PHERECLOS

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White Book on Open Schooling

A REFERENCE GUIDE

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European Children's Universities Network

NICULESCU

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824630.

NICULESCU

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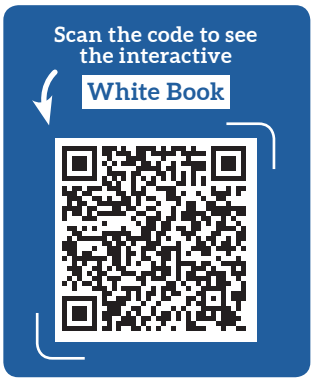

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INTRODUCTION

1.1. INTRODUCTION – PHERECLOS UNDERSTANDING OF OPEN SCHOOLING

Chris Gary and Cyril Dworsky
Vienna University Children's Office, Coordinator on behalf of the PHERECLOS Consortium

PHERECLOS - *Partnerships for pathways to Higher Education and science engagement in Regional Clusters of Open Schooling* – is an approach that aims to initiate and mainstream innovative models of collaboration in education with reference to "Open Schooling".

In October 2019, 15 institutions from 10 different counties gathered under the PHERECLOS logo with the ambitious aim to contribute to the modernization of education, in particular with consideration of STEAM education as a key to cope with the grand challenges on our planet and in our societies.

The PHERECLOS Whitebook seeks to summarise the approach, the implementation and the outcomes of PHERECLOS and will condense the learning which has derived from this joint endeavour.

This Whitebook shall enable experts and practitioners in education to learn more about the concept of Open Schooling, its potential in education and to encourage all parties who have a role in teaching and learning to consider it as a fruitful approach regardless of their perspective. From school teachers and school heads to officials in education authorities; from educators in STEM programs to academic outreach and Third Mission coordinators; from CSR specialists in businesses to post-graduate researchers or those in industry and start-up companies; from learning and neighbourhood centres to science centres, museum interpretation officers and many, many more.

The PHERECLOS consortium is happy to share the experience and the outcomes generated from this pilot project.

The PHERECLOS project

PHERECLOS was a shipbuilder in Greek mythology, whose fleet helped to cross unknown passages in the Mediterranean Sea and combat foreign enemies at the time of ancient Greeks. In modern times, an asteroid was given the name of this Greek artisan, which is a Jupiter trojan in a far afield orbit around the sun.

In the same manner, these 15 partner organisations of PHERECLOS have embarked on an adventurous and passionate journey which, in its envisaged arrival point, will have planned, implemented and tested new structures for teaching and learning, which go beyond the usual scope and sectors linked with school education.

PHERECLOS has received funding from the European Union's Horizon 2020 research and innovation programme under the "Science with and for Society" topic ("*Open schooling and collaboration on science education*", grant agreement No 82463) from 2019-2022.

The project was aiming to combine the incubatory role of Children's Universities with the understanding of Science Capital and a commitment to an Open School culture. All PHERECLOS partner organisations have long lasting experience in these fields and cover relevant views on these issues from different stakeholder perspectives.

Project consortium:

Kinderbüro Universität Wien GMBH (KUW), Austria

SYNYO GMBH (SYNYO), Austria

Universität Innsbruck (UIBK), Austria

Universytet Slaski (UNI SLASKI), Poland

Universität Wien (UNIVIE), Austria

European School Heads Association (ESHA), Netherlands

Københavns Universitet (UCPH), Denmark

Stichting International Parents Alliance (IPA), Netherlands

Snellman-instituutti ry (SNELLMAN), Finland

Politechnika Łódzka (TUL), Poland

Universidade do Porto (UPORTO), Portugal

S.I.S.S.A. Medialab SRL (MEDIALAB), Italy

Universidad EAFIT (EAFIT), Colombia

Asociaţia Universitatea Copiilor (UNICO), Romania

Teacher Scientist Network LBG (TSN), United Kingdom

Project website: www.phereclos.eu

What is Open Schooling?

The idea of Open Schooling can help to create a more dynamic, more versatile and more purposeful learning environment. PHERECLOS has put this concept in the centre of its approach and even though there is no explicit definition of the term, many of the protagonists of Open Schooling share an understanding as follows:

Open Schooling can be seen as a way of teaching and learning inside and outside schools, which is based on the collective knowledge and learning opportunities which are available in a local area. It enables and makes use of collaboration across the structural edges of formal and non-formal education providers and includes all relevant actors in a community. Businesses, cultural institutions, civic centres and municipalities, science and research organisations, nature conservation authorities, NGOs and local initiatives and many more – all

these societal actors are a vast resource of information and knowledge which can be linked with school teaching, both inside and outside a classroom. Needless to say, this also includes parents and families. Open Schooling can help to make learning more authentic, more affiliated to real-life experience and – maybe most relevant – linked to relevant local challenges vis-à-vis the grand global issues of our time. In an ideal setting, Open Schooling can contribute to community development and active citizenship when it puts schools in the centre of a local community in a collaborative manner. In return, schools would not only be recipients of knowledge and learning opportunities, but contribute to community well-being from their side, with all the creativity of pupils and educators, competences and resources, incl. Buildings.

> *Even though we have been organising Vienna Children's University and other STEM programs for 20 years now, schools were not a strategic partner for us – as the roots of our initiatives lay in a summer programme. Open Schooling has shown us ways to add a systematic approach to our intuitive way of collaborating with schools."*
>
> *(Karoline Iber, Kinderbüro Universität Wien Gmbh)*

Incorporating external ideas into everyday school practice and enriching education approaches with elements and topics that extend the core curriculum allows schools to reflect and respond to external challenges - and thereby link education with real life experience and commonplace interest in the world as it appears to children and young people.

What is the unique approach of PHERECLOS?

The PHERECLOS approach deems this interconnection of spheres - the educational and the everyday - as a fundamental principle for the accumulation of science capital and critical thinking – which can boost STEAM education and its understanding in many ways. This shall stimulate the formation of new approaches to teaching and the education process and the scaling-up of existing state of practical knowledge and teachers' competence.

How can Open Schooling be implemented in practice? PHERECLOS was aiming to design and implement such systematic models of collaboration in six diverse geographical regions, establishing so-called LECs "Local Education Clusters" that were the core element in the concept.

These six clusters have in common these three pillars:

- The concept of Science Capital, which perceives individual representation of science as a bundle of commonplace habits, expectations and attitudes which are directly linked to and influenced by the everyday social sphere of individuals and the social actors therein.
- The concept of Children's Universities (CUs), which stands for non-formal, University-based science engagement programs for children and young people as unconventional and non-traditional recipients of academia.
- The understanding of an Open School culture, in which schools reflect on external ideas, topics and challenges and incorporate them in their teaching approaches and everyday school life, and in return, provide the creativity and potential as the assets of their pupils and teachers to the community around them.

Children's Universities as incubators of change

What makes the PHERECLOS approach unique is that it is based on the experience gained from the formation of Children's Universities, which in the past 15 years have turned out to be 'incubators of change' in their academic environment. The term "Children's University" has become popular since the turn of the millennium as an attractive model of outreach and engagement between University academics and children and their families. Attracting significant interest in media and policy, these programmes provide first hand insights into the sphere of science and university research with face-to-face encounters with academic researchers as role models.

> *The collaborations in PHERECLOS has made me realise how important an element the authenticity in Opens Schooling activities and the co-influence of the children are. This experience will affect our own future approach in STEM outreach at the Faculty of Science, UCPH."*
>
> *(Torben Roug, University of Copenhagen)*

During the past 15 years, more than 500,000 participating children and young people (typically aged 7-14 yrs.) in Europe every year have engaged with a Children's University. Almost 400 initiatives exist in Europe and beyond involving more than 15,000 academics year-on-year. With support of the European Commission, a Europe-wide network of Children's Universities was established in 2008, which is busy developing this approach further (www.eucu.net).

Children's Universities vary in concepts and approaches, depending on their particular objectives, local conditions and history of its implementation - but as a common principle, Children's Universities have significantly contributed to shaping of the Third Mission of universities - a collective term for activities, which use scientific knowledge to help shape societal development – and became a strategic instrument in the dialogue between science and society.

There is a shared understanding of basic principles: the encouragement for critical thinking, the providing of a basic understanding of academic mechanisms, academic culture and values of science as well as the promotion of educational pathways and educational opportunities.

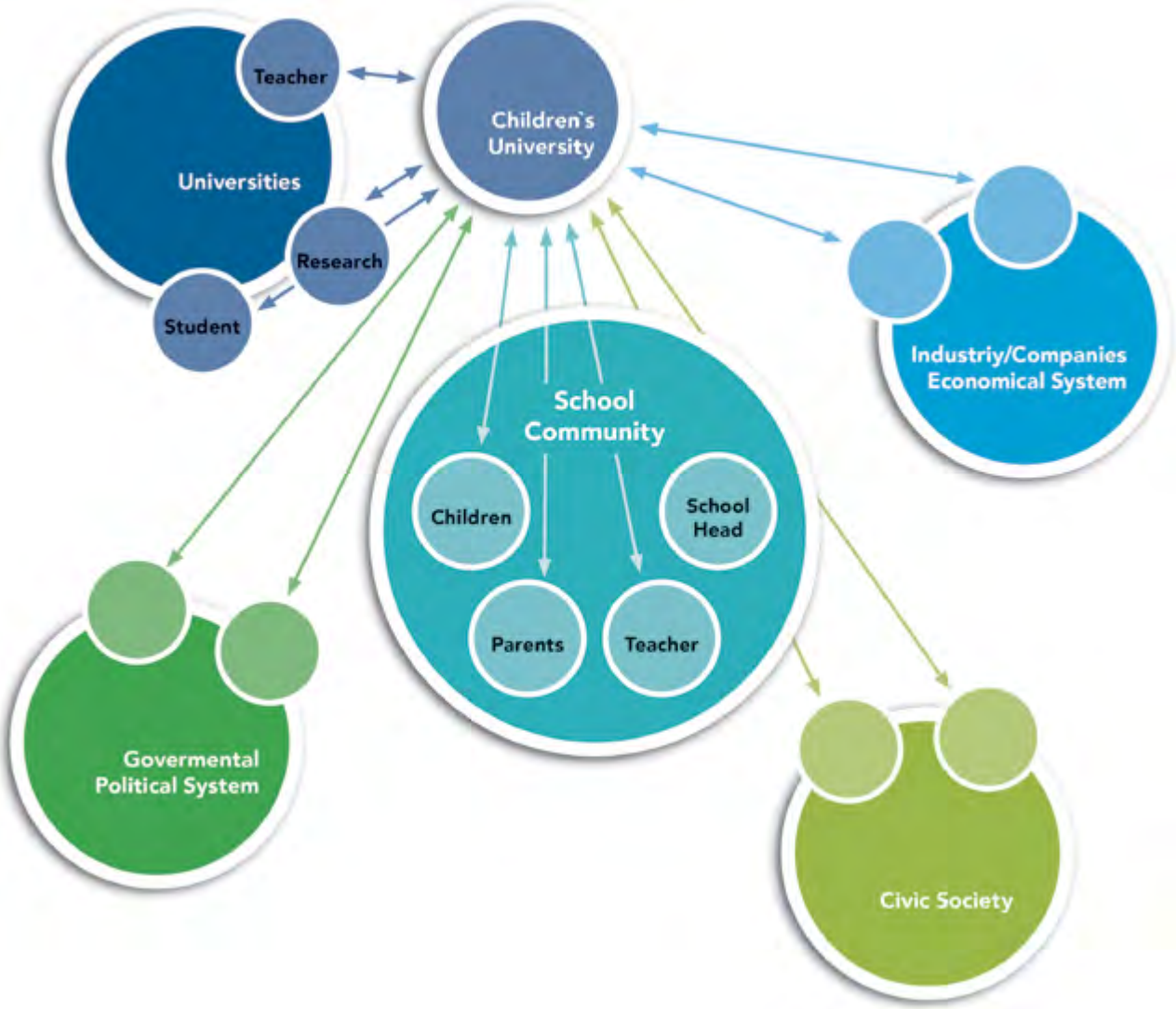
> *Children's Universities represent the most radical approach to open Universities towards the general public.*"
>
> *(European Commission, EUCU.NET evaluation summary report 2008)*

Over the years, Children's Universities have changed the perception of universities and have created new opportunities for learning. At the same time, Children's Universities have also made progress in themselves. More and more emphasis is on social inclusion and first generation students, after they (CU) have proven to be successful models of low-threshold STEM engagement which enable first-hand experience of science and research. This is particularly relevant for those young people and their families who had less chances to get in contact with the academic sphere due to their socio-economic status, their educational milieu or their cultural background.

Local ecosystems of education

In most of the cases, Children's Universities have achieved this in a collaborative approach. A majority of Children's Universities have developed, implemented and delivered their programs in close collaboration with other societal actors. Children' Universities always had to be translators between the complexity of (academic) scientific issues, appropriate pedagogy and society at large. They had to take an intermediary position between all the various parties who are typically involved: university management, academics, funding authorities, (local) authorities and ministries, businesses and industry, (charity) foundations and civic society organisations - between researchers and children, between science and society and most relevant - with schools!

The central idea of PHERECLOS was that, in the same way as Children's Universities became change agents in their academic environment, school should now be empowered through this experience and supported to take a more central role in their local educational ecosystem. Schools



Initial Structure

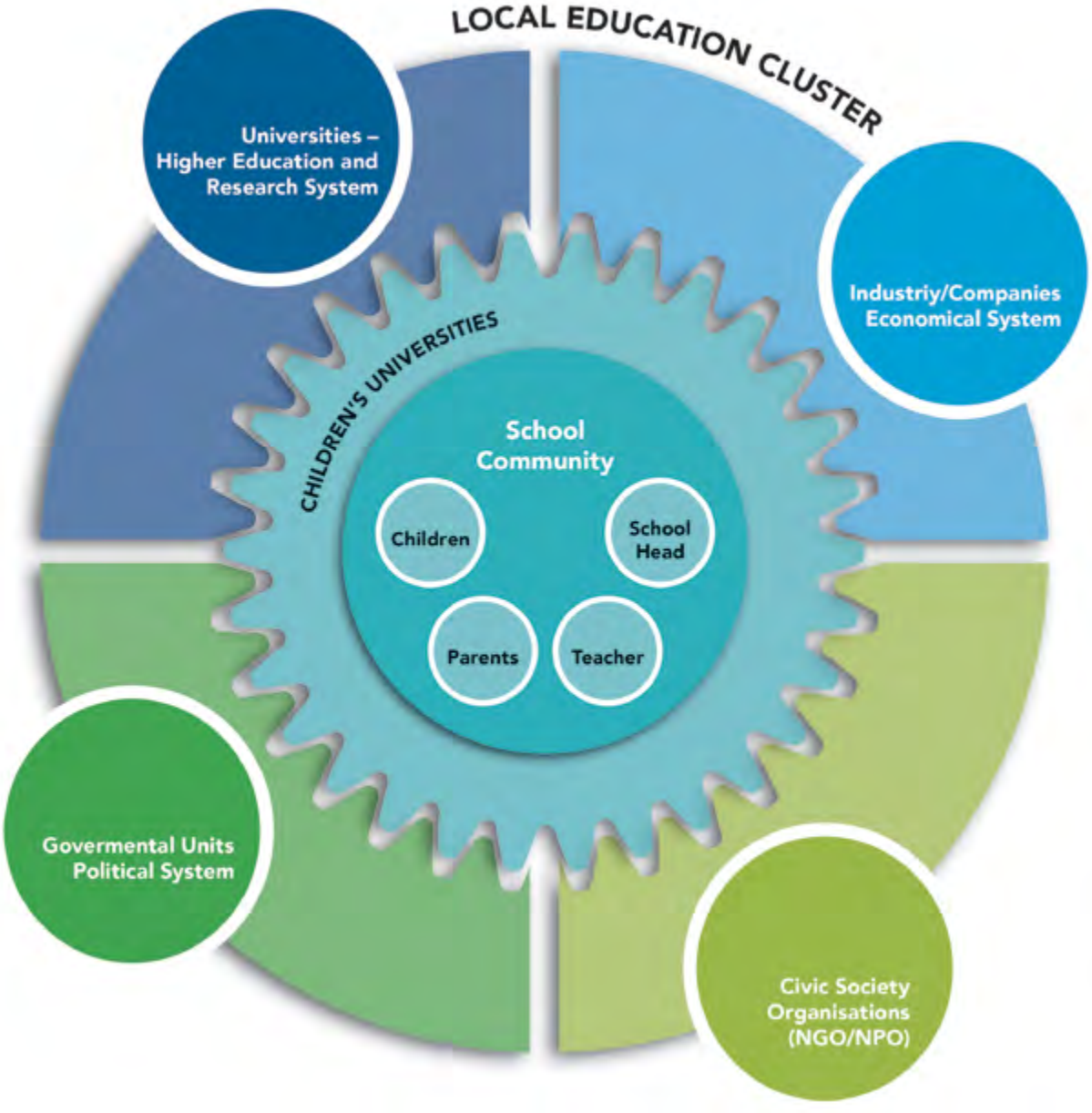
shall – in close cooperation with Children's Universities and academia *per se* - become intermediaries between the sectors, between several knowledge providers and between formal and non-formal education.

For that purpose, PHERECLOS established six "Local Education Clusters" (LEC) as model initiatives. These six LECs are all located in their particular geographical, social, political, educational and economic context in Austria, Colombia, Finland, Italy, Poland and Portugal. All six model LEC involve active parties from all relevant sectors with up to 28 partner organisations. (For more details see chapter 2.3).

All of these are centred around Children's Universities and in collaboration among all parties involved in a LEC, they are aiming to support accumulation of science capital by linking education with science and real life experience through authentic, first-hand insight and personal encounters with scientific research(ers).

However, and this is probably the most unique characteristic of the PHERECLOS approach, these new forms of collaboration are not meant to happen from scratch in isolation.

The entire piloting of these "Local Education Clusters" (LEC) is based on a precise work plan,



Targeted Structure

which has been developed by all partners in a joint, co-creative process. In this regard, the focus clearly was on setting-up sustainable structures based on shared objectives, much more than just developing joint activities or shared learning content.

Elements and outcomes

Successful implementation of an innovation requires a well-conducted strategy that involves all parties who shall contribute to it. For that purpose, the entire process was continuously informed by expertise available from academic implementation studies, which provided both theoretical models as well as practical tools for planning, monitoring and assessment during the implementation period.

An accurate analysis of the legislative and administrative context for Open Schooling across European countries as well as the identification and description of available "inspirational examples" of Open Schooling (see chapter 2.1) has provided further food for thought to make the joint LEC work plans more realistic, more effective and more sustainable.

> *The development of a joint workplan with a network of several different schools of all levels made us aware about the relevance of co-creation! So not what we deem relevant for a school is the starting point, but to co-create such interventions which are of added value for both sides. PHERECLOS laid the foundation for future strategic partnerships with formal and non-formal educational institutions in Vienna.*"
>
> *(Thomas Troy, Kinderbüro Universität Wien Gmbh)*

The continuous monitoring of the process has directly fed into a mentoring programme, which was arranged in parallel and included 44 educational institutions in 15 countries, ranging from schools, school authorities, teacher training organisations, higher education establishments, NGO, non-formal education entities, businesses and alike. This mentoring programme had a significant impact on sharing the organisational and individual learning gained within the project and mainstreaming the idea of Open Schooling. (see chapter 2.4)

In the same way, PHERECLOS recognized the inevitable role which stakeholders and deciders have in the formation and upscaling of Open Schooling. In order to enable informed and reliable decisions and policies, a set of advocacy briefs and policy recommendations was distilled from the model implementation of Local Education Clusters. (see chapter 2.3)

In any case, innovative pilot implementation will never be sustainable without a direct impetus for changing current practice. For that purpose, PHERECLOS has set-up a model guide for encouraging other educational establishments and even individual educators to take the chance of Open Schooling and embark on their own mission (see chapter 3). Analysis of success factors has revealed that – amongst others – *teachers are key to making a change*. This requires both skills and attitudes, and both need to be addressed in teacher training, no matter if pre-service or in-service teachers. The PHERECLOS Teacher Training Innovation Toolkit for Open Schooling (see chapter 2.6) has outlined concepts and methods in teacher training which can help to bring about new generations of educators who are more open and more competent to successfully pursue an approach of Open Schooling in their schools and in their classrooms.

> *The change of learning scenery and educator in an open schooling situation, can give children a possibility to learn and express themselves in other ways than in their regular classroom. Our experience are that they often ask other types of questions and are differently curious on the authentic learning environment. Maybe it also develops some of the children's self-efficacy regarding STEM."*
>
> *(Torben Roug, University of Copenhagen)*

All in all, PHERECLOS is aiming to have a significant impact in the formation of educational landscapes on regional levels vis-à-vis global trends and challenges. The PHERECLOS consortium is convinced and committed to the idea that collaborative structures across all sectors are demanded, including non-professional educators and the non-formal part, in order to make education more responsive and more targeted towards current and future challenges in our societies.

The PHERECLOS consortium is proud and happy if any of the outcomes of this joint endeavour can contribute to widen the horizon for Open Schooling.

1.2. WHY OPEN SCHOOLING – DIFFERENT PERSPECTIVES AND OPEN SCHOOLING IN PRACTICE

The following chapter discusses the topic of Open Schooling viewed from different perspectives including reflections on practice from PHERECLOS partners and other EU Open Schooling projects.

> *Parents wish their children to receive the best education possible, and often only see it provided by the school if they are external players in the formal education game. Similarly, parents have a lot to share, and they are happy to be engaged in a meaningful way with school. One great opportunity for this is when they can support the learning of children - their own or not their own only - in an open school that welcomes them as valued educators."* (Eszter Salamon, IPA)

> *Open Schooling is a form that adapts to current needs, changes faster and connects with real problems. Open Schooling promotes learning, children do not even notice when they absorb knowledge and new skills, without the need to consolidate, repeat and verify them."* (Ania Janicka, LEC Lodz)

> *I have learned how to work in a group, I am more courageous, I can perform in front of a larger audience, open schooling should be implemented!"* (Miłosz, 12 years old, LEC Lodz)

> *Open Schooling provides regional stakeholders a wide range of ways to work together to promote the well-being of the region. The approach depends on regional and cultural factors. In a rural area, a variety of digital services and tools facilitate the collaboration between partners. However, digital technology cannot fully replace in-person meetings. More dynamic interaction and less formal sharing of ideas helps participants deepen their collaboration."* (Niko Kyllönen, SNELLMAN)

Projects such as *Schools as Living Labs*, *Make it Open*, *OSHub*, *PHERECLOS*, *PULCHRA*, *CONNECT* and *MOST*, funded by the European Union's Horizon 2020 research and innovation program, work towards actively involving local communities in the teaching and learning process to help European schools becoming hotbeds of innovation and agents of community well-being. The seven projects promote the concept of Open Schooling: a concrete new way to approach science education programs by fostering collaboration between schools and local communities. Students, teachers, and their communities are invited to develop research and innovation projects to address relevant local challenges, contribute to community development, and promote an active global citizenship attitude.

