. Feedback from participants

	Feedback from participants
Teachers	They complain that the app for plant identification proposed by the LU is paid. They found a free equivalent. They do not have field microscopes There are 80 students involved, and moving them to the mc2 museum complicates matters. They do not want to discriminate against anyone, so they are not considering moving only part of the group.

	Success Story #3
Country	Spain
City	Ortigueira
School name	IES Ortigueira
Number and profile [1] of teachers involved	1 Technology teacher. Large experience in Maker pedagogy and in some international school projects. She started OS by the end of 2022
During school time or after	During school time
Topic(s) addressed in the project	Physics, town planning, physical exercise, public speaking

[1] Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. The school

The school is located in an urban area, in a small peripheral town, surrounded by a rural environment. It has a Maker classroom, library, auditorium and access to a Professional Training centre for woodworking on the same premises.
The school participates in various educational programmes such as science club, bilingual section, STEM baccalaureate, "creative poles" (a programme dedicated to maker culture), or the gender equality plan "proyecta".

2. The school in the project

The aim of the school is to involve students from a peripheral area like this one in projects that allow them to enhance their cultural and emotional development, and to have access to resources more typical of larger cities.
With this type of initiative they hope to bring students closer to a 21st century form of education.

3. The Make it Open approach

a. Prepare

The topics covered by the project are physics, town planning, physical exercise and public speaking. The teacher chose the scenarios that best fit with the technology subject curriculum from those proposed in the Navigator. The scenario chosen was "physics everywhere...", adapting some of the Learning Units to better fit the official curriculum.

The whole development of the Learning Scenario was organised by the teacher, who was responsible for inviting experts and collaborators from her personal contacts.

b. **Brief**

The dynamics and theme were presented to the students in class. They were told about the previous experience with photos and a short presentation, thus contextualising the reasons for this activity.
The families were made to participate in the project, sending several letters so that they knew the objectives and didactic techniques that were going to be used.

With the above references and the presentation, the pupils were delighted, curious and expectant.

c. **Research**

They measured times and other activities proposed to do in the park. They worked in groups. It was important that some groups observed how others took measurements and corrected each other.
There was a (guided) conclusion session where they were able to contextualise what they did and discuss with each other the differences between their results.
In the classroom of the Professional Training centre for wood they learned about the parts of the trunk, types of wood, tools, safety... (these topics are part of the official curriculum).

The pupils met with a technical architect (teacher of the centre), a teacher and a pupil from the neighbouring Professional Training centre.

The research activities took place in the playground, in the maker classroom and in the wood classroom of the neighbouring Professional Training centre.

d. **Create**

Models of a playground designed according to their interests.
Leaflet about wood and woodworking.

In order to take advantage of the maker pedagogy, some of the learning units were adapted to the curriculum of the subject. During their work they had to accept mistakes in observations and conclusions, and not having finished everything they had planned, for example. They also observed how others solve problems.
They drew conclusions (in a plenary session).

e. Share

The exhibition of the pupils' work took place in the school library. The pupils explained their projects, the things that worked and the ones that failed, and answered the visitors' questions. Three sessions were held with the public, one of them with an explicit invitation to the families, who participated actively. The other visitors were pupils from nearby primary schools (where many of the pupils who participated in the LE had studied). In total about 300 pupils from the same school, 100 from the surrounding primary schools and about 30 parents attended the exhibition. About 35 teachers from the school collaborated in this exhibition.

The school is planning another exhibition session for people from a centre specialising in people with functional diversity, and participation in the Día da Ciencia na Rúa, the science fair organised by MC2 (around 15,000 visitors are expected to attend). It is possible that they will present the projects at other science fairs.

The regional press echoed the project exhibition with a news item in the education section.

4. Feedback from participants

	Feedback from participants
Teachers	We are delighted with the response from the families. It is not usual for them to respond to the proposals we make to them. Perhaps a key element is that in this case we invited them with a concrete proposal (to come to the exhibition of projects), and to see the work of their daughters and sons. The primary school teachers were happy to see their former pupils again.
Students	At first the children were not receptive to the idea of parents coming to see their work and having to explain it to them. After the exhibition they felt important and supported.

Make it Open success stories (Sweden)

	Success Story #1
Country	Sweden
City	Norrtälje

School name	Rådmansö skola
Number and profile [1] **of teachers involved**	Three middle school science teachers
During school time or after	During school
Topic(s) addressed in the project	Forces and motion

[1] Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. **The school**

Rådmansö skola is a K-6 school located in the countryside in Norrtälje – approximately 72 km north of Stockholm. It is a communal school with approximately 140 students – one class per grade.

2. **The school in the project**

Nina Berglund, the teacher who suggested that Rådmansö skola participate in Make It Open, is a science, technology and Swedish teacher for grades 4-6. She had a very inspiring science teacher during her teacher training who instilled in her the importance of discovery and how important it is to make subjects such as physics and chemistry accessible.

During the pandemic, there was very little contact between the school groups and there was no opportunity to connect with the outside world. In spring 2022, the staff was discussing how important it was to open up and stretch the students' experiences beyond the school. In Nina's words, the school has a responsibility to compensate for what students don't have access to from home.

Nina said that she was also reflecting over how she could make the technical part of her lessons more engaging. She saw a post about Make It Open and felt like it was perfectly aligned with the school's new goals as well as her own personal goals.

Since then, grades 4-6 have collaborated for the first time by approaching forces and motion together. The engagement level of the students has been extremely high, and now they are requesting researchers and guest speakers to come address their history class, as well.