Sharing the same goal, the seven projects developed common channels to raise awareness on the opportunities of open schooling and on the different methodologies to implement this concept.

In the following chapters, five of the Ecsite partner projects present their aims and objectives in view of Open Schooling and provide an overview of their project activities and practice.

Philip H. Smith from the Teacher-Scientist-Network in the UK - a PHERECLOS partner - will begin this chapter with a discourse of Open Schooling and Science Capital, a notion that PHERECLOS is built on.

1.2.1. Open Schooling and Science Capital

Philip H. Smith

Science Capital, a concept proposed by Louise Archer and colleagues in 2013 in the Aspires report (Archer *et al*, 2013) about young people's science and career aspirations, can be seen as a way of collecting and enhancing 'science-related' experiences and encounters. It is recognised as a significant influencer in the pursuit of science careers by young people. In essence, the more science capital a young person has, the more likely they are to aspire to study science in the future and with repeated calls for more people to enter the STEM professions, boosting young people's science capital (which they start to develop from a young age and continue to add to throughout their life) is a desirable end-goal for all involved in formal and non-formal educational settings.

Neil Carberry, CBI Director for employment and skills policy, speaking at the launch of the Royal Society's report (2016) *Making education your business: A practical guide to supporting STEM teaching in schools and colleges* in 2016 said "Many industries rely on a supply of science talent, at both graduate and technician level, but shortages are appearing that will hold our economy back." Reports of similar shortages are seen across Europe (EU Stem Coalition).

To help visualise her ideas, Archer (Archer et al., 2015) summarises these science experiences and encounters - a person's science capital - as a bag, or holdall, containing what they know, what they think, what they do, and who they know related to science and classified Science Capital into 3 levels – low, medium and high (with 27% of UK pupils in her study being described as having 'low' science capital). Students who do not see science as meaningful and relevant to them find it more difficult to engage with the subject, and in order to participate/engage they must feel that 'science is for them'

With all these ideas linked to science capital being potentially influenced by multiple interactions and applicable as much to school and non-school settings, the concept of Science Capital can be used to argue in favour of Open Schooling.

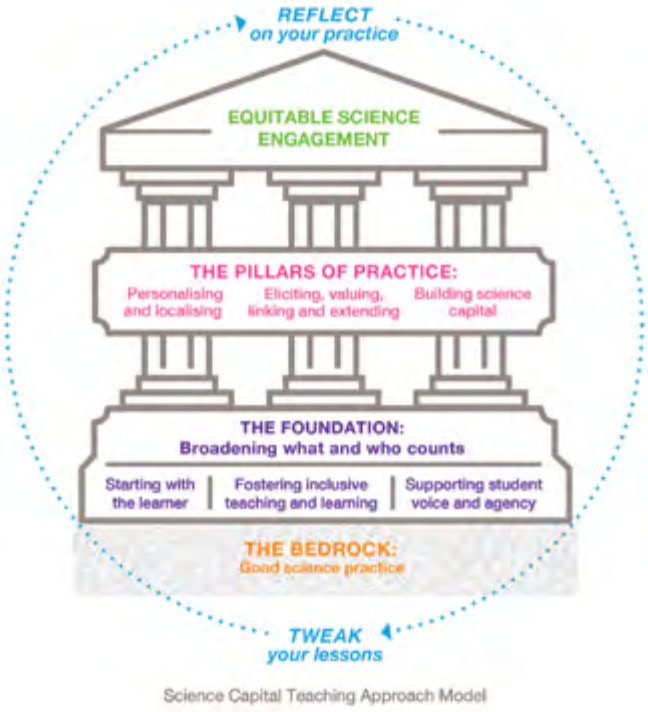
Indeed, Open Schooling can be used to boost a young person's Science Capital. With frequent encounters for pupils with researchers and employees, a focus on local issues and needs, activities that help conceptualise science, and a curriculum that is co-designed with members of the local community all being characteristic of the open schooling environment, it is easy to see how such measures can (when delivered in a planned and well thought out approach) enable young people to boost their science capital.

But rather than rely on chance or the risk of misinterpretation, Archer has developed (in tandem with educators and based upon statistical analyses of extensive survey data) the Science Capital Teaching Approach (SCTA) to help boost young people's science capital. Its implementation requires small, but significant, changes in the educator's mind set (as opposed to dramatic changes in curriculum or planning).

The SCTA is based around first laying the foundations to what Archer describes as '*Broadening what counts*' - this involves creating spaces where all students feel able to offer contributions from their own experiences, interests and identities, knowing that they will be valued.

With solid foundations, you can then seek to lay down the pillars of the SCTA. The first is *personalising and localising*. Helping students see that their interests, and attitudes and experiences at home and in the community relate to aspects of science. The second (*eliciting, valuing, linking*) uses questions to elicit students' knowledge that draws on personal, family and/or cultural experiences. Valuing refers to explicitly recognising and acknowledging the contributions to emphasise that such knowledge is relevant and worth sharing. Linking is about connecting students' contributions and experiences to the curriculum. The third and final pillar, *building the dimensions of science capital,* means considering eight dimensions when developing activities, programmes, interventions and other initiatives, whether in school or out-of-school contexts.

A full guide to the background and implementation of the SCTA can be downloaded via **www.ucl.ac.uk/ioe** with the steps that Archer outlines all as applicable to outside the classroom as in it. These are therefore valuable tools in the armoury of the informal educator who may be facilitating open schooling activities.



Science Capital Teaching Approach Model

photo credit: Primary Science Capital Project, www.ucl.ac.uk/ioe/PrimarySciCap

1.2.2. The CARE-KNOW-DO pedagogy with a multi-actor platform technology for students to CONNECT-SCIENCE.NET into their lives with Open Schooling.

Alexandra Okada, Georgios Kolionis and Eva Jaho, CONNECT PROJECT

> *Students miss the fun in learning and the relevance to their own lives. Let's bring science to life through open schooling".*
>
> *(CONNECT science teacher)*

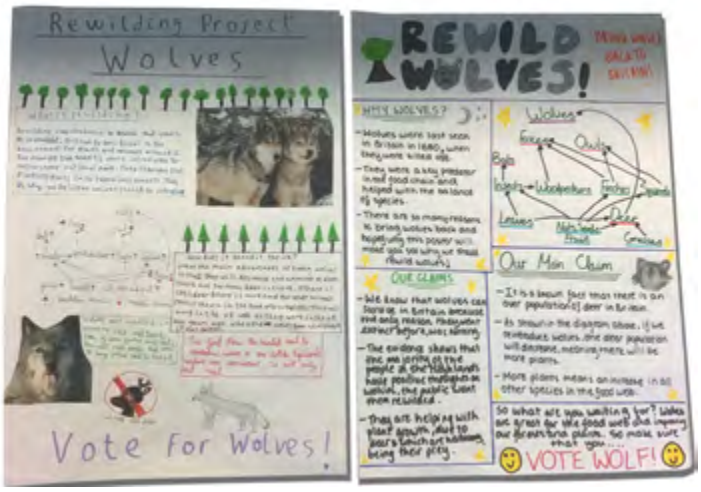
Open schooling is an important approach to make science learning more meaningful because it helps students identify the value of science in their lives and in society. This approach brings young people together with scientists and community members to solve real-life problems using science knowledge, skills, attitude and values. It prepares learners to become responsible citizens and innovative professionals, more aware of science careers. In other words, installing the conviction that "science is for them".

According to our recent research study (Okada et. al., 2021), students from disadvantaged groups have little 'science capital', especially those who do not feel confident to talk about science, use science knowledge to solve problems nor doing science projects outside schools. Our findings show

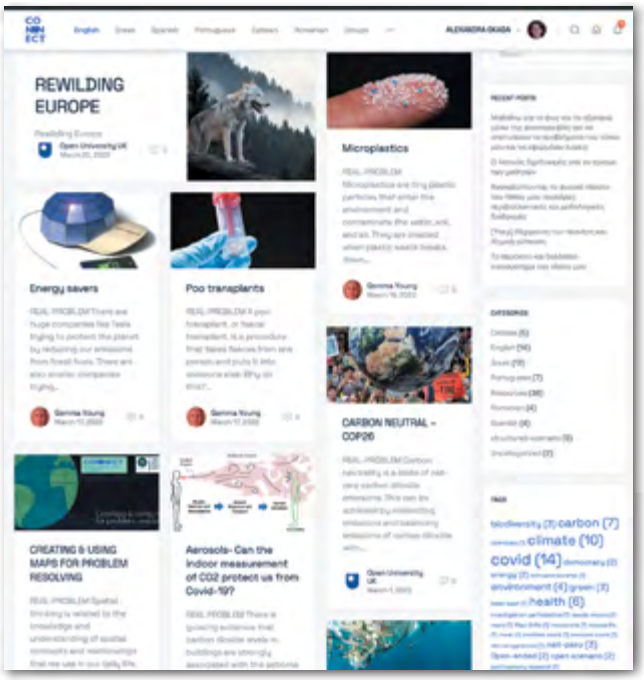
that the lack of confidence in science affects students to not wish to be seen themselves as future professionals in science.

The open schooling project CONNECT adds more opportunities into the curriculum for those students to have contact with scientists, talk science with their families, and make decisions using science. Our objective is to help teachers adopt open schooling in the core-curriculum through a multi-actor multi-language platform that enables the interaction between schools, universities, enterprises and communities.

CONNECT provides interesting add-ons to existing units that tick many curriculum boxes and are easy for teachers to use: real-world challenges, future-oriented support from a scientist, engaging family activities, inclusive strategies for teaching skills, fun tasks with open or structured scenarios, and competence-based assessment. To create a flexible and inclusive open schooling environment that inspires students to explore the world through science, CONNECT has three pillars. The first pillar is the CARE-KNOW-DO pedagogy that helps teachers engage students in discussing real-life problems that they 'care' about. It creates the need to 'know' about science in context. It also enables them to 'do' actions for exploring solutions assisted by others with feedback. The second pillar is the PARTICIPATORY SCIENCE resources to foster students' interest in science through engaging families, universities, and enterprises to be part of school-life activities. The third pillar is the SCIENCE-ACTIONS developed by students which encourage them to learn and use scientific knowledge, skills, and attitudes to benefit their lives and their community.



Rewilding Europe – participatory science resources and activities designed with the CARE-KNOW-DO pedagogy to support students' science-action



CONNECT multi-actor multi language platform
http://connect-science.net

1.2.3. Open Schooling: an exciting opportunity for igniting enthusiasm for STEM

Aileen Fahrländer and Katja Maaß, MOST PROJECT

The International Centre for STEM Education (ICSE) at the Freiburg University of Education is an internationally networked centre with the goal of reorienting STEM education in Europe. In our EU project MOST we focus on bringing schools and communities together in open schooling projects. When seeing the large variety of great, interesting open schooling projects, the enthusiasm of participating people, the pride when presenting their results across 10 countries, we realised that open schooling actually means an opening in many dimensions:

- **Personal opening:** In Open Schooling, schools work together with other actors (e.g. families, experts from companies, community members) on topics and problems relevant to society as a whole. Persons from specific spheres, which would normally not cooperate, learn to solve joint problems and get to know different perspectives and insight into different professions.
- **Opening content:** Sustainability and environmental issues have changed in recent years and decades and are increasingly influenced by areas such as globalisation, digitalization and the pandemic. These interlocking issues give rise to exciting interdisciplinary project ideas: *How much paper is saved through digital communication channels? How can waste heat from data centres be used to heat offices? How can electric cars be charged in the smart grid? What is the real benefit of using solid shampoo? Or how much does a coffee-to-go cup actually cost to produce?*

Mathematical modelling, chemical and physical processes in recycling or energy generation, the importance of biodiversity - these are all curriculum-relevant topics, but also socially relevant context. This context shows the relevance of STEM subjects and sparks enthusiasm for STEM.

- **Opening for scientific working:** Not simply "teaching" the solution to such challenges, but having participants inquiry on the solution by following scientific processes, like formulating questions, collecting data, evaluating data and communicating results. This not only gives participants insight into science, but also about science and thus enables them to understand publicly communicated scientific results, e.g. in relation to the pandemic, which empowers them to act as active citizens.

Altogether, open schooling is an existing opportunity for all involved to experience science as it is: related to reality, exciting and cooperative.

Photo credit: Edvin Johansson on unsplash

Information about ICSE and its projects at icse.eu

1.2.4. Enabling the Enablers – when students become knowledge MULTIPLIERS

Priscila Jordão, MULTIPLIERS PROJECT

The days of one-directional learning, with highly abstract concepts and stereotypical images of science are over! The MULTIPLIERS Horizon 2020 project **(www.multipliers-project.org)** is offering a new way to learn that makes science meaningful, appealing and directly relevant to everyday life.

From November 2021 to October 2024, MULTIPLIERS will establish novel Open Science Communities (OSCs) across six European countries, expanding opportunities for science learning in collaboration with schools, universities, informal education providers, museums, local associations, industry, civil society, policymakers and media.

Educational activities of enhanced authenticity will revolve around six highly relevant themes: air pollution, biodiversity and ecosystem services, vaccination, antimicrobial resistance, forest use vs. forest protection and clean water and sanitation. The goal is not simply to enhance science learning through engaging activities but to also achieve wider societal impact by turning approximately 1.500 pupils into knowledge multipliers.

As a first step, students from 6 to 18 years of age will be involved in the collection and critical evaluation of data by using real-life work tools and instruments in authentic settings, with the support of professionals of varying scientific disciplines. Newly acquired knowledge and reflections will help them make links between economic, ecological, and social perspectives, developing analytical and critical competencies to overcome the gap between school science and real-life challenges.

Secondly, students will present science projects to society at events and through media, becoming

photo credit: University of Bonn

ambassadors for science-based decision-making in their local communities. Acting as experts will enhance their feelings of self-efficacy and competence for science learning and help them gain support for sustainable attitudes in their families and communities. Dialogue between schools and communities will be fostered, as well as effective public communication and science learning for all.

photo credit: University of Bonn

Through the open educational interactions and enhancement of science education opportunities for a wider audience, the project will contribute to the development of important competencies, such as creativity, communication, collaboration, and problem-solving.

Some say it takes a village to raise a child. But one could add that it takes a community to raise a scientist. And little scientists transform a community for the better!

MULTIPLIERS is coordinated by the University of Bonn, with the University of Cyprus, the Autonomous University of Barcelona, the University of Umea, the University of Ljubljana, multi-utility company Iren, the international organisation European Forest Institute and consulting company EU CORE as partners.

To learn more, visit the project website and follow MULTIPLIERS on social media.

https://multipliers-project.org/

https://twitter.com/MULTIPLIERS_

https://www.instagram.com/multipliers_project/

1.2.5. Open Schooling and Public Health – "Healthy me, healthy us!"

Carolina Santos and PAFSE Team

In PAFSE project we believe that open schooling (OS) creates conditions for the co-creation of learning scenarios and STEM resources for better health and well-being at national, regional and local level. OS establishes a connection between schools, research institutions, start-ups, enterprises, civil society organisations and NGOs which, in the case of PAFSE, boosts readiness and concerted action on critical issues such as health emergencies and pandemics. The benefits for special groups and populations are provided through families and community engagement in school-based projects that influence the adoption of healthy lifestyles and create global awareness on the social and environmental determinants of health. Open schooling with the engagement of scientists, research centres, public health authorities, also influences students' consciousness on how much they know about many conditions (e.g: diabetes, cancer, obesity, zoonosis) and which knowledge they need to protect themselves and make evidence-based decisions regarding their health. By providing a structured script for the development of skills and competences, PAFSE also creates conditions for students and citizens can have a contribution for the community health.

PAFSE is a science education project that addresses the challenges of public health. PAFSE explores science education as a vehicle to provide citizens with the knowledge, tools and skills to make informed decisions on public health challenges. The project promotes community preparedness, by focusing on risk factors for the health condition of individuals, but also on the pre-emptive and protective behaviours from a personal and population perspective, contributing to more literate communities on healthy lifestyles, injury prevention, as well as detection, prevention, and response to infectious diseases.

PAFSE establishes partnerships between schools, universities, non-formal education providers, enterprises, and civil society organisations, and engages them in efforts to enrich Science, Technology, Engineering, Mathematics (STEM) education to include public health issues.

With a focus on building a strong interdisciplinary team, the project consortium integrates in the educational programme views from biologists, psychologists, environmental health specialists, mathematicians, engineers, project managers, science educators, public health professionals, policy makers and researchers.

For more information: **www. pafse.eu**

photo credit: PAFSE

PHERECLOS

Chapter 2

PHERECLOS IN ACTION

2.1. INSPIRING CASES

Silvia Prock and Karen Pesjak-Brownlee

2.1.1. Transferability of Inspiring Practices in Open Schooling

> *The first time I was asked for my opinion was at secondary school. A philosophy professor asked me about my opinion. I did not know that I had an opinion because I was raised not to say my opinion."*
>
> *(Andrea Eberhöfer)*

Over the years, Open Schooling has been promoted as an approach that creates an engaging environment for children's learning while strengthening links to local communities. Local expertise and experience incorporated into learning at school, making links to the real world offers ways to learn more meaningfully and leads to better motivation of learners, but also of teachers. Open Schooling brings the arts element into STEM learning in a natural way, and thus paves the way for higher levels of STE(A)M (Science, Technology, Engineering, Mathematics and Arts) competences.

> *Different strategies for different people: typically, kids that give best results in Open Schooling contexts are those that fail normal lessons: the wider the approach students can use, the more engaging it will be to more students who will become more confident and succeed."*
>
> *(Sissa Medialab)*

With this definition of Open Schooling in mind, one first step within the PHERECLOS consortium was to search, describe and to establish a repository of at least 60 best Open Schooling inspiring practices collected by all the partners from around the world, with the aim of exploring how these structures are best developed to boost young people's Science Capital and promote STEAM engagement. A total of 63 projects were collected, assessed and analysed, with a particular focus on their implementation within various settings and environments including political, social and economic contexts.

This collection of inspiring cases will serve as an **inspiration and a guideline for stakeholders that want to develop future Open Schooling projects/programmes**, for anyone interested in these topics such as teachers, school principals, decision makers, other stakeholders. Readers should be able to draw inspiration from those practices and find no obstacles that could prevent a successful implementation – no matter financial, material and human resources!

The collection can be viewed at **https://www.phereclos.eu/practices**.

This rich knowledge base of inspiring practices has already been used as an inspiration for PHERECLOS partners when establishing the six Local Education Clusters (LEC) and 10 Transnational Educational Mentoring Partnerships programmes (TEMPs).

2.1.2. Key Categories and Principles for successful Open Schooling Projects

Key criteria should facilitate *„to describe and implement at a scale a process that will facilitate the transformation of schools to innovative ecosystems, acting as shared sites of science learning for which leaders, teachers, students and the local community share responsibility, over which they share authority, and from which they all benefit through the increase of their communities' science capital and the development of responsible citizenship."* (OSOS – Open Schools for Open Societies, Open Schooling Model, 2017)

An in-depth analysis of all 63 collected inspiring cases helped to identify key categories and principles for successful Open Schooling projects and revealed communalities of impactful implementation within various settings and environments – including the political, social and economic contexts.

The selected inspiring practices were assessed against **15 key criteria** which were as follows:

Active Citizenship, Career Orientation, Children's Universities, Creative STEAM, Digital Technology, Entrepreneurship, Environment and Climate Change, Formal/Non-formal Education, Inclusion, Conditions for Learning, Methods, Training and Capacity Building, Stakeholder Engagement, and Geographical Scope.

In addition, Topicality, **Transferability**, National Distribution, Multidisciplinarity and Interdisciplinarity, as well as Creativity and Ingenuity of the projects was taken into account.

The selected cases show a great variety of activities, which fit well with the broad definition of Open Schooling as part of the PHERECLOS approach. Most of the activities have a STEM-focus, but some include strong connections with humanities and arts (STEAM). They cover a range from preschool to upper-secondary level and are broad in terms of scale: some initiatives are small activities with a rather local focus, but large scale, nationwide activities can also be found.

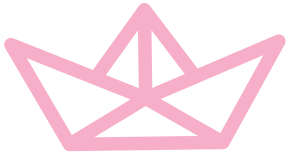
These inspiring practices stand out because they are strengthening active citizenship, are considering inclusion in education and seeing children as the most important stakeholders.

> *In 2019, a project to include teens in a citizen science project partly failed because the topic was chosen by the adults without including them into the decision process. Top-down decisions ended up in a lower level of participation and involvement."*
>
> *(Sissa Medialab)*

List of the 63 Inspiring Cases (arranged alphabetically):

Number	Name of Project	Country
1	Action day	Austria
2	Alianza por la Educación Rural para Antioquia -ERA-	Colombia
3	ATMOSPHERIC RISK PHENOMENA: CONCEPTS, MONITORING AND IMPACT	Romania
4	Brains at Work (B@W)	Italy
5	Children aren't fish and they have their voice	Poland
6	CIIMAR4society	Portugal
7	Cognitive Accessibility Programme	Israel
8	Concurso e Mostra Nacional de Jovens Empreendedores	Portugal
9	DA Open Company	Denmark
10	Designing and developing flexible and digital learning environments	Finland
11	Doing World Heritage – Understanding World Heritage	Austria
12	Dragonfly educational programme	Hungary
13	Dream Designers	Poland
14	E-FABRIK	France
15	EAFIT Children's University	Colombia
16	EDU-ARCTIC	Poland
17	EduCycle Exchange program	Finland
18	Escola On (School On)	Portugal
19	Ferias CT + I	Colombia
20	GOGYA Centre	Israel
21	HospiEdu	Hungary

22	INCAS pentru TINERI – INCAS for YOUNG PEOPLE	Romania
23	Inspiring Future	Portugal
24	It's my life	Austria
25	Karkhana (Karkhana Science Program, Karkhana Computing and Karkhana Make)	Nepal
26	Kide Science	Finland
27	Kinder-Sommer-Uni	Austria
28	KlimaZirkus	Denmark
29	Lab_13 Irchester	United Kingdom
30	Laboratório Aberto – Ipatimup / i3S	Portugal
31	Let's save the world!	Poland
32	Lodz Children University for Teachers	Poland
33	Meet a Researcher	Finland
34	Mostra Nacional de Ciência (Portuguese National Science Fair)	Portugal
35	No Bad Kid	Hungary
36	p[ART] – Partnerschaften zwischen Schulen und Kultureinrichtungen	Austria
37	PERCORSO DI POTENZIAMENTO-ORIENTAMENTO "SCIENZE DELLA TERRA CON CURVATURA GEOLOGICO-AMBIENTALE" (Geologically and Environmentally Focused Science High School)	Italy
38	„Porți deschise spre Geografie” – Open Gates to Geography	Romania
39	Rutka	Poland
40	SAPIE – Sistema de Alerta Precoce do Insucesso Escolar (School Failure Early Warning System)	Portugal
41	Sc!Fy – Science for You	Greece
42	School Activities	Austria
43	School of Dreams	Latvia
44	School as a Multifunctional Community Resource	Poland
45	Science4People	Palestine
46	Scifest	Finland
47	Ser Más Maestro	Colombia
48	SISSA FOR SCHOOLS	Italy
49	St. Colmcille's Primary School, Ballymena	United Kingdom
50	STEAM capacity building	Lithuania
51	StarT	Finland
52	Știința Altfel – Fun Science	Romania
53	Superpowers – planet of the insects (innovation and technology combined with natural science)	Denmark
54	The SMAC coding project	Italy
55	Tinkering Studio	USA
56	UniClub	Austria
57	Universidade Júnior – Junior University	Portugal
58	Universitatea Copiilor – UniCo – Children's University	Romania
59	University of Porto Fair (Mostra da Universidade do Porto)	Portugal
60	Volunteering Junior	Poland
61	X-Polli:Nation	Italy
62	Young Explorers' Club	Poland
63	ZAU Science Clubs	Finland


2.1.3. Inspiring Practices by key category

Active Citizenship

> *Open Schooling projects are an opportunity to break the fence around schools and to build up external relations for the benefit of all stakeholder groups."*
>
> *(IPA)*

Active citizenship means people getting involved in their local communities and democracy at all levels, from families to cities at a local, national and even global level. Key competences, like being able to collaborate, listen to the ideas of others, think critically, be creative and take initiative, solve problems and assess risks and take decisions and constructively manage emotions, are essential in the 21st century.

These competencies are clearly strengthened within the project "Children aren't fish and they have their voice" from Poland. It supports and strengthens the citizenship attitude of children and youths in terms of their engaged, courageous and innovative commemoration of the former Nazi concentration camp for children and youths in Lodz. The pupils cooperate with various entities of public life, from young politicians, through museums to NGOs and therefore improve their historical knowledge regarding children's martyrdom. It involves the integration of many generations around a socially important topic, developing many soft competences in both pupils and adults.

> *Communities get to know the needs of the citizens."*
>
> *(UIBK)*

History paints us a detailed picture of how society, technology, and government worked way back when so that we can better understand how it works now. It also helps us determine how to approach the future, as it allows us to learn from our past mistakes (and triumphs) as a society.

Career orientation

The introduction to professional opportunities at an early age is helping students to effectively define future jobs and careers. Thus, it is important to build students' general capabilities, support students' interests and aspirations, and help them to make informed decisions about their subject choices and pathways. This promotes engagement in education and a clear understanding of themselves and how they might live and work when they leave school.

The initiative **"DA Open Company"** from Denmark has the purpose of influencing choice of education and career and thereby enhancing the work force with Vocational Education and Training (VET) or higher STEM education. It can be difficult for companies and schools, no matter how close they are geographically, to understand how they can work together or use each other in the context of a local educational landscape.

> *For companies, the benefit can be direct income, preparing for meeting their own future labour needs, but also indirect by raising appreciation of the company in the community. It can also be a CSR goal for companies. "*
>
> *(IPA)*

The *Åben Virksomhed* courses contain central elements of the compulsory STEM curriculum within the Danish schooling system. For every course a teacher guide, a guide for companies, and student materials has been created. Over a website teachers can find, for free, companies all over the country, contact persons in the companies, and download all relevant course materials. This approach is enabling collaborations with private companies on a systemic level and on a national scale.

Children's University

Children's Universities (CU) aim to improve the aspirations and attainment of pupils by providing learning activities beyond the normal school day. They stand for communicating the idea of science and humanities as an instrument for them to develop their own educational future, to take part actively in a positive future of the society and the well-being of the world.

The inspiring practice **"Sissa for Schools"** from Italy is a program of visits offered by the International School for Advanced Studies. Annually the institution is opening its doors for pupils of all grades, no fees are required. A whole class, including the teacher, can be part of several interactive activities proposed from different research areas of SISSA, such as physics, mathematics and neuroscience. Volunteering PhD students and postdocs, but also senior researchers and technical staff are bringing the world of science closer to pupils. A science communication team supports volunteers in designing and leading the activities.

Creative STEAM (STEM + Arts)

STEAM is an educational approach to learning that uses Science, Technology, Engineering, the Arts and Mathematics as access points for guiding student inquiry, dialogue, and critical thinking. It promotes through creative process the engagement in experiential learning, the solving of problems and the embracement of collaboration.

> *Successful Open Schooling initiatives in STE(A)M education require a certain level of autonomy in formal education."*
>
> *(PHERECLOS Policy Brief #2)*

The ingenious project **"Lab_13 Irchester"** from the United Kingdom is a space dedicated entirely to investigation, innovation and creativity, external from curriculum pressures.

A group of children, the so-called 'management committee', is taking science onto the playground each lunch time and engaging others with fun tasks.

Pupils are able to ask their own questions and the scientist-in-residence guides them to find the answers. Activities are planned for community events such as parents' evenings, school fairs and coffee mornings for adults and children alike. No formal partners are needed for the implementation of this inspiring practice and therefore it is easily transferable.

Digital Technology

Nowadays for young people it is extremely important to learn through technology, as they can develop a set of skills that will help them throughout their future careers. Digital technology in education undoubtedly reaches more students efficiently across geographies and is able to break boundaries.

Educational possibilities are very restricted in many countries around the world particularly since the Covid-19 pandemic. Thus, digital technology has gained an importance that cannot be ignored. Unfortunately, in many countries there is not enough money to equip classrooms/students with digital devices and the internet. Affordable technology is therefore very valuable to reduce the expenses of schools.

> *In Columbia technology is a critical obstacle and the economic and human support. Our country is very diverse and we need to know all the cultures and territories to understand barriers."*
>
> *(EAFIT)*

The exemplary inspiring practice **"Karkhana"** is contributing to renovating the education system in Nepal, a very poor country, striving to improve education for a large portion of society including rural and mountain regions. Karkhana is an education company and makerspace that wants to empower people with the skills & attitudes that will help them build their future and the future of their community.

Karkhana programmes are launched at all levels of private schools as well as public schools. They create and run innovative workshops to teach Science,

Technology, Engineering, Arts and Mathematics (STEAM) to children through playful fabrication projects.

Science teachers in school are receiving a bag full of kit needed to run experiments for the whole year.

The teacher support system is providing teachers and students with a workbook, teachers also receive access to an online platform where they can watch instructional videos.

Entrepreneurship

Entrepreneurship aims to establish a bridge between the worlds of education and work as regards to entrepreneurship as a competence. Entrepreneurial skills, knowledge and attitudes can be learned with Open Schooling Projects in turn leading to the widespread development of entrepreneurial mind-sets and culture, which benefit individuals and society as a whole.

The **"Concurso e Mostra Nacional de Jovens Empreendedores - The National Competition for Young Entrepreneurs"** from Portugal aims to promote creative and social entrepreneurship, encouraging the development of innovative ideas and businesses, and supporting students in achieving social changes.

In addition, it offers a great opportunity for students to collaborate as a team, develop an entrepreneurial idea and introduce it to a range of leading juries in entrepreneurship.

This National Competition is serves as a vehicle for promoting entrepreneurship, seen as one more driving and catalytic mechanism for the creation of companies/own jobs as well as direct and/or indirect jobs, and inevitably contributing to the increase and renewal, namely of the local and regional economies and of the surrounding business fabric.

Environment and Climate Change

Raising awareness on environmental issues through education, especially when focused on children and young people, is more important than ever. It helps the next generation to understand and tackle the consequences of global warming. In the past years, various initiatives have been launched in respect of "Climate literacy ".

The inspiring practice **"XPolli:Nation"** is a citizen science project funded by National Geographic USA. The resources and work programme are designed for registered schools in the UK and Italy; however, everyone is welcome to get involved in the activities! The project is based on a participatory approach engaging teachers and students to create appropriate pollinator friendly habitats and improving green areas planting flowers and vegetables.

The aim is to create a community spreading words about conserving pollinators by using a specific communication campaign. The field of citizen science will be advanced by adapting and integrating existing web-based technologies for new audiences, species and countries, supporting a long-term vision of creating a global pollinator monitoring network.

Formal Education

Formal education is a structured and systematic form of learning. It's part of the Open Schooling ideology to support teachers and students to participate in the challenges of formal education.

"No Bad Kid" from Hungary is fostering the formal education system by concentrating on assisting children with behavioural problems. Those children are a horizontal group at risk of not graduating from the level of education that fits their general abilities. Teachers often find it difficult to work with them, and it is quite common that they only apply a symptomatic approach, without looking into the roots of disturbing behaviour.

Schools that have been part of the programme reported that teachers lack both theoretical and practical knowledge to cope with these challenges in the classroom on a daily basis. This initiative brings the knowledge and expertise of an NGO to the school that opens its doors for them, ready to not only cooperate, but also to disclose and discuss challenges. This training and mentoring program offers a solution by working with the children, their family and school staff.

> *For teachers and school heads the benefit is partly in being able to serve these needs properly, but also a learning journey, developing their skills and competences for their own life as well as professionally."*
>
> *(IPA)*

Non-formal Education

Non-formal education can be seen as an addition, alternative and/or a complement to formal education. It has generally more flexible structures, making them more suitable for innovative activities, answering immediate and diverse needs.

For example, the **"Tinkering Studio"** at the Exploratorium (http://www.exploratorium.edu) in California (United States) offers very inspiring activities. Many Universities, research institutes (e.g. "Interdisciplinary Centre of Marine and Environmental Research (CIIMAR)", **CIIMAR 4 society** from Portugal), but also national institutes (e.g. the "Aerospace Research establishment", "**INCAS pentru TINERI"** from România) are opening their doors for the curiosity of children and youths.

Non-formal education can also happen in the form of a fair, where young science talents can present their ideas/projects to a group of scientists and a wider audience (e.g. **"Portuguese National Science Fair"**). That can promote cooperation and exchange among young scientists and stimulate new young talents in the areas of science, technology, research and innovation.

The Finnish project **"StarT"** (StarT in English: Home) highlights the role of learning communities as collaborative learning environments. In the international StarT, learning communities get support, recognition and awards for carrying out interdisciplinary, collaborative project-based learning. Everyone can participate annually by reporting their work! This programme also includes StarT events, a virtual science club, and cooperation with StarT ambassadors, corporations and universities.

Inclusion

The implementation of inclusion in education is essential, as it improves the participation in society for people who are disadvantaged on the basis of age, sex, disability, race, ethnicity, origin, religion, or economic or other status, through enhanced opportunities, access to resources, voice and respect for rights. The goal, social inclusion, is only possible if no barriers exist for disabled students.

The project **"UniClub"** from Austria is a prime example for the implementation of inclusion for Open Schooling. It brings together students from the teaching profession, but also committed individuals from other study fields with young people with a history of flight or migration.

Teacher training students participate in the learning clubs on a weekly basis, support the young people with their homework and learn together with them. They become "study buddies" and work on specific topics / impart knowledge in individual one-to-one sessions with the young people. Workshops and excursions to research institutions are organized periodically and friendships may develop.

Conditions for learning (Environment, Strategies and Support)

Learning strategies and learning supports affect teachers and students equally and are a critical component of an effective learning environment. To support the general learning process, smart innovation, systems and technologies can help to reach this goal.

The **"Dragonfly education program"** from Hungary combines the advantages of a colourful magazine with the educational materials of a schoolbook. The programme includes teacher training, interactive workshops for children or parents and the magazine, which is for both children and adults. Each issue of the magazine deals with a new topic and that given topic is looked at from various aspects, using both artistic and scientific approaches.

Several issues of the magazine are discussing social inclusion with regard to refugees, socially and physically disadvantaged people, Romany communities and gender roles in Hungary. A growing series of audio materials are available for the visually impaired and for students who struggle with reading. These materials are all freely downloadable from the website.

Methods and Events

Ideally, an Open Schooling project should be based upon a clear concept and a well-founded method in order to describe and show the motivation and process behind the project as well as the overall educational goal. The organization of various events, such as workshops, exhibitions, open days or school fairs, supports the dissemination of results of a class activity or a school project, expresses its relevance and enhances communication and reflection skills.

The Romanian inspiring practice **"Atmospheric Risk Phenomena: Concepts, Monitoring and Impact"** enhances students' knowledge regarding atmospheric risk phenomena; by participating in seminars, practical activities, and educational tours for observing, monitoring, interpreting and measuring atmospheric phenomena.

Students produce their own films and present them to a wider audience. Through these films the students are able to show their creativity, newly gained knowledge and communication skills. Students were young people coming from different environments and schools, mainly from the National Traditional Education System but also from the Waldorf Alternative Education System.

Stakeholder Engagement

Open Schooling is the space where schools, in cooperation with other stakeholders, become an agent of community well-being. Families are encouraged to become real partners in school life and activities; professionals from enterprises, civil and wider society are actively involved in bringing real-life projects into the classroom.

> *School heads have become more involved and enthusiastic students and have teachers and a better relationship with the local partners."*
>
> *(EAFIT)*

The Latvian inspiring practice **"School as a Multifunctional Community Resource"** supports the development of sustainable partnerships among schools, local communities and the broader civil society in transforming schools into multi-functional community resource centres.

Schools planned and implemented different activities in addition to formal education and curricula both for students and adults (teachers, parents, other community members). Lifelong learning, active citizenship and building skills for civic participation have been promoted. Holistic, high-quality support has been given for young children and their families. Due to adult education programmes, vocational training, and motivation programmes entrepreneurship and increasing employability have been fostered. Schools have been supported in returning to their deeper function, being the centre for development and growth of the community.

Training and Capacity Building

> *We need support from governmental institutions and companies to create strategies that reach different contexts, we need better teacher training and involve students and parents in the process."* (Politechnika Lodzka)

In order to introduce Open Schooling activities in any school, autonomy and professional support (training, coaching, mentoring) of teachers and school leaders is needed.

The Columbian project **"Alianza por la educación rural para Antioquia-ERA"** is strengthening rural public education in Antioquia at all levels, coverage, quality and pertinence to contribute to social and economic development of the communities in their territories. It is a public/private partnership composed of different governmental and non-governmental organisations who have experience in education and in the promotion for development.

Due to the scattered population in rural areas, a new education model has been implemented, where the teachers cater and deliver content to different school grades. School heads, parent associations, the different mayors, teachers, students and alumni are involved in this inspiring practice. This project integrates active teaching pedagogies (Waldorf, Reggio Emilia & Montessori) into their teaching methods and content.

Inspiring practices concerning various didactical approaches

From a practical point of view the following projects pursue these aspects of access and didactics and are briefly described here:

The **XPolli:Nation-Project** for schools from Italy and the United Kingdom evaluates the impact on people, pollinators and practice and wants to improve an existing web-based technology. It creates exciting participatory learning experience and fit-for-purpose data, which gives tailored conservation action across the UK and Italy.

The **Lab_13 Irchester-Project** has set itself the goal, that scientists-in-residence help children conduct experiments safely and lend a hand where needed. Children are able to ask their own questions directly by posting a note on the Lab-Question-board, or they get the help to ask questions based on their class learning in lessons directly to the scientist.

The **Concurso e Mostra Nacional de Jovens Empreendedores-Project** from Portugal is a national competition which aims to promote creative and social entrepreneurship, encouraging the development of innovative ideas and business, and supporting students in achieving social changes. It also helps students to learn to work in a team-setting and to develop an entrepreneurial idea or project.

The Colombian project **Feritas CT + I** enables school students to get scientific and citizen skills. Exchange of scientific knowledge and the learning of scientific research strategies are the focus and students learn to solve problems through a research process. Six areas of knowledge are included (e.g., social science, environmental and sustainability), which enable an interdisciplinary access and address as many students as possible.

Lodz Children University for Teachers, a project from Poland, has set itself the task to increase the competences of teachers and to become experts who spread their knowledge to fellow teachers and their students. The teacher is selected by one of his/her students and takes part in 3-year learning sessions on life science with new media, learning problem-based education and using innovative teaching methods.

2.1.4. Conclusion

Open Schooling models in times of school closures due to the ongoing impact of COVID-19 could be just ambitious projects. Despite this situation the inspiring practices offered to the local communities by the PHERECLOS project represent a great variety of possibilities and a multifaceted opportunity for schools to reach their community. What makes these collected practices especially inspiring is that they are all easily transferable and adaptable to any context and scale.

Open Schooling initiatives, approaches and projects are often a means of inclusion, and support to overcome barriers to education that is best for an individual child. Having the best interest of the child, the learner in mind, schools, but also non-formal education providers and community educators, can team up in the most un-incentivising environment.

The successful implementation of the described inspiring cases underlines the fact that **Open Schooling is an approach that creates an engaging environment for children's learning while strengthening links to local communities.**

2.2. HOW TO IMPLEMENT AND SUSTAIN OPEN SCHOOLING PROJECTS

Monika Finsterwald and Marlene Kollmayer

2.2.1. What is Implementation? What is Implementation Science?

> *Implementation can be defined as "a specified set of activities designed to put into practice an activity or program of known dimensions".*
>
> *(Fixsen et al., 2005, p. 5)*

Implementation – from a scientific perspective – is supposed to be the (often) missing link between research and practice: The existence of an evidence-based practice* does not mean that it can and will be used in practice. We know from Implementation Science that evidence-based practices that are not actively implemented do not produce the expected benefits or get lost over time.

> *Implementation Science is "the systematic study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practices, and hence, to improve the quality and effectiveness" of human services."*
>
> *(Eccles & Mittman, 2006)*

According to Implementation Science three components always must be considered when implementing a project:

- The **practice** itself (esp., is there evidence that it makes sense to implement this program/project/strategy?)
- The specifics of the **system** (esp., what are the main characteristics of the system where the program should be implemented and which could be the facilitators and barriers for implementing that program?)
- The **people** involved (what are the needs and worries of the people involved?)

* Evidence-based practices are programs, interventions, therapies, guidelines, principles, practice standards, procedures, products, policies etc. that have been shown to be effective (e.g., to improve educational outcomes, behaviors, related environments) by systematic research studies.

2.2.2. Why is Implementation Science Important for Open Schooling Projects?

> *Open learning and open schooling are broad terms which describe learning which is 'open' in terms of timing, location, teaching roles, instructional methods, modes of access, and any other factors related to learning processes.*
>
> *(Halligan, n.d.)*

The term "open schooling" refers to the idea that schools must become flexible structures, open to society and able to make a difference in the world (Make it open, n.d.). Distal aims of open schooling are manifold (support 21st century skills, STEAM engagement, improve science capital etc.). Overall, open schooling is about creating a more differentiated education to support all children's learning, their well-being and community well-being.

There are already various (evaluated) practices in many countries that have adopted the open schooling (OS) approach: Schools have been "opened" to the surrounding community and are working with external learning environments. There is no hard evidence that OS works better than other learning approaches, but there is enough research that opening schools in the sense of problem-based learning improves learning outcomes. However, evaluated OS projects cannot be transferred 1:1 from one school or even one country to another, as they are context specific. Nevertheless, to maintain the basic ideas of these projects, they must be implemented as intended and properly adapted to new contexts. Therefore, the approach of Implementation Science can be helpful.

If you want to start OS projects in schools you should have in mind the above mentioned three core components that should be considered when implementing a project, namely *practice*, *system*, *people*. If you start an OS project that has already been implemented elsewhere and has shown very good effects, it is important in a first step to take a close look at these initiatives/programs (e.g., what are the core elements of these projects? To what extent could these core elements be implemented in schools?). In a further step, it is crucial to analyze the system in which the program should be implemented in more detail – ideally, the analysis should be carried out together with representatives of the different groups that will be involved in the implementation of the program.

To sum up: Successful implementation of educational innovations requires *evidence-based practices* and *systems* to be ready for implementation. Moreover, there must be a clear vision of the *aims* and *activities* planned in the implementation process as well as *clear responsibilities and communication structures* (Schober *et al.*, 2019). The three components mentioned above should be kept in mind not only during the selection and planning of the OS projects, but also during its implementation. Adaptations will be necessary, and evaluations can help to find the appropriate starting points. So called "Implementation teams" should be established who focus on implementation efforts. In addition, Implementation Science can contribute to ensuring sustainability of OS projects (Tommeraas and Ogden, 2017).

2.2.3. A Simple Formula for Successfully Implementation

The starting point of any implementation process is to formulate – at least a broad – **goal** (e.g., you want to promote STEAM engagement among school children). To achieve this goal, various existing **evidence-based practices** (or at least evidence-informed practices) might be available. Decisions are made about

what specific evidence-based practice to implement and what might be good strategies for doing so. In addition, it is important to consider **how the implementation context can be supported** so that the evidence-based practice can be implemented in the best possible way and tailored to the needs of the context without compromising the effectiveness of the program. This requires the use of monitoring tools that keep track of the implementation **fidelity** of the evidence-based practice (= degree to which an evidence-based practice is delivered as intended).

According to the National Implementation Research Network – NIRN (2022) the **formula for successfully implementation** involves (see Figure 1):

- defining *what* needs to be done,
- *how* to establish what needs to be done in practice and *who* will do the work to accomplish positive outcomes, and
- *where* the effective practice and effective implementation will thrive.