3. **The Make it Open approach**

    a. **Prepare**

Nina and her colleagues chose to work with Forces of nature as it fits well with the middle school curriculum. They planned in engagement with a physics professor and Tom Tits Experiment (workshops at the school and a visit to the exhibition).

b. Brief

The teachers presented the theoretical information about forces and motion and then informed the students that they would be taking a new approach to the topic.

c. Research

They kick-started the unit with a visit from a theoretical physics professor from Uppsala University. He showed this video (https://www.youtube.com/watch?v=NUMjnSTRjzs) and also demonstrated live with the class. He spoke with each class (4,5,6) for one hour. They were hooked!

Towards the end of the unit, the students visited Tom Tits Experiment and carried out specific challenges in the exhibition related to their unit on forces and motion. The students exhibited a high level of engagement in the experiments.

d. Create

The students' research and creation went hand in hand. There were three separate creation projects: build a car, build a rocket and build and program a simple Tivoli attraction with Lego Spike Essentials.

The students in grade 4 built a balloon car – they tested with different wheels and constructions after first drawing their designs. The teacher tied in this unit with her Swedish class by having students write about their cars. Since it was in December, she created a story about a small Christmas elf who wished for a balloon-powered car to use in the summertime when julmust (a Christmas drink) wasn't available as fuel.

The students in grade 5 made rubber-band cars. The students in grade 6 made cars with mouse traps.

On a visit from Tom Tits, the students made and launched air-pressure rockets. They then learned more about simple machines by building and programming lego in a workshop with pedagogues from Tom Tit.

e. Share

The students in grades 4-6 will gather at the conclusion of the unit to showcase their different car designs and test them together.

During parent-teacher-student meetings, the students also were able to show their cars for their parents.
The planning for the unit was also shared digitally with all parents, and the parents also received information in the monthly newsletter.

4. Feedback from participants

	Feedback from participants
Teachers	This came at the right time and has been an ideal solution for us.
Students	After the workshop with lego - "This was the best day ever". On the visit to Tom Tits, the teacher observed that one student who doesn't typically engage in lessons, came up and asked for the next challenge in the forces and motions exhibit, and he stayed with his team and collaborated – something that is not usual for him. From Grade 6 students: "I think it has been fun working with this because we've done so much more than normal lessons, and not just at school." "It has worked well because lessons have been more fun and we haven't had to work as much in a boring way." From a Grade 5 student: "It was really fun when we programmed Lego and it was even more fun to go to Tom Tits." From a Grade 4 student writing about their visit to Tom Tits: "Then we went to the first floor and worked in groups and tested different experiments. Building the bridge was most fun and the least fun was the pirouette because you spun around so much and I felt sick."
Hub leader	This is exactly the sort of collaboration we wish to have with schools.

	Success Story #2
Country	Sweden
City	Södertälje
School name	Nyckelskolan

Number and profile [1] of teachers involved	5 - Two Science grade 4-6 teachers; Gym and Health Education teacher; Swedish teacher grades 4-6
During school time or after	During school
Topic(s) addressed in the project	Health and movement; the human anatomy; screen time

[1]Subjects they teach, previous experience in Maker pedagogy, other management responsibilities in the school, etc.

1. The school

Nyckelskolan is a small charter school in Södertälje – a city of approx. 100,000 residents just south of Stockholm. There are 251 students in grades K-9. the school is situated in a neighborhood quite close to the city center.

2. The school in the project

A brief description of what motivated the school to join and what benefits they foresee for their school in the long-term.

The middle school science teacher has traditionally been very active in testing new teaching methods and projects to engage students. She has been a driving force in the school encouraging colleagues to think more outside the box and collaborate. When she retired in December 2022, she handed the reins of the project to her successor, a newer teacher who is familiar to this teaching model, but is open-minded and sees the value in this project.

3. The Make it Open approach

a. Prepare

The students ended the fall term with a unit on space, and they were to start the new term with a science unit on the human body. It suited perfectly for them to kick-off this new unit by visiting the science center, Tom Tits Experiment, and completing the challenges in the human body exhibition to “Train like an astronaut” (based on ESA’s material). This provided a natural segue from the previous unit and

helped them directly see the connection between science and discovery and movement.

b. Brief

The gym teacher held lessons on the importance of physical movement on a person's well-being. The science teacher introduced bones, muscles and human body functions in anatomy lessons and used Kahoot in her lessons. The Swedish teacher introduced Skärmhjärnan Jr (Screen brain Jr).

c. Research

The students have been reading and discussing Skärmhjärnan Jr. throughout the term. It is about the effects of too much screen time on a person's well-being, memory exercises and concentration.
In gym, the students have tested how different forms of exercise make them feel.
In science, the students have been doing independent research on the human body and conducted research on the science center visit.
The also had a guest visit from a local optician who spoke about the eye's functions, the importance of training your eyes and resting your eyes. The students had a chance to test practical exercises, as well.

d. Create

The students were tasked with creating "brain-break" exercises for themselves and for younger students at the school based on their research.

e. Share

At the conclusion of the unit, the students will teach these new brain-break exercises to the younger students in grades 1-3.
Parents receive updates via newsletters, and the parent-student-teacher development meetings.

4. Feedback from participants

	Feedback from participants
Teachers	We want to do more collaborative, cross-curricular projects like this.
Students	Observation during the visit to the science center: The students were really engaged and took time to test and test again the different experiments and study anatomy models and feel where they have muscles and bones in their own bodies.

Hub leader	This school is exemplary in how they collaborate and communicate between subjects and age-groups.