The multiplicative formula indicates that each element must be at least somewhat developed to achieve the expected outcome.

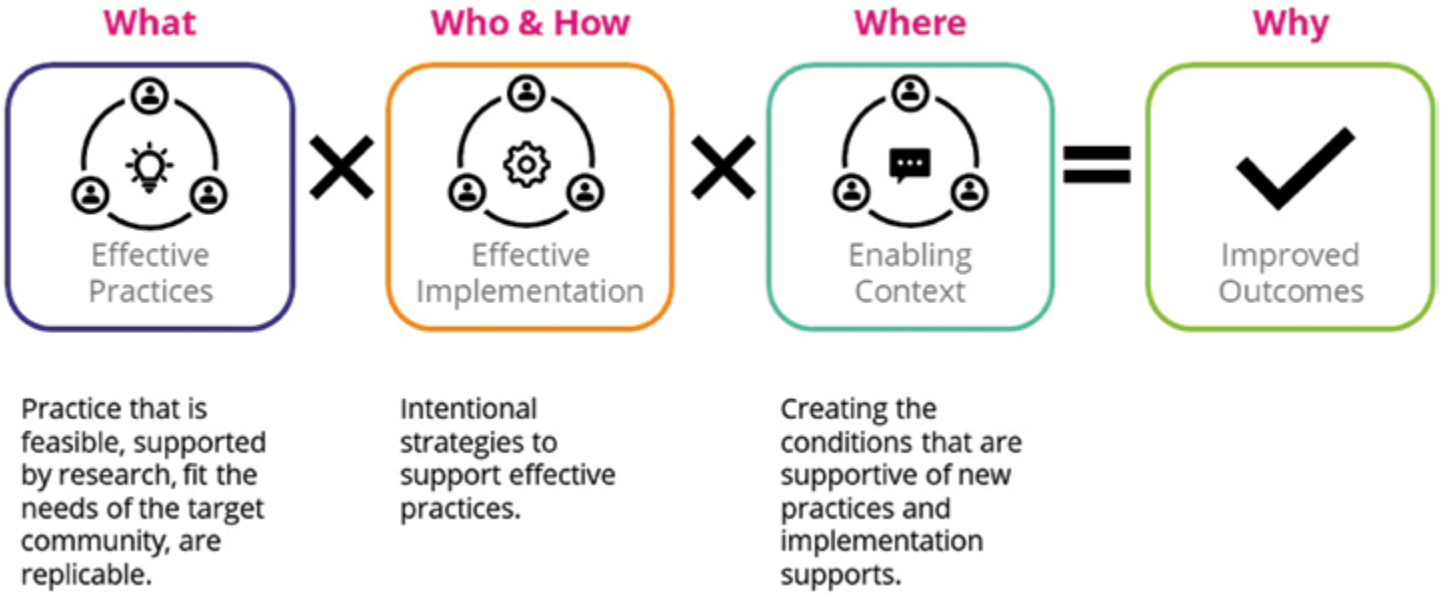


Figure 1. ***Active Implementation Formula*** **(Metz *et al.*, 2017a, p. 92)**

That means whenever a new practice is to be implemented in a new system/context, the following **questions must be answered**:

- What is my/our effective aim? Why do I/we want to implement something new?
- How can I/we reach this aim? Are there existing usable , evidence-based or at least evidence-informed practices? Which ones are the best for my purpose? Why?
- What could be a good implementation strategy? Who should be involved?
- How can the context be enabled?
- How can implementation fidelity be ensured?

After that, it is helpful to develop **plans:**

- A plan for **Effective Practice**: What is our effective plan for the new practice? Why do we need this practice?

- A plan for **Implementation**: Which strategies or methods are good for putting a new practice into place? Who should be in our implementation team?
- A plan for **Research**: How can we grasp that the implementation is going well enough? How can we check whether we are achieving our goal?

a) Effective Practice: "WHAT" should be implemented?

At first, one must decide WHAT should be implemented. This can be practices (interventions, programs, practice standards, etc.) or strategies which are supported by evidence, are feasible to implement, fit the needs of the context, and are well defined.

After having an effective specific idea about what the specific goal is to be achieved (e.g., encouraging your ninth-grade students to engage with science as a tool to contribute to the solution of local problems), the first step should be to conduct a search to find whether there are any evidence-based (or at least evaluated) practices that have the same or a similar goal. If you find such evidence-based practices, you must assess them and select one.

How to choose between different evidence-based practices?

Evidence-based practices that are ready to implement in other settings should be usable (learnable, doable) for the persons who implement this practice. Many evidence-based practices have been tested in different settings by the developers but are not described well enough to transfer them. Dean Fixsen and Karen Blase specified **four criteria for "usable evidence-based practices"** (Blase *et al.*, 2018; Active Implementation Research Network, 2022):

- First, there must be a **clear description** of the evidence-based practices regarding its philosophy, the values, and principles behind the practice as well as inclusion and exclusion criteria that define the population for which the practice is intended. This information helps potential users to decide whether the program fits the goals and needs of the target group.
- Second, clear **essential functions** or **core components** of the evidence-based practices that need to exist in any given context have to be defined. Information about essential functions also enables persons who want to implement the evidence-based practices to know which components *can* be adapted to suit local conditions.
- Third, the core components of an evidence-based practice must be described well enough and clear indicators that help to identify whether this core component is present during planning and implementing that evidence-based practice must be given. Such **"operational definitions of core components"** promote the consistency of implementation across classrooms, schools, districts and countries, and allow for replications and scaling-up.
- But how do implementers know that the evidence-based practice is really working, and goals are achieved? A **practical performance assessment** should provide evidence that the evidence-based practice is effective when used as intended. It should be practical and ideal, formative and include different perspectives. However, only 5% of evidence-based practices have a useful performance assessment available. In most cases, implementers must create an assessment themselves.

Most evidence-based practices do not meet all of these criteria – but scaling up for population benefits would require such usable evidence-based practices. If none of the found evidence-based (or at least evaluated) practices meet (at least most) of these usability criteria, check whether any of

the evidence-based practices would have the potential to be implemented anyway. For example, contact the program developers. Maybe they can give additional information or are even interested in participating in your project.

Case Study "Open Schooling Project on Peace"

An elementary school in Austria wanted to do an OS project on the topic of peace, as this topic is of current relevance for both the pupils and the teachers. The teachers first researched on the internet what programs and materials are available and who could be invited from outside the school or which institution could be visited that deals with the topic. The teachers decided that there should be a "Peace Day" in the school, to which a speaker from a regional peace education network will be invited. Subsequently, it is planned that each class will then vote together on how the topic could be pursued.

After that event, many pupils and teachers recognized that it is important to deal with each other peacefully on a daily basis and to resolve conflicts without violence. They noticed that in some classes there is no peaceful atmosphere, and that some children suffer from bullying. The school social worker remembered hearing about evidence-based programs for schools and a nation-wide initiative called "Weiße Feder" (engl.: White Feather)". She finds out that there is a regional network of the "Weiße Feder" and calls the contact person. Various opportunities for schools to deal with the topic were available. Since it has been scientifically proven to be most effective against bullying to have a "zero tolerance against violence" climate in the entire school, the schoolteachers and school head decided to implement the VISC program (Strohmeier *et al.*, 2012; VISC, 2018) that helps schools to achieve that goal: In a first step, teachers are familiarized with the topic of bullying in the context of a school-internal training course and they develop for the whole school appropriate strategies how to deal with bullying. Furthermore, the teachers get to know the contents and materials of the so-called "VISC classroom project", which should take place in each classroom over a couple of weeks (8-13 weeks, 2 hours a week).

The VISC program is an evidence-based program that proved to be effective against bullying in many different schools and countries (e.g., Austria, Turkey, Cypres, Rumania). The school decided to take this program because of several reasons: A clear need was identified (from pupils, teachers, parents), teachers and school receive support by VISC trainers (trained by the program developers) and there is a well-written manual about the program, so that teachers who could not attend the training can read and implement the program as well – supervised by teachers who received the training. A further argument was that also other schools in the region decided to implement that program and a shared approach on how to deal with that topic in schools in general was recommended by the state school board. Schools who implement that program get a certificate from the "Weiße Feder".

When does it make sense to implement an evidence-based practice in a different context?

Implementing effective practices with a good base of evidence is not enough. Research shows that one must ensure a good fit with needs of the target group(s), a good quality of implementation and care for sustainability from the beginning on (see Metz *et al.*, 2017a). Furthermore, the evidence-based practices must be well-aligned with the organization, community, and system – the local implementation context. If there is a mismatch between the local implementation context and the chosen evidence-based practice, the likelihood that the evidence-based practice will not be implemented with quality, will not achieve the desired outcomes, and will not sustain is very high (Fixsen *et al.*, 2010).

A tool that can help you in gathering profound information according to the fit between the evidence-based practice and the context is the **Hexagon Tool** (Blase *et al.*, 2013). It is widely used by communities and organizations to understand how a new or existing program or practice fits into existing work context at an implementing site. It can be used at any phase of an implementation to assess fit and feasibility, but is most commonly used during the exploration phase, when an implementing site is identifying and selecting new practices. The **Hexagon Tool** helps in assessing innovation and system indicators, which are seen as prerequisites for successful implementation.

Indicators of the **Innovation/Practice**:

- How about the **usability of effective** practice?
- Is there **support** to implement the practice fully and effectively?
- What is the strength of the **evidence** of this practice?

Indicators of the **System**, in which the effective practice should be implemented:

- What are the **needs** of your target populations?
- Which practices are a good **fit** for your community?
- What **capacity** exists to support the new way of working?

If one or even more of these factors are not sufficiently highlighted , the implementation makes little sense, unless there are realistic possibilities to create better conditions during the preparation phase.

A detailed description of the relevant innovation and system indicators can be found in Figure 2. This figure can be used as a basis for discussion. Ideally, the reflection about the fit between the local implementation context and the chosen practice as well as the connected decision-making process should be done together with representatives of the groups who will be involved in the implementation process.

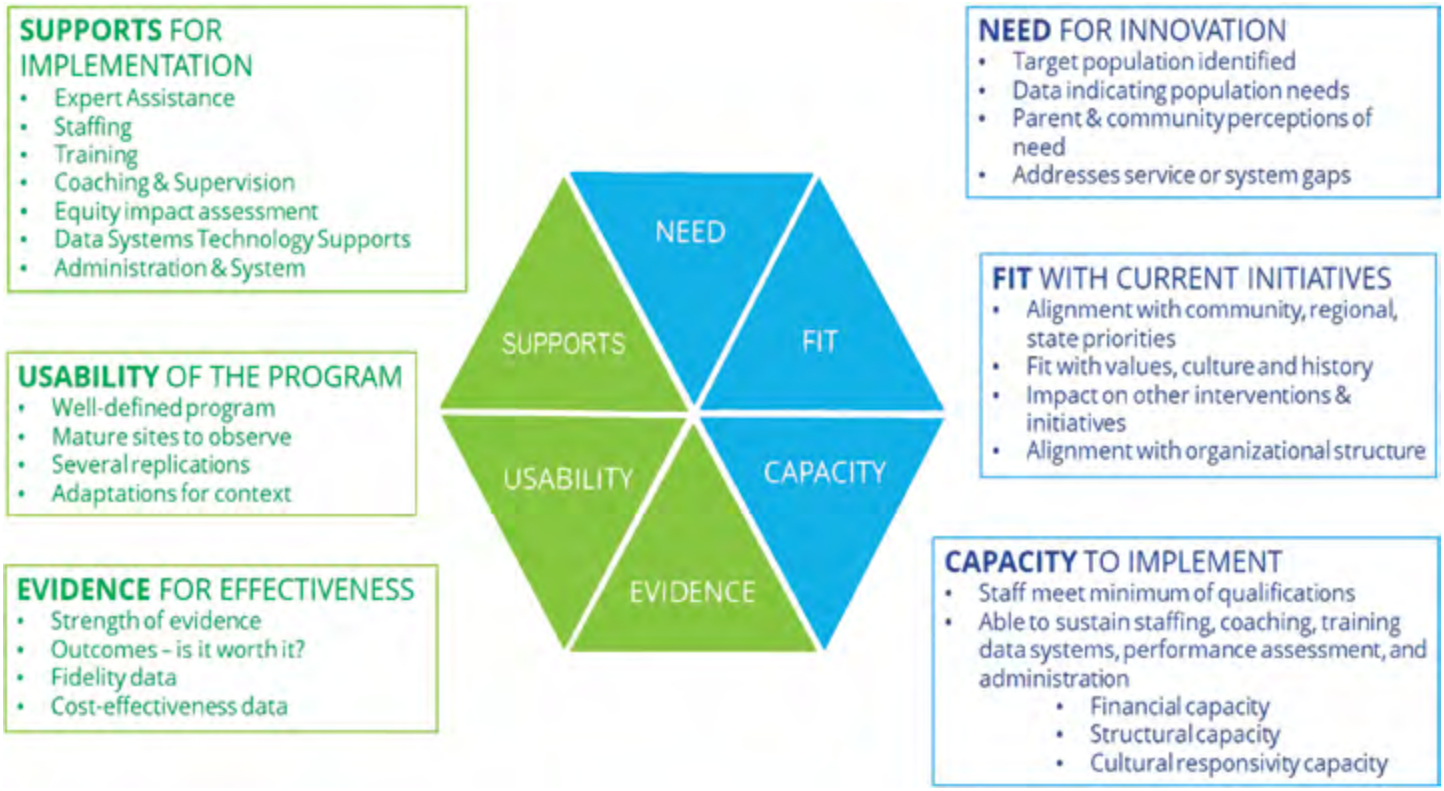


Figure 2. ***The Hexagon Tool (Metz and Louison, 2018).***

These groups include implementers (e.g., the museum, the companies that should be involved in the OS project), supporters (e.g., school head) and "users" of the evidence-based practice (e.g., pupils, student teachers). The questions of the interview guide could be sent in advance as a basis for discussion. By including the diverse perspectives of multiple stakeholders already in this preparation phase, the implementation has a better chance for a good start; commitment can be generated, or resistance/barriers become visible, and can be readily addressed. Nevertheless, it can also be a good decision not to implement the program. The decision-making process itself should be deliberative, and consensus based.

b) Effective Implementation: Planning and Strategies

To support high-quality implementation, it is helpful to create an implementation plan in the very beginning and think about Implementation Strategies. It is very likely that both the implementation plan and the strategies will be adapted over the implementation process. Nevertheless, it makes sense to think about this in detail at the beginning – especially, to make sustainable implementation more likely.

What is an Implementation Plan? Why is it important to have one?

An implementation plan includes goals, target groups, and stakeholders as well as a description of the planned evidence-based practice and its context. Furthermore, it contains considerations how the goals can be achieved. It has the function of a step-by-step guide to making changes in practice – it should be realistic, feasible, concrete. Ideally, it is developed with all stakeholders and updated as needed. Initial considerations for implementation strategies and evaluation approaches should already be included as well. An implementation plan should not be mistaken as a plan for the evidence-based practice itself. Thus, the focus of the implementation plan is not on the activities of the practice (e.g., conducting a training session to promote social skills), but the focus is on what is needed so that the practice can be implemented at all (e.g., for making teachers feel addressed by this training meaningful information materials must be created). To develop a good implementation plan, it is necessary to answer some important questions (see Table 1).

Table 1. ***Questions and steps for creating an implementation plan***

What do we want to achieve? Who is important for this? Whom do we need?
Step 1. Determine goals and target groups What is our aim, what do we want to change? To whom is the change relevant? What should our target groups know/think/do afterwards?
What are the main characteristics of the target groups?
Step 2. Analyze target groups It is important to get a good picture of the characteristics and situation of the different target groups. What interest does the target group have? What does the target group know about the evidence-based practice? What does the target group think of the change? What motivations are involved? A stakeholder analysis might be helpful.
What are the main characteristics of the evidence-based practice that should be implemented?
Step 3. Screen the evidence-based practice What are the main components of this evidence-based practice, what activities are associated with it? What staff is required? Look at the practice critically. Consider in advance its strengths and weaknesses. This may epending on the target group. The Hexagon Tool mentioned above may be helpful to answer this question.

What are the characteristics of the context?

Step 4. Analyze the context

The context influences the implementation of the evidence-based practice and thus, the possible change. Determine the opportunities and risks in advance. Use them to your advantage, or get an idea know how to prevent or mitigate them.

Determine as concrete as possible what factors in the context will influence implementation. There may be circumstances that inhibit or facilitate/accelerate implementation. Pay attention to the social contexts and the relationships between individuals involved. Consider the "logic" of the organization(s) in which you plan to implement the innovation. How do the decision-making processes work in this organization(s)? What leadership style is predominant? Also, consider the economic and financial factors.

How to implement evidence-based practice? Which implementation strategies can be helpful?

Step 5. Choose suitable implementation strategies and activities

Choose strategies

To choose the right strategies, you need the information from the previous steps. What is required for the evidence-based practice itself but also for a successful implementation? What are possible barriers? Are there any facilitators?

Choose the right activities

You should now know which strategy you use per target audience. For each strategy there are numerous possibilities and activities this can look like (e.g., to inform about the evidence-based practice one can use mass media, organize an information event, and distribute flyers). For each target group, state what activities and resources you will use. Be specific in naming them.

Know time, tasks, and costs

For each activity, determine when it will be done. Also consider who will make sure it happens. This is also a good time to check the feasibility of your plans. For example, check to see if the costs match the available budget. Check also whether the plans are feasible in terms of time. Adjust your plans if necessary.

How to reach the target group(s)? How to enable the context?

Step 6. Communicate and consider the context

Summarize the results of your analysis in a few meaningful sentences – the core message. Do this for each target group. The message tells what you want to achieve, with whom and in what way. Writing down such a core message forces you to clearly articulate your plans. At the same time, consider how you can best convey this message. What messages and words might help to attract the target audience?

How to determine goal achievement?

Step 7. Evaluate

To measure your outcomes and achieve your goals, you must evaluate, both in the interim and in the end. This will help you determine if the implementation is successful or if further adjustments are needed.

This table is based on a "step-by-step plan" provided by ZonMW (2020)

What are Implementation Strategies?

After you have decided what should be implemented, you must think about how it should be implemented. You need an **intentional and visible infrastructure** to support the implementation of the effective practice. During the planning phase, consideration must be given to what needs to be done and who will do the work to accomplish the expected positive outcomes.

Implementation strategies are "Methods or techniques used to enhance the adoption, implementation, and sustainability" of evidence-based practices (Powell *et al.*, 2015). They can target individual determinants (like knowledge), interpersonal determinants (like networks and communication), determinants of the involved organization (like implementation climate) or determinants outside the organization (like external policies, peer pressure) (University of Washington, 2022).

Case Study

Let's come back to our case study: The elementary school that set the goal of achieving a peaceful atmosphere in the school and decided to use the evidence-based VISC program for this purpose.

The overall implementation strategy of the program is primarily based on educational strategies – i.e., on the one hand teachers participate in training and receive supervision, but on the other hand pupils are provided with knowledge on the subject. In addition, information about the program should be provided to parents via information letters.

Our elementary school aims at implementing the program sustainably in their school. Therefore, the school principal, the social workers and a teacher take the time to think about which of their projects have managed to remain sustainable and which have not and why. They conclude that it has always been a helpful strategy to have spokespersons for a project who have been involved in the planning from the beginning, or who have known about the project and have advocated for it. Therefore, they plan to create an implementation team with key persons involved (parent representatives, pupils' representatives). Furthermore, they want to contact important stakeholders from the community and gain their support for the project.

They also discussed about networking with the other elementary schools that used, have used, or will use this program or work on the topic "Peace" as an OS project, because they noticed that an exchange across schools was also often helpful for sustainable implementations. But the effort seems too high for them in this case, so they discard this strategy at this point.

What is important to consider when determining an Implementation Strategy?

When developing an implementation strategy, there are different possibilities: You can focus on a single strategy (e.g., information campaign, training, organize dialogues to aid consensus)? or tie up a bundle of strategies to address multiple implementation barriers (e.g., provide educational material and provide training to improve knowledge and skills)? Or you can use mixed strategies (e.g., provide training for knowledge acquisition on the individual level and engage opinion leaders within the organization to foster organizational determinants)?

To develop a comprehensive implementation strategy, the implementation team should

1) select implementation strategies that address best the context and setting – especially regarding barriers to implementation and/or facilitators to implementation.
2) engage stakeholders in selection and tailoring of implementation strategies.
3) select implementation strategies based on ratings of importance and feasibility. (e.g., Most important strategy "Identify barriers and facilitators"; Least important strategy "get support from politics"; Most feasible strategy "Developing educational materials"; Least feasible strategy "get support from politics".) (King's Improvement Science, 2018, p. 26)

It's important to keep in mind that an implementation strategy should never be viewed as fixed; the implementation team should constantly discuss the effectiveness of each implementation strategy and whether modifications could enhance the implementation success.

c) Enabling Contexts: Establishing and Sustaining Implementation Teams

Besides considering how to best implement an evidence-based practice, it is important to create conditions that are supportive of new practices. Above all good collaboration is needed for successfully implementing innovations. This is best achieved through team structures, communication and feedback loops, and the ongoing collection of data that shows whether implementation is successful, or adaptations are needed. Successful implementation requires organized "expert" support, which is gathered in an implementation team. Implementation Science has identified implementation teams as a key factor for facilitating the intended change.

What is an Implementation Team? Why is it important?

> *An implementation team is a group of stakeholders that oversees, attends to, and is accountable for facilitating key activities in selection, implementation, and continuous improvement of an intervention."*
>
> *(Metz et al, 2020)*

They are a group with a common goal, high interdependence, and autonomy. Ideally, an implementation team should consist of individuals who have expertise in the evidence-based practice itself, represent all groups affected by the practice, and have knowledge about implementing innovations and organizational change processes. They should work simultaneously at multiple levels of the involved systems to assure that the evidence-based practice is implemented as intended and to good effect. They do not have to do the whole work (selecting, implementing, etc.) all for themselves but facilitate the completion of such activities (e.g., identify qualified trainers, tell quality managers which data they need and ask for analyzing them). Implementation Teams are different to Advisory Boards or Technical Working Groups who are involved from time to time and for a limited time span : Implementation Teams are active facilitators for the implementation and are involved throughout the whole implementation process. Their members are taking over specific responsibilities for ensuring the success of the evidence-based practice.

> *Without teams, an implementation effort ends up relying on individual leaders who, without a team, are unable to influence multiple stakeholders. This "solo hero" model of implementation has been demonstrated to fall short on key issues related to successful implementation such as stakeholder buy-in, integration and alignment of the new practice within the system, and sustainability to achieve population outcomes."*
>
> *(Metz et al., 2017a, p. 35)*

What does an Implementation Team take care of?

The Implementation Team's main tasks are to (1) select, adapt and tailor the evidence-based practice, and support the implementation through (2) improvement cycles, through (3) developing a good infrastructure for the evidence-based practice and through (4) taking care about the different systems that are involved, see Figure 3.

A lot of investment must be made in creating readiness for the implementation (e.g., by preparing the participating organizations, preparing the staff, providing supervision structures). Experiences from Implementation Science shows that about 80% of the work is needed for *Creating Readiness* and about 20% for *Assuring the Implementation* (see Fixsen *et al.*, 2019).

Figure 3. *Tasks of Implementation Teams* (Metz *et al.*, 2017a, p. 40–41)

Therefore, an Implementation Team should periodically address the following questions (see Metz *et al.*, 2017):

- Are the participants of the evidence-based practice (still) engaged?
- Is the practice defined well enough? Are guiding documents available / well-written and accessible enough?
- Is there (still) a good fit of the evidence-based practice with the context and setting?
- Are implementation supports in place and do they work?
- Which data do we need for decision making and for continuous quality improvement? Do we have this data?
- Is fidelity of the implementation measured and does fidelity improve?
- Is the achievement of outcomes a good way?
- Is sustainability ensured?
- Does our communication and cooperation work well (enough)? Is everyone still on board?

How should the Implementation Team look like?

Allison Metz summarized important aspects of implementation teams, namely about the size and composition of implementation teams, about terms of references and leadership of these teams, as well as about which teams are suitable for complex implementations (Metz *et al.*, 2017b; Metz and Bartley, 2020).

Size and Composition: Implementation Teams should "be as small as possible, given the work to be accomplished" (Wageman *et al.*, 2005, p. 4) – typically these are 6-10 people, whereas a minimum of 3 persons is recommended. But – as they work together for a longer time – there must be a tolerable turnover meaning that teams can work even when players come and go. Implementation Teams should include key staff from all organizational levels (e.g., program administrators and practitioners, supervisors, persons from administrative leadership) and key stakeholders who offer diverse perspectives on what is needed to create the best conditions for implementing innovations into systems and organizations. The advantage of diverse teams is that the skills and knowledge of the members can complement each other to create a good implementation plan, better anticipate barriers, and achieve good diagnostics and solution finding when problems arise.

Case Study

As mentioned before, the VISC program has been implemented in many different schools and countries. In our case, the implementation took place in only one school. The implementation team consisted of the principal of the school, the secretary, the school social worker, a class teacher as well as – from time to time – a representative from the parents' union and a class representative.

Terms of Reference: After the team has been formed, it is helpful to create guidelines that include the purpose and goals of the team, the scope and tasks of the team, roles and responsibilities as well as the communication and decision-making structure. It has proven useful to create a document in which all terms of reference are recorded. Without this, collaboration may quickly get derailed.

Leadership: Leadership is also important to talk about right at the beginning. On the one hand, implementation teams need the support of organizational leadership: Change processes need resources or intervene in the allocation of resources, and this is not feasible without support from management. On the other hand, the team itself needs leadership. This is not about appointing a single leader but establishing co-leadership.

Linked Teams: If the evidence-based practice is very complex one may need several implementation teams. These teams may address different levels (e.g., state, regions, school-level) or different aspects of the implementation (e.g., training of practitioners, doing assessments / evaluations). But they should be linked in some way – e.g., if you have implementation teams for different aspects at least one person of each level (state, region, school-level) should be represented in each of this team. In any case, for complex evidence-based practices, there should be a core implementation team responsible for the day-to-day implementation (consisting of a limited number of people to be agile and productive).

How to ensure effective team processes?

Teams need to work together effectively to best achieve their goals. To make this possible, four central processes need to be addressed: Meetings, Communication, Data Reflection, and Member Engagement (Metz and Bartley, 2020).

1) Meeting Processes

Implementation teams should have regular meeting times and collaboratively develop the basic procedures for these meetings. The meetings should make it possible to use the time effectively to also achieve the planned goals.

2) Communication process

One of the implementation team's main tasks is to keep communicating about what works, what doesn't work, and how they know that. Vertical and horizontal feedback loops are important to get a broad information base about the success of the implementation, see Figure 4.

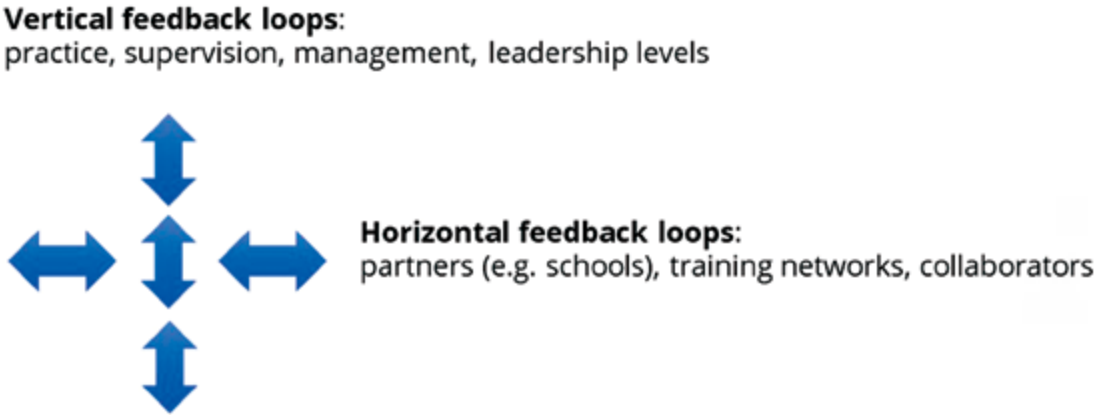


Figure 4. ***Vertical and horizontal feedback loops***

There should also be clear guidelines on (1) which stakeholders to communicate with, (2) when to communicate with whom and (3) about what, as well as (4) how to communicate. If there are Linked Teams, a communication process must also be determined for them. Bidirectional communication should also be supported: Partners and stakeholders should be encouraged to share feedback that has been brought to them with the implementation team.

In sum, when developing a communication process for your implementation team you should address the following questions (Metz *et al.*, 2017a, p. 39):

- WHO should be communicating?
- About WHAT should we communicate?
- HOW OFTEN should we communicate?

3) Data Reflection Processes

The core task of the implementation team is to make data-based decisions and initiate continuous data-driven improvement processes. Shared learning should be a core value of any implementation setting. Therefore, an Implementation Team should be clear about which data they need for decision-making (e.g., tailoring/ adapting a program; reallocating resources), for feedback and for improving the implementation.

Usually, you need data that is relevant to the administration (e.g., enrollment, costs, staff), data about whether the evidence-based practice is implemented as intended (e.g., are structural aspects of the implementation in place, is compliance given) and data regarding the outcome that should be achieved (e.g., increased knowledge, improved skills). It is important to think about possible sources of data to use for answering the specific implementation question you have.

4) Member Engagement Processes

Research indicates that team members are more likely to participate when they can actively engage, learn, and develop themselves. This is particularly achievable when co-leadership, peer-to-peer coaching, task-related learning (Higgins *et al.*, 2009) and possibilities for co-creation are facilitated.

Case Study

Meeting and Communication Process: In our case study, it was determined that the implementation team would meet twice for planning the project (Meeting 1: Constituting the team and initial discussion of the implementation plan, Meeting 2: Finalizing the implementation plan). For the implementation of the project three meetings were planned (Meeting 1: Experiences and consequences from the introductory workshops for the whole school; Meeting 2: Experiences and consequences from the VISC training for the teachers; Meeting 3: First experiences and consequences from the implementation in the classes). At the end, a reflection meeting was planned. It was also decided to inform the mayor and the local media at the beginning of the project and to have a closing event at the end where they will be invited.

Date Reflection Process and Member Engagement Process: For the data-based discussion, it was agreed that each person involved will systematically gather impressions about facilitators and barriers from the perspective they represent (e.g., teacher perspective). These impressions may be gathered by interviewing others (e.g., in the teaching staff) or through observations (e.g., from classroom observations). Meetings were scheduled for 90 minutes each to allow sufficient time for in-depth discussions. In addition, the implementation team jointly planned the final event.

d) Caring about Outcomes

During implementations, it is important to always keep the desired outcomes in mind. These outcomes can be related to the goals of the **evidence-based practice** concerning the users (e.g., increased social competencies of the students) or concerning the organizations involved (e.g., increased student-centeredness, more visibility) or to the **implementation** itself. Meta-analytic research shows that the level of implementation affects the outcomes obtained in promotion and prevention programs (Durlak and DuPre, 2008). Thus, if the expected outcomes of the evidence-based practice are not achieved, it is helpful to determine whether the failure is due to the practice (intervention) being ineffective, or due to implementation issues.

The focus of implementation science and intervention research is very different as they address different research questions. While intervention research mainly focuses on the question if and why interventions are successful, classic research questions from implementation science include (University of Washington, 2022):

- What are the most effective approaches to disseminate evidence-based practices?
- What approaches are most effective for incorporating new knowledge and evidence-based practices into organizations?
- How do contextual factors influence the success or failure of implementation? How can these contextual factors be changed to increase the likelihood of successful implementation?
- What are the most effective approaches to removing practices that are no longer effective or were never effective?

What to measure: Implementation or Intervention Outcomes?

If there is already good evidence for the effectiveness of the evidence-based practice, the focus of the data collection can be on implementation outcomes. However, the outcomes of the evidence-based

practice (intervention) should also be measured, albeit to a lesser extent. If there is little evidence on the effectiveness of the intervention in different contexts, the focus should be on examining the effectiveness and efficiency of the intervention, but one should also keep an eye on implementation outcomes. In any case, the implementation team should determine which outcomes to measure and how best to measure them. In the best case, stakeholders should also take part in this decision as the involvement of stakeholders has an impact on the adoption, implementation, and sustainability of evidence-based practices (King's Improvement Science, 2018, p. 33).

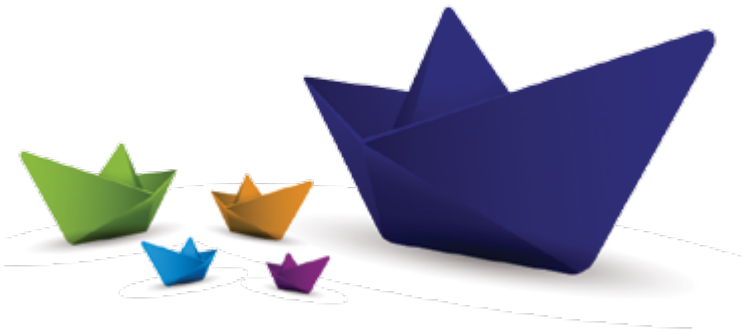
What are possible Implementation Outcomes?

In the literature, eight conceptually distinct but interrelated implementation outcomes have been proposed (see Table 2; Proctor *et al.*, 2011).

Table 2. ***Implementation Outcomes***

Implementation outcome and definition	Commonly used terms
Acceptability: perception among implementation stakeholders that a given evidence-based practice etc. is agreeable/ satisfactory	Satisfaction with various aspects of the innovation (e.g., content, complexity, delivery, credibility)
Adoption: intention, initial decision, or action to try or employ an innovation	Uptake; utilization; initial implementation; intention to try
Appropriateness: perceived fit, relevance, or compatibility of the innovation for a given setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem	Perceived fit; relevance; compatibility; suitability; usefulness; practicability
Cost (incremental or implementation cost): cost impact of an implementation effort	Marginal cost; cost-effectiveness; cost-benefit
Feasibility: extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting	Actual fit or utility; suitability for everyday use; practicability
Fidelity: degree to which an evidence-based practice is implemented as originally intended by the program developers	Delivered as intended; adherence; integrity; quality of program delivery
Penetration: integration of an innovation within a setting and its subsystems.	Level of institutionalization; Spread; Service access
Sustainability: extent to which a newly implemented evidence-based practice is maintained or institutionalized within a setting's ongoing, stable operations.	Maintenance; continuation; durability; incorporation; integration; institutionalization; sustained use; routinization

Based on Proctor *et al.*, 2011; see also ImpRes-Tool (King's Improvement Science, 2018, p. 31)



Case Study

In order to achieve the best possible implementation of the program, it was decided to continuously capture the acceptance of the program among both the primary target group (pupils and teachers) and the secondary target group (parents). The acceptance of the program was assessed using feedback questionnaires. In addition, at the end of the program, the perceived fit of the program to the school as well as the actual relevance of the topic should be determined in a group discussion. It was also important to the implementation team to obtain data on the extent to which the program leads to less bullying and more cohesion. The school social worker pointed out that often shortly after implementation of violence prevention programs – because of the raised awareness – more bullying cases are observed or reported and only after a period the cases actually decrease. Therefore, suitable indicators must be found that prove the success of the program in the short term (e.g., that the pupils know better how to deal with aggressive behavior of others).

How to conduct an evaluation?

It's not only important to have a plan for implementation, but also one for capturing outcomes. In some cases, there are enough resources available to do a sound scientific research study. But most of the time, there is a lack of money for this. Nevertheless, efforts should be made to capture, analyse, interpret, and discuss central (implementation and innovation) outcomes within the framework of an evaluation. There are various types of evaluations, which differ on the one hand in who carries out the evaluation and on the other hand, in when they are conducted (Scriven, 1991):

- **Self-evaluation** is the process of systematically observing, analyzing, and improving one's own actions or results.
- **Peer Review** is an assessment by external experts or colleagues.
- **External evaluation** is conducted by persons who are outside the system or internal third parties (e.g., persons from quality management).
- **Summative evaluation** is the final assessment of the degree of goal attainment after the implementation. (Mnemonic: You summarize the results)
- **Formative evaluation** reduces risks during program development/implementation by allowing for modifications to be made, maximizes the likelihood that the program will succeed. (Mnemonic: You form the results).
- Or said with the words of Robert Stakes, a famous evaluator: "When the cook tastes the soup, that's formative. When the guest tastes the soup, that's summative evaluation."

During implementations, it is particularly important to keep t types of evaluations in mind. To develop a plan for your evaluation, it is helpful to visualize the **steps of an evaluation** and the questions that are important to clarify here (see Figure 5).

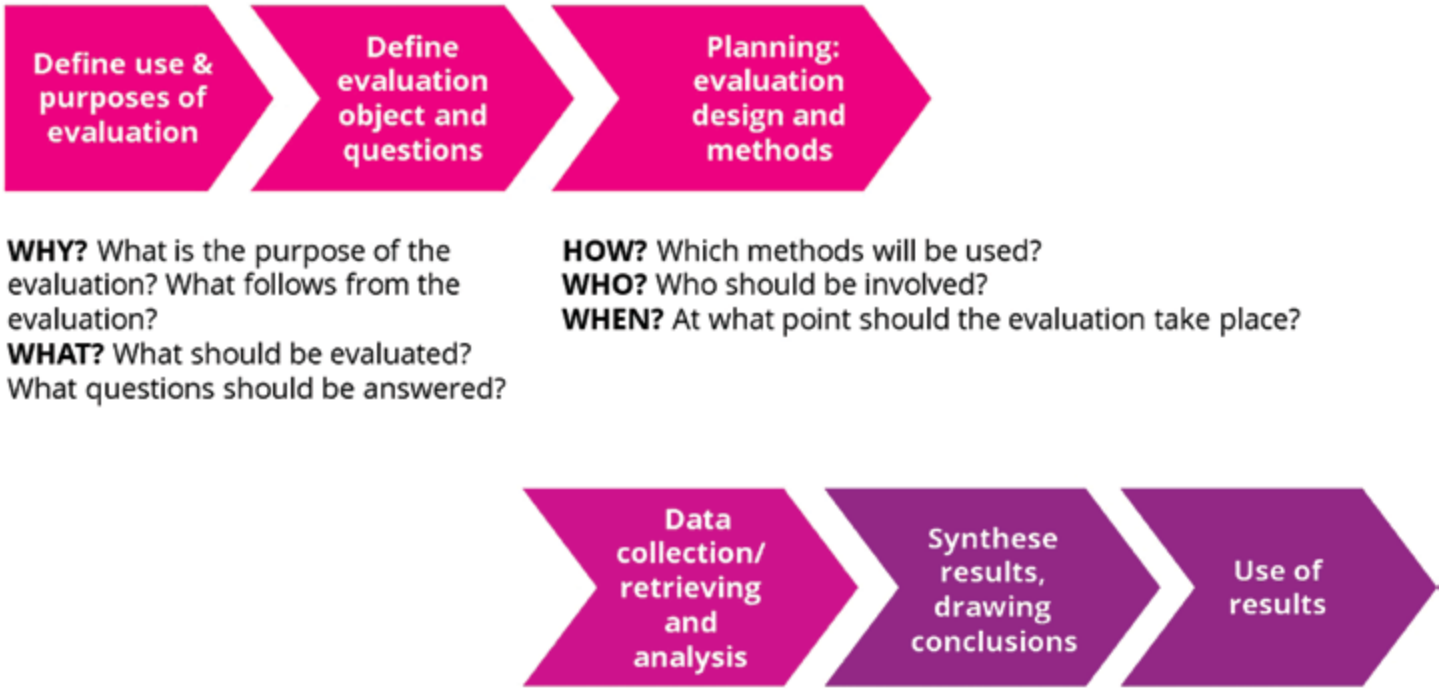


Figure 5. ***Evaluation Steps***

A participatory and utility-based approach has proven successful for the development of an evaluation plan. This means that the inclusion of stakeholders is also very beneficial in evaluation (Guijt, 2014; Zukoski and Luluquisen, 2002; Patton and Campbell-Patton, 2021).

We recommend that the implementation team think carefully about the purpose(s) of the evaluation already in the planning phase. They should determine, which specific questions to be answered (e.g., is it more about the evaluation of the practice or more about that of the implementation; what exactly is of interest here), which methods to be used to answer the questions (questionnaires, tests, interviews, focus groups, observations, document analyses, etc.), and what are good measuring points. During the implementation data should not only be gathered and analyzed, but also discussed, and communicated to relevant stakeholders.

2.2.4. Making Evidence-based Practices Sustainable

One key implementation outcome for many people/organizations is sustainability. Sustainability is not clearly defined – it could mean being able to continue the mission that one has pursued, to retain experienced people, to refine the program and to gain more credibility. The concrete meaning of sustainability is depending on…

…the program goals and core components (Which goals should be sustained? Which activities relate to them and should be sustained with which extent of fidelity?)

…the context (Should the program be institutionalized within the organization, or within the community, or within a network?)

…the timeframe (Should it maintain for a year, 3 years, 5 years, more?).

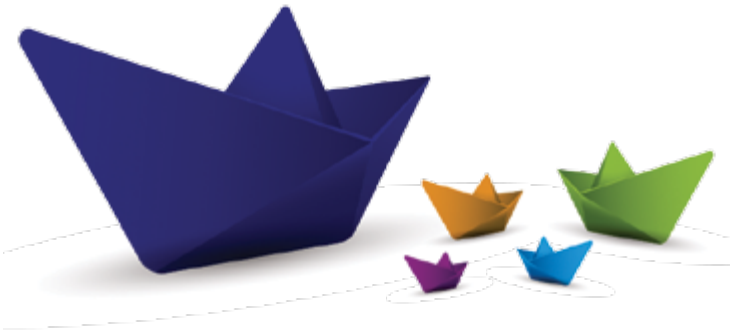
Current concepts do not conceptualize sustainability as “static” anymore, because this may impede adoption of more effective practices as the environment changes over time or new evidence emerges. If evidence-based programs are not sufficiently adapted to the context, it will be difficult to sustain them.

Programs that manage to establish a good fit between the program and the needs of the context (inside and outside the organization where the program is implemented) are much more likely to be sustainable (Dearing, 2009; Racine, 2006; Shelton *et al.*, 2020). Research shows that it is important to think about sustainability right at the beginning of a pilot project. Many tools for planning for sustainability can be found in the book "Survive and Thrive: Three Steps to Securing your Program's Sustainability" (Hutchinson, 2016).

A final remark: The term "maintenance" is often used synonym to "sustainability". However, maintenance usually refers to a shorter period of time (e.g., 6 months after the program was delivered) and focuses primarily on the institutionalization of a program (e.g., made part of routine organizational practices and policies).

What are the sustainability goals of your program?

As sustainability can mean different things it is important to set sustainability goals that fit your practice. To do so you should ask yourself in the first place what you like to sustain and what is reasonable to expect (regarding size, type, and design).



Then you can think of three different scenarios you can head for in the long run:

1. The continuation of your successful pilot program after funding is terminated, e.g., by renewing grants year after year or new funders each time. This scenario is familiar to most of us. But there is no guarantee that founders will re-fund on and on.
2. The transition of a pilot program into a core program within a host agency, i.e., incorporates it into their operating budget and procedures. That scenario mostly happens if a program is very mature.
3. The sustainment of program benefits through the development of increased community capacity. That occurs when a program has been so successful that it's no longer needed. That is the most challenging type of sustainability one can head for.

Does everything have to be sustained? Of course not. Research Studies/ Evaluations can help you finding out what the most promising components of your program are. Having a clear sense of your sustainability goals will help as you move forward to develop sustainability strategies.

How to foster sustainability?

There are several methodological hurdles when trying to find a scientific answer to the question of what makes a program sustainable: As mentioned before, there is lack of agreement on what sustainability even means. Furthermore, different sectors are investigated (e.g., health, education) often by using retrospective studies with obvious limitations. Overall, a combination of various factors seems to be responsible for the sustainability of programs. Although research does not have a solid answer to the question what influences program sustainability the most, there are a couple of factors that appear in many studies. When heading for sustainability, we should be aware of these factors. We can reflect on them related to our specific programs and develop a rational sustainability action plan.

The factors that were found most frequently in research articles into can be clustered in categories and used for sustainability planning (see Table 3). You may notice that this list contains some categories that we already presented to you at the very beginning of this Toolkit when introducing the hexagon model.

Table 3. *Factors Influencing Sustainability*

Cluster	Tips
Funding	It's good to have diverse sources of funding like individual donations, major gifts, fee for service/membership, in-kind contributions, charitable gaming, special events, corporate sponsorship, social enterprises
Strategic Planning	Develop a sustainability plan right in the beginning of your project.
Program Evaluation	Invest in evaluation and demonstrated the worth & value of your program through evaluation results.
Program Design (including Adaption)	Tip 1: Pick only programs for implementation where there is a clear need and ongoing demand for this. Tip 2: This program should be at least evidence informed (to justify the value of implementation) as well as being easily adaptable to the context.
Partners & Political Support	Tip 1: Invest in partners and let them really collaborate to reach a sense of shared ownership. This allows you better problem solving but also provides you more possibilities for getting the resources you need for sustaining your program. Tip 2: Look for program champions. These individuals are well-positioned advocates of the program – they use their connections, influence, prestige etc. to mobilizing people and resources, obtaining publicity, influencing policy, etc. They could be external or internal to your program but are usually not staff – ideally, they know how to do "politics".
Personnel	Programs that employ local residents as program staff are associated with greater sustainability. The reason is that these people are usually better in reflecting the local values and culture of the local community. They foster greater community buy-in and take more ownership.
Host Agency / Organizational Capacity	The program should have a good fit to the goals, current strategic priorities, culture of the host agency. The capacity of the host agency should be large enough to cover the resources needed for the implementation of the program (including resources for evaluation, communication, and networking).
Community	The involvement of community members increases their ownership and long-term commitment to the program which has an impact on sustainability: "people support what they helped create".
Communications	Assure high visibility. People can only support you if they know who you are, what you do and what you have accomplished. A development of a communication plan right in the beginning is helpful.

Hutchison, 2016, p. 33 ff; see also Program Sustainability Assessment Tool (2022)

Important: Consider, how each factor applies to your current situation / program. Not all factors will be relevant for each situation. Some factors might be more influential than others in your case. The earlier you focus on the relevant factors, the better you can position your program for greater sustainability.

Case Study

Even if no financial investment is necessary for the implementation of the VISC program, a time investment is necessary (e.g., until the teachers are trained, until the pupils have gone through the program). Some teachers or parents need to be convinced that promoting social skills is as valuable as promoting school performance.

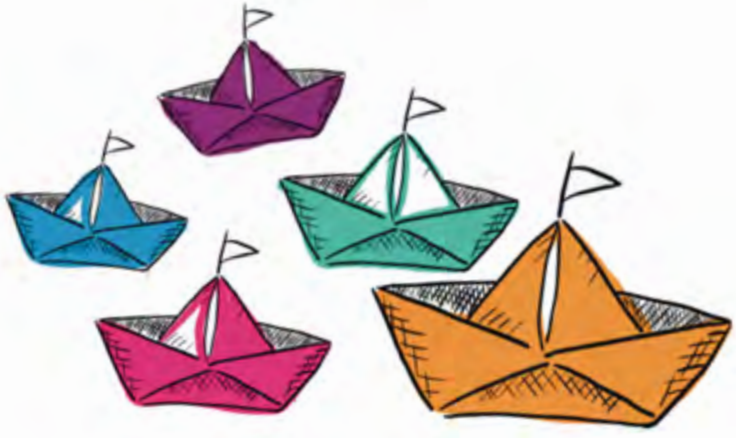
The implementation team's experience in past similar projects is that it's important to have the parents' union on their side, but also the ministry. So, they involved parents early on and asked the ministry for their patronage. They also decided to keep parents informed about the project through a newsletter. Parents will also be invited to the final event, at which all classes that have participated will receive awards from the program developers.

2.3. INCUBATORS OF CHANGE: LOCAL EDUCATION CLUSTERS

Karoline Iber & Thomas Troy

Innovative collaboration across the sectors is key to Open Schooling. Within the PHERECLOS approach, the development of models for Local Educational Clusters (LECs) was the starting point for initiating this collaboration and change. LECs originate from Children's Universities with years of experience of bringing together children and university in a non-formal educational setting – a story of success in science engagement and social inclusion. The new idea of a Local Education Cluster is to put schools in the centre with the aim to build up sustainable relations and mutual learning between the school system, the university/research system and other relevant knowledge providers in a region in order to widen and improve the learning space. They are located in Vienna (Austria), Kuopio (Finland), Lodz (Poland), Porto (Portugal), Trieste (Italy) and Medellin (Colombia).

LECs are communities of practice and serve as incubators of change in local education ecosystems at the overlapping edges of formal and non-formal education. They operate with different thematic focuses (ranging from entrepreneurial thinking, sustainability, climate or health to active citizenship), involve diverse schools (from kindergarten to upper secondary), explore and deploy various didactical concepts and approaches (from co-creation to problem-based learning) with a clear focus on an inclusive and gender sensitive way of teaching and learning.



Within the PHERECLOS approach, the LECs developed sustainable alliances, taking local circumstances, stakeholders, (future) challenges

and possibilities into account. As a result, mutual projects under consideration of specific community needs have been set up, where partners provide resources and share their individual knowledge or take responsibility in the implementation. The ambition is to cooperate on an equal level and to leave room for the strength of each institution. Such local education alliances demonstrate a potential for a double learning effect:

First, it enables children to experience (scientific) knowledge within their surroundings and allows them to engage with it in a low-threshold way. Second, the synergies leverage learning inside all participating institutions and support at the same time an understanding of potential individual contributions to the social progress of the community. As a consequence, enormous potential for mutual learning and continuous development in public engagement is generated.

The following overview of all six LECs provides an insight into the underlying structure of each LEC as well as their activities and outcomes during the course of the implementation process. It illustrates the diversity and scale of how local education landscapes can evolve in order to equip successive generations to address emerging challenges.

2.3.1. LEC Lodz

Anna Janicka and Agnieszka Michałowska-Dutkiewicz

Short Description of the LEC

The LEC Lodz is one of the six clusters created in the PHERECLOS project. It consists of the Lodz University of Technology (TUL) represented by the Children University of Lodz (ŁUD) , the primary school No. 81 , the foundation Spunk and the City of Lodz as well as many newcomers. It is focused on two main activities - workshops for teachers and conferences for children concerning the local labour market as the major vehicles for enabling and engaging a dialogue among all parties and stakeholders concerned in the area.

The aim of the workshops was to provide the support for school teachers in technical sciences and career counselling, including classes on carrying out scientific experiments with children, modern teaching methods, such as Flipped Education/ Classroom Model or Problem Based Learning.

The conferences were organised by children and held for children aged 10-15. During the conferences pupils and teachers defined the actual needs of school- and post-school communities using the knowledge of the local labour market.

The organisation of conferences with full involvement of pupils allowed them to develop their soft skills and competences of the future by giving public presentations on topics directly related to the problems of children and youth. Special attention was given to information about the existing industries in the local neighbourhood and the skills of the future, that will be necessary to perform the professions which will thrive in the future.

"Future Goals of the LEC"

Our goal is to support children and adolescents in the education process, listen to their suggestions and take action that will make it possible to "turn the hours of pointless learning into a short and effective process" - a statement by Julka, 17 years old. We will continue to promote the idea of Open Schooling and continue the activities of LEC Lodz.

LEC Activities

a) LEC Promotion

In order to make the LEC activities as successful as possible, a proper promotion of the activities was necessary. Therefore, many promotional activities were carried out, which were accompanied by the regular meetings of LEC partners.

At the beginning it was assumed that in order to create and develop the LEC, it is worth promoting it and attracting potential members through activities favouring the integration of the community.

The LEC Lodz started with two activities: workshops for teachers and conferences for children. The information out about the planned workshops

for teachers potentially interested in the participation was sent out together with our partners to as many people as possible.

In December 2020 the Facebook account of ŁUD was set up in order to promote the LEC activities with a consistent frequency. The volunteers were also dedicated to promotion. They created an Instagram account posting regularly the information on the progress of their work, which is bilingual in Polish and in English.

In January 2021 the coordinator of the PHERECLOS project at TUL organised a webinar in cooperation with the Centre of Science Copernicus in Warsaw where 35 teachers from the "Dream Designers" project were present. The idea of Open Schooling was thoroughly discussed as the basic concept of the Lodz LEC activities.

b) Workshops for Teachers and Parents

While implementing the LEC activities, it was recognized that the involvement of parents had to be increased. Therefore, a series of workshops for parents were organised in the following topics: dissemination of information about the PHERECLOS project, safety of children on the internet, vaccinations against COVID-19.

In parallel, the workshops for teachers were continued. The following workshops were organised: experimenting in science subjects, STEM promotion, mathematical experimenting, modern teaching methods, materials engineering, the competences of the future, philosophising with children.

c) Conferences Organised by Children for Children

The organisation of conferences by children for children is the most innovative form of the Lodz LEC activity. On 24th February 2021, the first conference prepared by pupils of Primary School No. 81 in Lodz took place. On 29th May, 2021 - the second one prepared by ŁUD volunteers followed up. In May 2022, five additional conferences were organised at Primary School No. 91 and Primary School No. 166 in Lodz, Primary School in Zygry, Primary School in Wartkowice and Primary School in Dalikow.

LEC Outcomes and Results

a) Children:

The group of children who benefitted from the Lodz LEC include predominantly volunteers of the Children University of Lodz (ŁUD), children organising the conference and pupils from various primary schools participating in the conference and preparatory activities.

While working on the preparation of the conference, the children learned how to work in a group, how to be systematic, manage their time, share responsibilities, and how to use the strengths and competencies of the group participants. They learned how to prepare and develop surveys, how to present them and how to create and design their own graphics while running the Instagram account. By conducting interviews with company representatives e.g. aircraft making industrial cluster "Dolina Lotnicza", they learned how to communicate with companies, how to handle the correspondence and prepare and structure interviews. According to their individual feedback , it helped them to become more self-confident, more courageous and aware of their own strengths. This change is visible for

the children themselves and they described it and referred to it in numerous conversations with peer-teachers and in the written answers to the question: what did you get from participating in the project? It was also confirmed by the teachers who supervised the process of preparing the conferences. All these skills will greatly help children to get oriented on the local labour market and with the high level of soft skills they will be more employable.

It was envisaged that the process of the organisation of the conference would greatly boost the competences of children. The results are outstanding and exceeding expectations because the children have greatly improved a wide variety of skills. First of all, they learnt how to work independently, how to search information, how to take initiative, how to take the decisions and how to be responsible for the decisions, which they took. They also learnt how to cooperate in the group, how to negotiate among peers, how to divide the tasks and how to take the position of the leader. They also boosted their organisational skills as well as performance skills while giving lectures and workshops during the conference. Some of them also learnt how to overcome their shyness, and how to be more self-confident. In addition to soft skills, the children gained knowledge related to the topic of the conference they were organising. They learned a different way of gaining knowledge through action and experience.

workshops for children. They could also understand that they play an important role in Open Schooling being the first educators for their children.

c) Researchers/Universities

The researchers of the Lodz University of Technology prepared and carried out the workshops for the teachers from the primary schools. They were inspired to prepare new classes e.g., on open badges as a tool to motivate pupils. As a result for the Lodz University of Technology the implementation of the project greatly enhanced the capacity building of the staff members.

b) Parents:

Parents were offered an opportunity to learn about the LEC approach and participate in specially prepared workshops. They also had the chance to be more involved and engage in the activities of their children. Particularly, when organising the conferences, the parents shared their knowledge and experience and sometimes also offered

d) Teachers

Teachers wanted to get engaged in the LEC creation and benefitted from the further possibilities of cooperation. They deepened their knowledge on innovative teaching methods as well as their understanding that children should be placed in the centre of the teaching process. This is gradually guiding them to change their roles from teachers into

mentors. The teachers learned about modern teaching methods and then showed their creativity in inventing ways to apply these methods during their classes. They also repeatedly began to modify these new tools to adapt them to their subject / level of education. The discussions resulted in new ideas for lesson activities.

e) Teacher Training Students

This group was not targeted by our LEC.

f) School Heads/ Policy Makers/ Government

The school heads were reminded of the importance of Open Schooling culture . They promoted the conference among their pupils since they were convinced that the knowledge on the labour market needs is vital, and it is not a part of regular curricula taught at schools.

Implementation Process – Collaboration within the Implementation Team

All LEC partners met regularly to discuss the progress of the LEC development, outputs, outcomes and future steps. At the beginning, the meetings were on-line due to the COVID-19 pandemic, mostly via TEAMS and ZOOM platforms. Since April 2022, when meetings were again allowed in Poland, the meetings were both physical and on-line.

The minutes were prepared after each meeting and spread out among the partners for their final consent. If no remarks were given within two working days, the minutes were considered as final and binding.

During the meetings, brainstorming was the frequent work method in order to generate the best

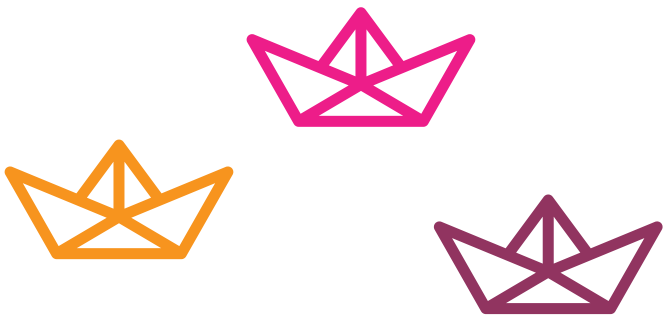
possible solutions, combined with other creative methods such as reverse brainstorming, the 635 method and similar tools. Meetings of the project team of Lodz University of Technology were organised on a regular basis, which also was in charge of the organisation of the LEC Lodz on-line meetings and physical meetings. These coordination meetings were used to distribute the tasks among the project team members and to discuss the progress of the project.

Impact and Sustainability

The Covid-19 pandemic, in which we started the project, made the beginning quite difficult. We had no idea how we could create the LEC Lodz to promote Open Schooling. We started our activities with meetings with the representatives of the LEC: the City of Lodz, Primary School No. 81 in Lodz and the NGO Spunk, as well as with researchers from Lodz University of Technology.

Then we recruited 80 teachers for workshops on modern teaching methods, experimenting together with children and promoting Open Schooling culture. The next stage was the involvement of children from Primary School No. 81 and ŁUD volunteers in the organisation of a conference for children. At this stage, the project gained momentum. The children's energy, their commitment and willingness to introduce changes to schools made all partners start working with increased interest.

Currently, the core of the LEC Lodz consists of the Children's University ŁUD, NGO Spunk, the City of Lodz and 20 primary schools from Lodz Province. The remaining partners are invited by children, so the character of LEC is open. The basic elements of our activities are workshops for teachers, children and the most important element characterising our LEC is organising a conference for children by children. We create an environment around these elements that brings together many cooperating entities: local small entrepreneurs, NGOs and parents who help children to prepare conferences. On one hand, we give the initiative to children, we let them choose the topic of the conference that is interesting for them and their environment, which ensures their commitment. On the other hand, we give teachers and tutors support, as we provide them training with the help of the NGO Spunk and researchers from the Lodz University of Technology. We have created a package of workshops for teachers and children that they can use: how to conduct interviews, how to prepare a speech, how to work with children, how to motivate them, how to conduct surveys, how to promote a project, etc.



We did not expect such a large involvement of children in the project. The group of volunteers that prepared one of the first conferences is still involved today, the volunteers became tutors of other five groups from other primary schools. They were meeting children and even conducting workshops for them. In addition, they are looking for new forms of activities for themselves, e.g. they talked about the project at the Digital Youth Forum 2021, they gave workshops for the Vienna Children's University in June 2022 based on their experience from the project and will prepare input for the conference in Bucharest, in September 2022. Headmasters are very eager to join LEC Lodz and want to implement the forms of work developed in the project by children in their schools.

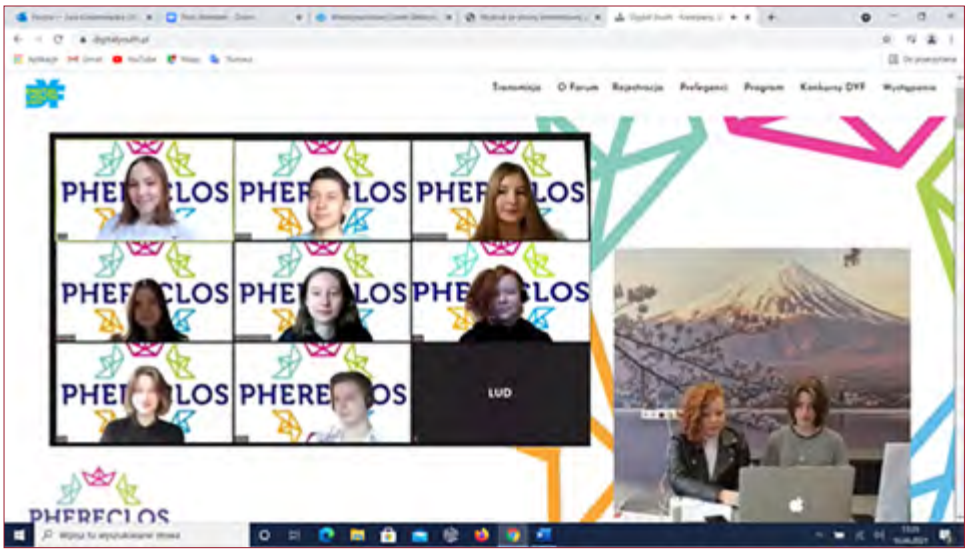
Quotes, Quotes and Quotes

Open schooling is a school that is not limited only to the knowledge of textbooks, but also a platform that inspires students to discover something new and broaden their horizons. First of all, participation in the project showed me that even despite unfavourable conditions, i.e. pandemics and lockdowns, you can do something valuable and convey something important to many people. In addition, it taught me to coordinate a group of people, run the social media of our conference and document the project. Moreover, it gave me the opportunity to speak in public for the first time on such a scale. During the preparation of the conference and workshops, I had the opportunity to explore the topics we were talking about."

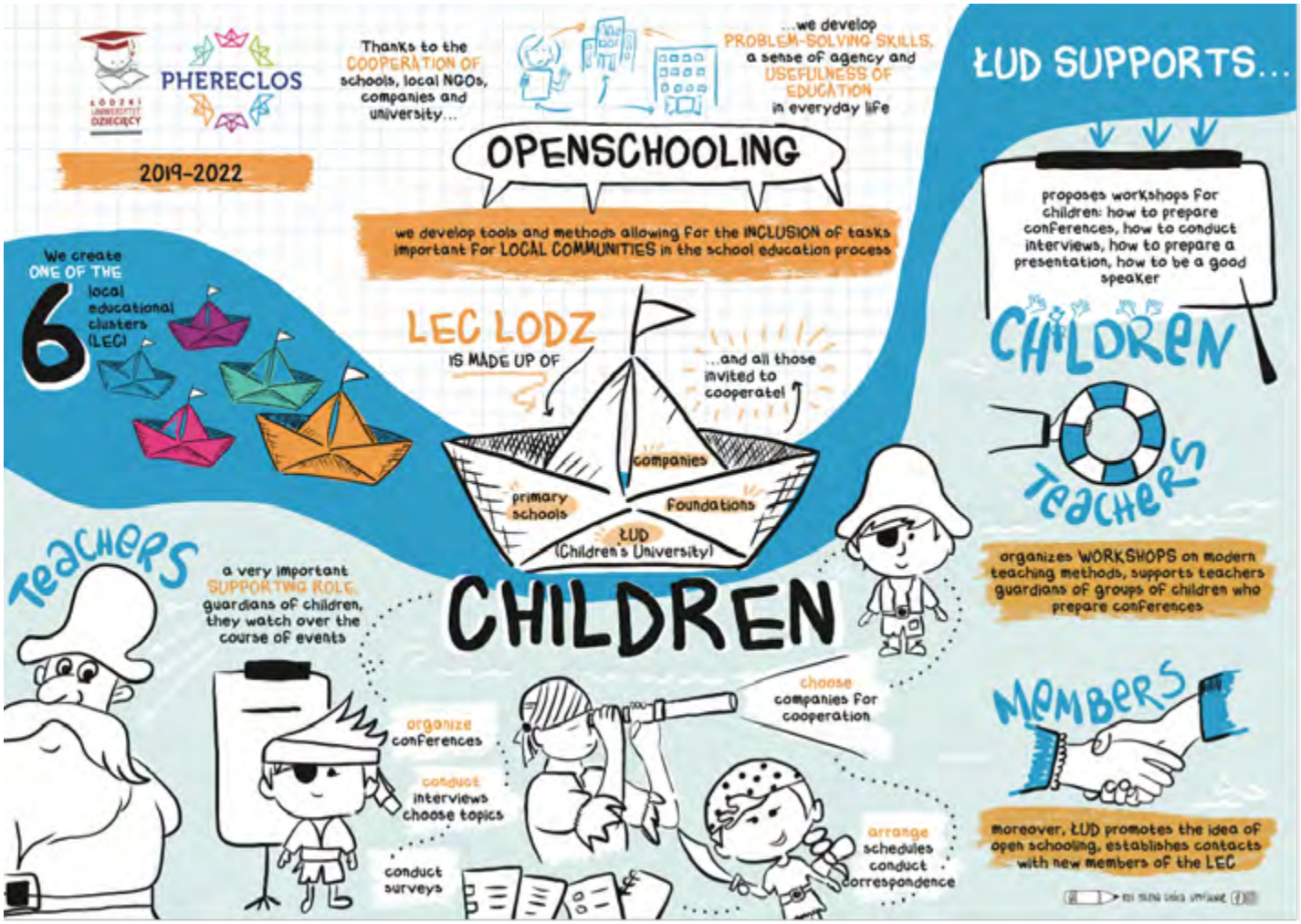
Karolina, student, participant of the project, aged 17

My name is Elżbieta Kucharska and I am a mathematics teacher at the Primary School John Paul II in Zygry (Łódź Province). I found out about the possibility of participating in the Phereclos project during the training for teachers. I admit that at the beginning I had many concerns, for example: will our students be able to cope with such a large undertaking? I was also quite sceptical when I found out that our students chose a topic about the mental health of adolescents. I was afraid that this topic would be too difficult for them. Today I am glad that the Lodz University of Technology is leading such initiatives. I believe that in our school we would not have come up with the idea of preparing such a conference. Observing the commitment, creativity, diligence and great need to take up this topic in our school, I am grateful to the Lodz University of Technology for the opportunity to participate in this project. I still have many concerns, but seeing how many useful things our students learn, which they will be able to use in the future, I know that it is worth it. I can see how our students feel honoured, take part in the Phereclos project and have the opportunity to cooperate with PŁ. At the same time, they will meet many wonderful people who have a positive attitude and are a mine of knowledge, sharing their experiences."

Elzbieta,teacher, Primary School, Zygry



A screenshot from student's meeting on Teams



Graphic prepared to promote the PHERECLOS project

2.3.2. LEC Medellín

Ana Maria Londoño Rivera, Ana María Agudelo, Carolina Arango Hurtado, Selene Isabel Pineda Gomez, Andrea Zuleta

Short Description of the LEC

In Medellín, Colombia, school curricula are focused on academic content compartmentalised by traditional knowledge disciplines with little connection to the context of students, who perceive education as a sphere disconnected from their reality. The LEC Medellin, led by EAFIT Children's University, sought to encourage students to engage with science as a useful tool to the solution of local problems through active learning experiences collaboratively designed by academia, the private sector, non-profit organisations and the public sector. LEC partners formed eight teams, each addressing a city-relevant issue (health, environment, economic development, culture, mobility, gender equity, youth and social inclusion). In the first phase, each team defined a local problem related to their respective topic; and in the second phase, they designed and implemented a teaching unit that connected curricula with the identified problem. In the third phase, teachers participated in a training program on active learning. Thus, the LEC also encouraged, supported and promoted organisations in various sectors to recognize and explore their potential contribution to a more relevant education, which promotes the development and strengthening of life skills.

The mission of the LEC was to encourage ninth-grade students to engage with science as a tool to contribute to the solution of local problems through learning experiences designed between academia, Industry, non-profit organisations and the state.

"Future Goals of the LEC"

In the future, we expect to maintain the LEC Medellin partnerships so that dialogue among the sectors will continue promoting Open Schooling activities. Leadership should be taken by entities other than EAFIT to promote new strategies and approaches in addition to obtaining funding when certain LEC activities demand it. Also, the LEC Medellin should strengthen its communication strategies so that the intersectoral partnership is acknowledged and new partners can be included that could potentially be beneficial. These communication strategies should allow to freely disseminate all the products that have been created during PHERECLOS such as teaching units, podcast, teacher training videos and the co-creation methodology

LEC Activities

LEC period 1: Knowledge of the problem

Time: September 2020 – October 2021

Once the LEC was formed, it was divided into eight co-creation teams, which means that the groups included companies, schoolteachers, and NGOs. Each team focused on a specific issue, analysing it, and created material to finally design the teaching units.

During the first period were carried out activities to convoke companies, schools, policy makers, and thus form the LEC Medellín. All organisations invited were related to one of the eight defined problematics as having a great impact on the city and its citizens.

In this table is defined each co-creation team by its approach and participants:

PROBLEM CO-CREATION TEAM	APPROACH FOR TEACHING UNIT	PARTICIPANTS	
		ORGANIZATION	TYPE
CULTURE	Education is disconnected from culture	Ratón de Bibloteca (Reading promotion)	NGO
		Otraparte (Culture and philosophy promotion)	
		Corporación cultural Nuestra Gente (Culture, art and play)	
		Unidad Educativa San Marcos	School
		INEM	
		I. E. Santa Elena	
		EAFIT	University
GENDER EQUALITY	Gender equality from a historical and contextual approach	Mujeres que crean (Feminisim)	NGO
		La Sallista	Teacher training students
		EAFIT	University
SOCIAL INCLUSION	Inclusion as a social construction from a rights perspective	ACNUR (Migrations)	NGO
		Unidad Niñez YA (Policy in Child Care)	
		Secretaria de Inclusión Social y Familia de Medellín	Policymaker
		Institución Educativa La CEIBA	School
		Colegio San José de Las Vegas	
		Comunidad de Jesús María	
		EAFIT	University
YOUTH	Meanings of life	El Colombiano (Newspaper)	Company
		Ciudad Don Bosco	School
		Colegio Marymount	
		Unversidad EAFIT	University
HEALTH	Focus on health care and wellness education, not illness	Fundación SURA (Ensurace and prevention)	Company
		Profamilia (Health, Sexual and reproductive Rights)	
		EAFIT	University
MOBILITY	Creating culture and citizen from and for mobility	METRO (public transportation)	Company
		Low Carbon city (ODS)	NGO
		INEM	School
		EAFIT	University

ENVIRONMENT	Pollution	ISA Intercolombia (Energy)	Company
		Parque de la conservación Santa Fe (Zoo)	
		Communidad Jesús María	School
		INEM	
		Comunidad de Jesús María	
		La Sallista	Teacher training students
		Universidad de Antioquia	
		EAFIT	University
ECONOMIC AND SOCIAL DEVELOPMENT	Diversities and human capacities	Colegio Hontanares	School
		Communidad Jesús María	
		Proantioquia (ODS)	NGO
		ACNUR (Migration)	
		La Sallista	Teacher training students
		Universidad de Antioquia	
		EAFIT	University

LEC period 2: Co-creation and implementation of teaching units

Time: November 2021 – May 2022

When the co-creation teams defined the focus of each teaching unit, they passed toward the design phase and finally the implementation in schools.

To provide accompaniment and ensure similar progress among the co-creation teams, EAFIT Children's University trained a group of mentors that support each team promoting activities according to the main purpose of sessions. These mentors are familiar with the EAFIT Children's University methodology and are led by the LEC Medellin base team from EAFIT.

Finally, and in order to establish a dialogue between the school and organisations, a pilot process was held to implement the teaching units in educational institutions that were open to proposals for educational changes. During this activity, a team in the EAFIT Children's University accompanied each educational institution during implementation and assessment tools were applied to measure satisfaction as a result of the teaching units' design and the co-creation phase among LEC partners.

LEC Outcomes and Results

a) Children:

In the LEC Medellin the main activities with young people started during the third period. But some students have been involved already during the design of the teaching units:

During the recording of the podcast some co-creation teams invited young people (culture, youth and social inclusion); when this happened, the teams recruited a diverse team of young people as a result to participate in the podcast production.

Ninth grade students were invited to evaluate the ideas of the co-creation teams. During these sessions, the students spoke with each co-creation team, gave their opinions, and put a symbol on those ideas that were the most motivating as a learning experience.

The youth co-creation team invited a group of six ninth-grade students and integrated them into the team, as a strategy of co-creation with youth.

Shark tank: To evaluate the teaching units, each co-creation team presented the teaching unit with a panel of young people, education specialists and citizen experts in each topic in a "Shark Tank" pitching setting.

During the assessment process, students participated in surveys and focal groups to observe the relevance, satisfaction and learning obtained with the activities contained in the teaching units. So far, 78 students have been assessed, who have stated that the teaching units have been a positively disruptive element in their daily life. These activities have facilitated their application in other spaces to rethink their reality.

b) Parents:

Involving parents was part of the planned activities during our third project period. The LEC Medellín prepared events, the distribution of information, and activities for parents. The parents were then polled and/or surveyed so that their voices are included and their feedback received and accounted for during period 3.

c) Researchers/Universities:

In period 1 and 2, EAFIT University was the LEC leader with most of the responsibilities. In addition, there were two universities, La Universidad de Antioquia and La Sallista, that connected the LEC Medellín with teacher training students. For the 3rd period, specifically for the teacher training phase, both universities have become more involved.

d) Teachers:

During 2020 October we did an open call to invite teachers to participate in our LEC because some co-creation teams were missing teachers. Thanks to this call, we found a group of teachers who are highly motivated and participated in the PHERECLOS project.

Therefore, LEC Medellín has a consistent group of teachers which are fundamental in co-creation teams, because they represent a realistic, grounded scholarly view. The dialogue between their practices and new ideas from those partners that came from organisations has an increasing potential of transforming teachers' perspectives and methods.

During the assessment process, teachers completed surveys and participated in group interviews. Currently, six teachers have been assessed, who manifested that the co-creation methodology has allowed students to interpret concepts through an experiential and outdoor proposal. Besides, activities have achieved consolidating a horizontal learning process in which all participants are recognized as contributors in collective knowledge construction.

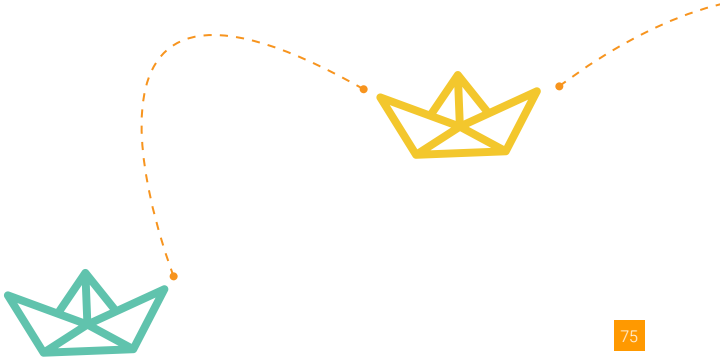
e) Teacher Training Students:

Although involving teacher training students was mainly part of the activities during our third period, a few of those already took part in the co-creation teams.

f) School Heads/ Policy Makers/ Government:

Thanks to the connection and acceptance of the school heads, many schools joined the LEC Medellin. Some policymakers became involved as members of co-creation teams, and others joined as advisors to the project.

During the assessment process, the heads of educational institutions filled out surveys and participated in interviews. So far, two directors were assessed, who confirmed that the project has been a good opportunity to participate in an initiative that has allowed them to build bridges with other actors. Equally, these two people pointed out that the teaching units have managed to address topics, which are difficult to discuss with young adults, and, in this sense, these guides have contents and methodologies that could be adopted in the institutions' curricula.



Implementation Process – Collaboration in the Implementation Team

LEC partners had meetings every two weeks. These gatherings have been planned by the EAFIT base team. All the meetings have been designed with the purpose of assuring an equal advancement of the eight co-creation teams. During these sessions the EAFIT Children's University mentors accompanied and led the work of the co-creation team.

LEC Medellín was using co-creation methodologies to support the work of the eight co-creation teams. To contribute to this goal there are three methods implemented so far as follows:

I. Online tools – Collaborative workspace

Virtual tools have been used during all sessions as a registration method, and also allowed free access in any other moment. Some of these tools include the following: Microsoft One Drive, Google Drive, Mural.co, Padlet.

II. Triggers of co-creation

During the 2020 meetings the EAFIT base team identified some dynamics of integration that are convenient and collaborative. Four triggers that are used in co-creation activities were defined as follows:

Trigger of co-creation	Use it when it is necessary....
Conversation	Analyse, sharing opinions, discuss
Activation	Activate the energy of the team with an ice breaker
Consensus	Create agreements, conclude or decide
Expansion	Generate new ideas

All triggers of co-creation can be used separately or be integrated. There is not an order or sequence in their uses. Triggers are best chosen within the context of an activity.

III. Activity 1, 2, 3

All meetings have been virtual. Those members who could not attend a session received by email a document called "Activity 1, 2, 3". This activity has three steps to be carried out in 30 minutes and is a synthesis of the virtual session. Co-creators were expected to continue contributing to the team, even when they missed meetings.

Regarding the implementation of teaching units in schools, the base team at EAFIT designated two people to be in charge of accompanying teachers in personalised meetings, visit during the activity with the young people and manage resources (experts, materials, visits). The teachers have also received some training and participated with the school heads in meetings with LEC partners.

Impact and Sustainability

LEC consolidation allowed to understand that the co-creation exercises have to come from the identification of needs of target audiences. Therefore, at the time of co-creating teaching units, it was important to keep in mind that the Educational Institutions, teachers and their students are permeated by social and economic contexts, which have to be recognized from the beginning of the process of creating the guide. In this case, the teaching units created complied with this approach, since" (...) material was created, which was designed for all types of citizens" (partner 01 in the process of co-creation in the mobility teaching unit, 2022).

One of the most important impacts of the LEC was including teachers, pedagogy students and ninth grade students in co-creation groups. According to 64% of the LEC partners who were interviewed, including these people to their co-creation teams made the difference. This is due to the fact that they "had methodologies and pedagogical tools to determine which activities were useful and which were not" (workshop coordinator of the co-creation process of the mobility teaching units, 2022). This situation was also presented through the Shark Tank exercise conducted by the PHERECLOS team, which allowed to incorporate the vision and perspectives of ninth grade students.

Regarding the implementation of the teaching units, it is possible to state that various impacts were generated. On the one hand, teachers, coordinators and students who were assessed consider that the teaching units were a disruptive element in the daily life of the educational institutions. The activities in these guides allowed participants to step out of their routine to rethink city issues. Also, these units allowed to recognize the student as an active subject of knowledge, with whom it is possible to deconstruct concepts and create learning.

Finally, the school heads of the Educational Institutions established that this project was an opportunity to create ties among the public, private, NGOs, and academic sectors. Equally, this allowed to acquire two learning experiences. On the one hand, the teaching units were able to demonstrate the perspectives that other actors possess to think and address city issues. At the same time, these guides confirmed that other tools exist which can be used by teachers and students to acquire new learning experiences.

Regarding the participation of government agents, there was a greater participation of those related to the education sector, but their participation is limited and depends on political commitment and current policies.

Quotes, Quotes and Quotes

> *PHERECLOS has the possibility to be flexible in content and methodology. Besides, it allows students to understand their world and build their own story. This project can reach diverse audiences rapidly and stimulate them to analyse and confront their reality."* (Partner of the co-creation process of the social inclusion teaching unit)

> *During the activities we were all carriers of knowledge. The Educational Institutions need different experiences and methodologies, which will allow students to know realities that are unknown to them."* (Teacher from the San José de Las Vegas School)

Creative Space

EAFIT's Children's University has experienced PHERECLOS as if it were a great organ that listens. In our processes, we have constantly listened to the multiple voices that accompany us to propose the basis of a model that is inclusive, fun, open, flexible and collaborative. We are excited to see exciting things happen between people and organisations in the school environment.

2.3.3. LEC North Savo

Niko Kyllönen

Short Description of the LEC

The LEC North Savo implemented an Open Schooling model of creating and distributing science educational contents in the context of rural areas. Teachers, teacher trainees, researchers, experts, science journalists and children co-created inspiring science education contents such as children's science articles, videos, virtual science clubs and pedagogical ideas. The participants prepared the contents as part of varied LEC activities, such as university courses and new science education training. With the assistance of educational technology experts, the LEC North Savo published the contents on two digital platforms. The contents are openly accessible to educators and families.

The fresh contents are valuable for schools and are also useful for out-of-school science clubs and workshops. In particular, virtual science clubs greatly benefit as they are often based on digital media contents. Improving the quality of virtual science clubs is particularly valuable for families who find it challenging to attend on-site science activities due to long distances, economic situations or social reasons.

"Future Goals of the LEC"

The developed science education contents will be used in the future to support STEAM education. The contents may inspire teachers, researchers, science journalists and teacher training students to create further education contents. The science education training can be modified to suit different target groups such as researchers and parents. The cooperation with researchers continues as a part of the Children's University's summer camps of 2022. Researchers visit the camps virtually to answer children's questions.

LEC Activities

Science journalists created a collection of science articles that were quality-checked and distributed to teachers by the Children's University (6/2020-10/2020). Teachers and parents gave feedback on making the articles more suitable for children (11/2020-3/2021). Using the feedback, a science journalist of Tiedetuubi and a content producer of Ilona IT edited the science articles (7/2021-8/2021). The finalised children's articles were published in the Digital World of the Children's University.

Young Academy Finland, University of Eastern Finland (UEF) and LEC schools planned and organised virtual school visits (4/2020-3/2021). Two teacher training students joined the activity as a part of their master's theses. Young Academy Finland's "Meet a Researcher" service matched the enrolled teachers, teacher training students and researchers with each other. UEF and the Children's University provided guidance via e-mail and online meetings.

Teachers and researchers of UEF prepared the Virtual Entrepreneurship Education Panel (10/2020-11/2020). The Children's University gave panellists information about the concept of the Science Capital approach. The Business Centre North Savo, one of the panellists, also provided expert support to teacher training students. The students prepared educational contents that were piloted by the Me and My City Eastern Finland and two schools (2/2021).

The Children's University, science journalists, teacher training students, teachers and museum educators and librarians developed seven non-stop virtual science clubs published in the Digital

World (10/2020-6/2021). Partners also discussed the future continuation of virtual science clubs.

The LEC organised three science education trainings (11/2020-11/2021). UEF, ThingLink and Ilona IT helped Children's University to develop the Basics of Science Education online course. The Science Teacher Training included a webinar series with the LEC experts with information on the concept and practical methods of Open Schooling and Science Capital. The Virtual Science Teacher Training included tutor meetings and online workshops with Ilona IT. The final projects of the participants were virtual science clubs for families. Several of the project plans of the science education training were published through the Emill service.

The Children's University organised four hands-on science workshops for families with local libraries and a youth centre (10/2021). At the workshops, children and parents could ask science questions. A science journalist used the questions to make eight children's science videos which were published through the Digital World (1/2021-2/2021).

During science workshops at North Savo schools, the Children's University collected children's questions about colours, sounds and tastes (11/2021). The Children's University used the questions to interview researchers of the Meet a Researcher service (12/2021). Video recordings of the interviews were shared with the school classes who participated in the workshops.

At a closing event, the LEC summarised project outcomes and shared ideas for further cooperation (2/2022). Partners also reviewed suggestions of regional decision-makers.

LEC Outcomes and Results

a) Children:

The meetings with researchers, teachers-students, science journalists and participants of the science teacher training allowed the children to ask questions about science and professions in science. By reading science articles and watching science videos, children acquired new knowledge and skills related to science topics (such as climate change, dinosaurs and space) and practised their scientific literacy. After watching science videos about space, children could also submit their own questions for further videos.

In some schools, children created their own interactive presentations using the ThingLink platform. ThingLink enabled pupils to view their own surroundings in a new way and explore different world locations. Teachers reported that ThingLink's 360° images and videos helped the children develop their cultural understanding, vocabulary and digital citizenship skills.

Hundreds of children were registered in the non-stop virtual science clubs of the Digital World of the Children's University by their parents or teachers. The non-stop virtual science clubs seem to operate as a low-threshold science activity. They have also attracted children who have never been to science clubs before due to costs, scheduling issues, or long distances. The non-stop virtual science clubs are an excellent introduction to science being fun. The instructed virtual science clubs and science workshops provided children with further opportunities for children to learn about science and ask their own science questions.

b) Parents:

The non-stop virtual science clubs provided parents guidance on how to do science education with their children at home. The educational contents of the clubs helped parents to start a conversation about science topics with their children. Many of the parents who gave feedback on the clubs said they participated in the clubs by doing preparations for the science experiments, reading the instructions and watching the videos. Some parents also reported that they assisted their child during the club by discussing the topics and helping to solve the club assignments. In parents'

opinion, the best thing about the non-stop virtual science clubs is a free schedule, interactivity and versatility of the contents and the chance to learn something new. Some parents also think that it is great when there is no need to drive a child to a club. The most engaged parents participated in the instructed virtual science clubs and supported their children's media skills by searching for more information from science articles, videos and even games.

The virtual clubs were also excellent alternatives to science clubs and camps cancelled due to the COVID-19 epidemic. However, there was strong demand for live events. The science workshops about space offered parents the opportunity to participate in science education at a low threshold. The most enthusiastic parents were excited to submit questions with their children for a science journalist to use in educational videos. In social media, parents were also offered opportunities to present their own ideas for making children's science videos.

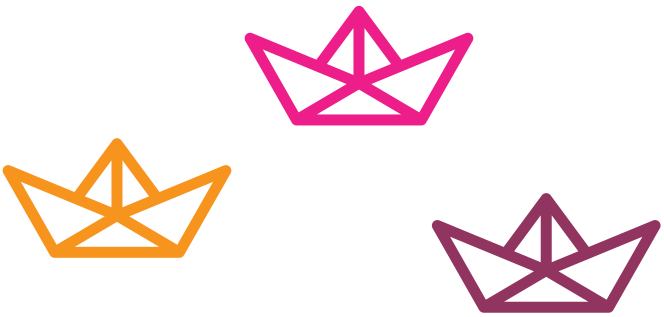
c) Researchers/Universities

The virtual visitors who participated through the Meet a Researcher service got unique opportunities to collaborate with teachers, teacher training students and the Children's University. Science articles of Tiedetuubi provided new ideas to the researchers on how a topic of a virtual meeting can be approached from different disciplines. Some researchers also participated in the science webinars and trainings coordinated by the Children's University. There seems to be a need for science education training not only for teachers but also for researchers as well.

The LEC cooperation enriched the several courses of the university. The university gained valuable connections to schools in other districts and experts in different fields. The positive experiences made the university teachers and researchers hope that cooperation will continue in future courses and projects.

d) Teachers

The teachers got great experiences on how to collaborate with the different academic stakeholders.



The teachers said that the virtual school visits and science workshops were successful and brought welcome variation to regular classroom activities. They particularly valued the fact that visits were also planned together and took into account the skills and composition of a pupil group. The teachers appreciated the versatility and functionality of the visits, as pupils were able to get to know the real researchers and do small research experiments in the classroom. Some teachers also found it useful that the science education contents of the workshops were available in advance in Emill.

The non-stop virtual science clubs were also available for schools. Many teachers integrated the clubs into the multidisciplinary learning entities that are mandatory in Finnish elementary schools. Some teachers became excited about using digital technology and creating educational contents by themselves. Some teachers took full advantage of the provided ThingLink and Emill services and participated in the webinars and online trainings organised by the Children's University and educational technology experts. The most technologically proficient teachers guided their pupils to create interactive presentations during a class. Using interactive ThingLink presentations, both pupils and teachers learned to explore the world from new perspectives and improved their digital literacy skills.

e) Teacher Training Students

The collaboration with the educational experts was perceived as very motivating and instructive. Unfortunately, teacher training students could not physically visit schools or informal learning environments before autumn 2021. In October, they were invited to join the face-to-face meeting between the university, museum and library at the Kuopio Kantti. However, the teacher training students felt that they learned a lot about using different digital services in distance learning and science education. The virtual cooperation trained the teacher training students to do multi-site work, which will become a more common method of implementing Open Schooling in the future.

Some teacher training students found that the collaboration with the educational experts (entrepreneurship education experts, museum educators, librarians, science journalists and the Children's University) opened new channels of trustworthy information for educational purposes. For example, one teacher training student reported that information about different beliefs and attitudes about science could be beneficial in one's teaching career. The teacher training students also learned to use science media and to create more appealing educational contents. These teacher training teachers have better chances to improve children's science-related attitudes and dispositions through high-quality educational contents.

f) School Heads/ Policy Makers/ Government

Many school heads found cooperation interesting when it provided concrete tools and practical methods to their schools. For example, the online events organised by the Children's University in cooperation with ThingLink and Young Academy Finland were found worthy of attending. In some schools (such as Kasurila School), the school head also participated in the LEC activities in the role of a teacher. Through these school heads, the participating teachers' positive experiences may spread around the school and become part of the school culture.

Local and regional decision-makers gained information about good practices in science education. Many of them found open discussion with the Children's University useful for including parents in science education and for the development of teachers' professional skills. One of the discussion topics was future science education training based on the LEC's training.

Implementation Process – Collaboration in the Implementation Team

The LEC participants collaborated mostly by using remote communication tools such as e-mail, phone, Microsoft Teams and ZOOM. Digital remote communication was a cost and time-effective communication method for the participants who did not have a chance to meet face-to-face due to the COVID-19 epidemic or long distances. The Children's University organised the meetings and invited the appropriate partners to discuss ongoing or upcoming LEC activities. During the first LEC period, the Children's University also organised monthly online webinars where partners could get to know each other better and discuss particular approaches and methods of Open Schooling such as Meet a Researcher, ThingLink, Tiedetuubi and Emill services. All the meetings were necessary to develop and maintain the learning in the LEC with a considerable number of participants. The most fruitful discussions resulted in unintended cooperation between the partners. For example, the two non-stop virtual science clubs originated during the first meeting, whose main focus was to invite teacher training students to collaborate with Me and My City and Business Center North Savo. The face-to-face meeting at the Kuopio Kantti and the online closing event provided partners to review the LEC activities and to discuss opportunities for future cooperation.

Impact and Sustainability

The LEC North Savo developed several methods to support the development of Science Capital and Open Schooling in rural areas. Good partnerships were formed due to the varied nature of the LEC activities. During the Science Teacher Training, the Children's University made contact with the secretary of the Finnish Science Centre Association. As a result, the Children's University was accepted as a member of the Finnish Science Centre Association in April 2022. The Finnish Science Centre Association deemed the Children's University an invaluable source of new and complementary knowledge for developing Science Capital at the national level. The network of the Finnish Science Centre Association may provide new ways to continue the implementation of the LEC work beyond the conclusion of the project.

The LEC's science teacher training offers a basis that can be modified to suit different target groups such as teachers, researchers and parents. PHERECLOS experiences and contents will be used in a science education training organised with the Regional State Administrative Agency of Eastern Finland in the fall of 2022 and later as part of the activities of the Snellman Summer University.

The collaboration between the Young Academy Finland and the Children's University continues as a part of the Children's University's summer camps of 2022. The Children's University's camps will have virtual researcher visits. In return, the Children's University offers visibility to the Young Academy Finland on its website and social media.

The meetings with the Regional Council of North Savo and with the deputy of Kuopio City provided good premises to increase the impact of the LEC. As all the region's municipalities are members of the Council, there is a stable basis to involve municipalities that did not yet participate in this project. The materials we shared with the Council are available for future distribution.

The LEC developed a vast amount of high-quality educational contents that will be used in the future to support STEAM teaching. The contents in the Digital World of the Children's University were initially directed at families whereas the contents of the Emill platform were directed at professional educators and students in the fields of education. However, contents of both platforms seem to interest both target groups. Therefore, all the created contents will be available cost-free on the Emill platform that is maintained by Ilona IT. ThingLink is a tool to further enrich the contents and improve their accessibility. The long-term goal is for camp counsellors, teacher training students and science journalists to contribute contents to the common database.

Quotes, Quotes and Quotes

Children's science questions to a science journalist and researchers of the Young Academy Finland's Meet a Researcher service.

How can you get into a black hole? Why is the sky blue? Why can't a person eat a thousand pounds of candy?"

A teacher from the municipality of Lapinlahti.

The contents in Emill service are good. I hope they can be used for even longer (after the science workshops)."

Creative Space

2.3.4. LEC Porto

Vítor Silva, Clara Vasconcelos, Tiago Silva and Bruno Pinto

Short Description of the LEC

The Porto LEC integrates institutions ready to develop new collaborative schools open to society ecosystems, providing teachers with valuable skills and promoting connections between the schools and their communities. It is based on the knowledge, expertise, and good practices of LEC partners.

In Portugal, non-formal education enjoys an especially favourable context in primary schools, but it is not properly developed in higher levels of education. Due to the emphasis placed on national exams, students from the secondary level are not really motivated to be involved in non-formal activities – they prefer to focus their time studying conceptual knowledge to achieve higher grades, which enable their college applications. For younger students, non-formal teaching and learning activities typically include visits to museums, to biological parks, to biodiversity galleries or botanic gardens, to scientific centres or even geoparks. Some teachers also develop visits to companies and research centres as part of their schools' vocational orientation program.

Porto LEC involved several schools and new partnerships to welcome innovative teaching projects in schools open to society. These non-formal education exchanges gather the experience of professors, professionals, teachers, families, and students.

STEAM4E "E" of Entrepreneurship was the project's motto. The Porto LEC aimed at fostering creativity and entrepreneurship ideas among young people. The expected knowledge sharing and the non-formal education activities were sustained by the inputs of the storytellers (namely market players in the areas of STEAM) and lecturers (entrepreneurs). In addition, to achieve the targeted skills and collaboration with other ongoing projects in the region will be pursued, like Youth Foundation contests about entrepreneurship and Science Exhibitions.

"Future Goals of the LEC"

- The Porto LEC has to open channels for developing new actions with diverse partners in the future and strengthen the collaboration of the already involved.
- The Porto LEC should be more focused on the importance of involving trainee teachers' in these types of activities, as teachers' basic training is reflected in their eventual personal and professional success.
- The Porto LEC intends to develop mechanisms to bring the University closer to schools and companies creating new projects that aren't simply about business and entrepreneurship, some already going on.
- The Porto LEC must develop more processes of communicating its activity to other stakeholders in order to spread the idea of opening schools to society.

LEC Activities

Some of the actions developed were based on connections between the schools and the University, and also some inspirational talks and conferences were organised with the aim of covering some topics related with STEAM (Science, Technology, Engineering, Arts and Mathematics). One of the actions involved a truss structure project, after an approach of several physics concepts

related to forces (application, direction and intensity). Students were able to understand how the trusses work, relating them with many buildings or bridges' structures. This was followed by a project where students themselves built bridge models using wooden ice cream sticks. These students were organised into teams, and all the models produced were submitted to the application of loads, in order to measure the maximum load supported.

At the same time, some workshops on youth entrepreneurship were developed, exploring the STEAM component as well. Many STEAM concepts were addressed during these workshops, which were designed in close contact with professors and researchers from the Porto Business School and the Civil Engineering Department at FEUP.

Whenever possible, the third generation was integrated in the professional development of the students, through the promotion of storytelling between the students, the third generation and the market players. The entrepreneurs' input, based on their own expertise, provided new knowledge development.

The starting point for the entrepreneurship approach was a process of inquiry among the students (basic and secondary levels) about their future interests and expectations, and how they could relate to the project; this was followed by a program about entrepreneurship for the secondary students, developed by the Porto Business School – these 12-hour workshops were an overview of the innovation entrepreneurship journey; a hands-on dive into relevant tools and methods for entrepreneurship and a way to learn, co-create and meet like-minded people. Concepts related to business plan, marketing strategies, startups, innovation, and design thinking were addressed. Building a startup is often very motivating, inspiring and usually rewarding, with plenty of new knowledge, experiences, unexpected opportunities and challenges;

that is why startups are called “ventures” or “journeys”, and also referred to as rollercoaster rides. In startups, students will learn more about the world, people, business etc. - much more than they can imagine.

In the entrepreneurship workshops, students discussed relevant concepts from the innovation entrepreneurship lexicon, learned about the startup journey and critical aspects of each phase, getting in touch with the startup development phases (problem, vision, product, business model and market fit).

LEC Outcomes and Results

a) Students:

Students were exposed to university subjects regarding STEAM and Entrepreneurship, which were presented in a simple and non-formal way. They benefited from extra-curricular contents and developed skills in an innovative way, complementing their school career with new topics and had the chance to develop new skills. They had the opportunity to work in teams with other colleagues from different school years and different classes.

b) Family:

The (grand)parents were receptive to the project and accepted the realisation of the activities with their (grand)sons and (grand)daughters. They showed us their enthusiasm with the workshops and also the participation of the family in the youth entrepreneurship program (together with Porto Business School) was very interesting.

c) Researcher/Universities

Due to the COVID-19 pandemic the developmental process of the project was quite slow and not much could be done at schools. In-person lessons were not allowed during the majority of the school year, and the few in-person lessons which took place were used to teach curricular subjects.

Nevertheless, a good contact was established between the university and the supervisors of teacher training students, and the main aims of the project were clarified.

d) Teachers

As already stated, schools closed at the end of January 2021 and students remained in distance learning until April 2021. Teacher training students and supervisors embraced the project, and only due to the COVID-19 pandemic were they prevented from developing most of the activities. Although face-to-face lessons and meetings were not authorised, online ZOOM meetings were done with teachers to present the development of the project. Some interaction with the students happened along the school year, and a moderate participation was attained.

e) Teacher Training Students

Supervisors of teacher training students collaborated with the project team, and were involved with the project insofar as the pandemic allowed. Despite their high motivation, the extra workload and unforeseen difficulties dealing with remote teaching did not allow them enough time to become more involved with the project, which had a negative impact over the planned results. Higher participation and involvement is anticipated in the next school year.

f) School Heads/ Policy Maker/ Government

Team members and School Heads established a good relationship, and they agreed to participate on the LEC work plan. The rules determined by the

government to avoid the spread of the COVID-19 pandemic restrict the development of the scheduled activities. It was possible, however, to engage students with the online platform "Escola-On". Even so, an increase of participation and involvement is expected in the next school year.

Implementation process – Collaboration in the Implementation Team

To ensure the successful implementation of the project, weekly and fortnightly meetings were organised, with emphasis on the following partners: Schools, Municipalities, Porto Business School and Associação Tempos Brilhantes.

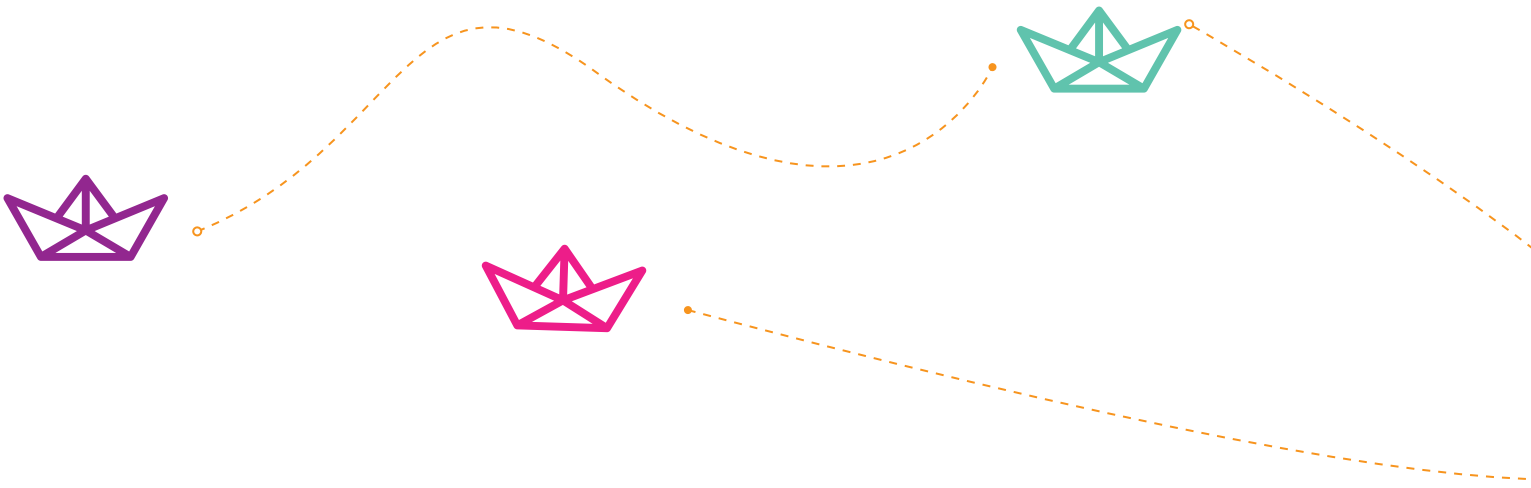
The general coordination was assumed by the University of Porto. Throughout the implementation process, the following were carried out:

- Online and face-to-face meetings: definition of the action plan with the Porto Business School and other partners. PHERECLOS online presentations to teacher training students and their supervisors.
- Together with the partners, we scheduled some inspirational talks and an inquiry process among the students.
- Development of an online platform with Escola-On, documentation, and guidelines regarding the work plan: http://phereclos.escola-on.pt/_
- PHERECLOS project online presentation in National Exhibitions, such as young scientists and researchers and young entrepreneurs.

In every student cohort a change in mindset was clearly perceptible. In the beginning of the workshops, students would verbalise their lack of entrepreneurial and creative skills, but every time it ended up with them being proud of the work they developed, the problems they explored and the prototypes they built.

These are the critical competences that students should embrace and take to their personal and professional lives - analytical and creative thinking, empathy, bias towards action, and an investigator mindset.

They learned that building businesses and coming up with innovative concepts is about constantly validating hypotheses – truly as scientists – a process which starts with a blank page, a neutral conception regarding a given topic or problem, and goes about exploring a new phenomenon, or opportunity in this case.



Impact and Sustainability

The Porto LEC was committed to get in touch with a vast audience in the educational field and in society.

The impact of the project was reflected in the teachers' comments and in the huge number of students that were engaged with the activities. Even during COVID-19 quarantine, the online actions were also very important.

The impact was also acknowledged by the families, especially the parents and grandparents who had a greater collaboration resorting to storytelling. The impact also reached other stakeholders, namely the CEOs of enterprises during the inspirational talks.

The Porto LEC team will continue to be involved in projects related to school open to society and seeking for national and international funds to pursue the aims of the PHERECLOS project.

It is expected that through the development of the Porto LEC the schools will connect transnationally and will develop synergies with local associations and companies to promote the development of entrepreneurship among school students and their families' involvement.

The Porto LEC consisted of a mix of government and non-governmental organisations with expertise working on European initiatives. As a result, a well-structured local, regional, and national level will assure the long-term viability of its outcomes. Furthermore, instructors, associations, and stakeholders involved in the Porto LEC are projected to have a larger multiplying effect, addressing the project's long-term objectives and sustainability. Even once it is completed, a significant amount of effort will be put into contacting and creating connections with a number of field associations.

The impact of the project was clearly the creation of some dynamism and novelty in the lives of our students and teachers. The students felt that something different and distinctive was happening, mainly outside the regular curriculum, and that it represented an opportunity for cultural enrichment compared to other student environments.

Students managed to fulfil their curricula but added social, cultural and technical skills to the portfolio already promoted by their courses. The CEOs invited to the inspirational talks mentioned that in recent times and in this country, they were unaware of anything resembling the type of action that we performed, and that this should definitely be the type of activity to invest in the future.

Entrepreneurs felt it is important to make themselves known, and to get to know students from a very early age in order to expedite employment and entrepreneurship opportunities. Many thanked the students for the ideas they shared and even invited the students to get to know their own companies.

From the perspective of the municipality, there was a search for answers about the continuity of the project and the expression of interest in holding events or programs with a similar structure to meet the motivation shown by entrepreneurs, students and parents.

Quotes, Quotes and Quotes

> *This was more cool than classes."*
>
> *Alexia Constantino, Teacher*

> *We want to open this to the whole community in Valongo."*
>
> *Lúcia Ramalho, Municipality of Valongo*

Creative Space

2.3.5. LEC Trieste

Valentina Mengarelli, Olga Puccioni, Francesca Rizzato, Paola Rodari

Short Description of the LEC

Trieste has an exceptional number of prestigious scientific institutions, many international, all involved in some sort of outreach activities. Many of these scientific organisations were already part of **Trieste Città della Conoscenza** (TCC), the network for the public engagement in science and technology promoted by the Trieste Municipality. Trieste LEC started exploiting these connections but aiming at the enhancement of competences and impact, and especially promoting the inclusion of schools in the partnership with a more proactive role. Today the Trieste LEC counts nearly 30 organisations (including companies and NGOs) and 6 more have asked to join.

The Trieste LEC has created, connected and made widely available the opportunities that the various institutions, but also the schools themselves, organise and offer, to enable each student to get in contact with science and scientists and establish an authentic relationship with them. A tangible product, which will remain after the project's end, is an **online platform** designed to collect and make accessible events, courses, materials and other opportunities for local schools - a digital public square, where to meet possible partners and co-create new projects.

With the focus on inclusion and diversity, the Trieste LEC aims at achieving a positive and long-term impact on the community, promoting dialogue and cooperation between research institutes, schools and other local actors.

"Future Goals of the LEC"

Increasing the science capital of young citizens, creating accessible, non-stereotypical and non-intimidating role models.

Proposing opportunities for amore real, authentic and meaningful dialogue between science and society.

Expanding and strengthening the network of schools, people and local institutions/associations, to make the experience of going to school in Trieste a unique experience for each student, also through the platform developed with the LEC partners.

Involving in the local LEC schools, pupils and communities still marginally involved in science education activities and science communication events.

LEC Activities

Trieste LEC has achieved to involve a wide range of diverse organisations, some of them as proper partners (nearly 30, and other joining also at the end of the project), others as organisations involved in specific activities only. We found a deep harmony of purpose, a common spirit and an enthusiasm higher than expected. An important achievement was the involvement of the University of Trieste as a whole: starting with two Departments only, in March 2021 the University decided for a full involvement and still represents one of the most active partners.

After the establishment of the LEC, we identified the **most significant lines of development** through a participatory process with all partners, and established the corresponding four working groups:

a) Internal and external networking

To strengthen the bonds between the partners and create synergies with new organisations. Despite the pandemic, we managed to meet regularly (by remote) and to keep alive the relationships among members. In 2022 a lobbying activity started to attract financial support for the future of the LEC, in particular for the maintenance of the platform and the Trieste Città della Conoscenza space and website. The newly elected Municipality authorities have been contacted and kept informed on needs and proposals.

b) Academy | Training

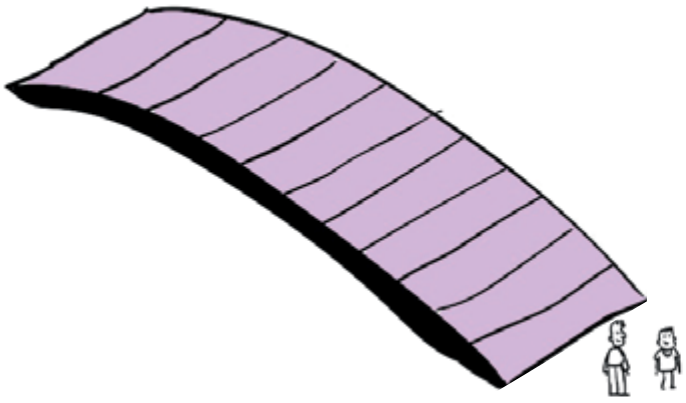
To share all internal skills and encourage self-training groups, peer-to-peer learning, co-creation of training opportunities. Besides the informal learning occurring in the common work we managed to organise several training courses of different length and for different audiences. The LEC online platform comprises an "Academy" section to continue the promotion of professional growth and to promote new courses designed by LEC partners.

c) Co-creation and citizen science

To encourage the co-creation of common projects in a participatory and inclusive perspective. This group designed a citizen science project, ZOOMare, that was launched on the 24th of September 2021 and closed the 30th of April 2022. Because of the pandemic, It did not achieve the number of participating citizens we expected, but it is considered by the partners a first test only of a project to be repeated in the future with all corrections the experience will dictate.

d) Platform: Website + search engine + LEC digitization

To conceive and design the web-platform, defining its structure, functions, services. The LEC platform has been successfully launched in April 2022 and we can count already on some success: by the 5th of May when we write this report, besides the original LEC partners, other 6 organisations manifested interest in joining the network, of which 2 sent a formal letter; 93 people registered as individuals to the platform, so that the Community (the base of a face-to-face service for the Trieste LEC) is taking shape.



LEC Outcomes and Results

a) Children:

Children and young people (4 to 18 years old) participated as possible (considering the Covid pandemic) in person and in remote activities, always with appreciation and enjoyment. We aimed at involving them also as protagonists, not only receivers, and we reached some success also in this direction. The Trieste Youth Council, an official programme of the Trieste Municipality, joined the LEC from the very beginning, bringing the voice of the children and helping all the partners to shape a LEC that better fits with the needs and wishes of children and young people. In February, the Provincial Council of Students joined as well, representing the wishes of young people (aged 14-19) to decide their future path both professionally and personally. Having young people as active partners in our LEC was one of our main aims and we were extremely happy to have reached this goal.

b) Parents

Parents was not an original Trieste LEC target. However, they were directly involved in two ways: many members of the LEC, affiliated to various organisations, are also parents, and as such they have brought their vision and contributed to the creation and programming of the LEC. The parents of the members of the Trieste Youth Council took part also in some of the activities (as the children were all under-age). This involvement was unintended and represented a positive side effect. Parents were also contacted for the ZOOMare citizen science project during NEXT, the local Science Festival. A more focused involvement will be one of the aims of the Trieste LEC in its future activities, after the end of PHERECLOS.

c) Teachers

The Trieste LEC has been based on a long and healthy relationship with teachers, educators and schools. It now includes representatives of all school levels. Some of the teachers have been enthusiastic and proactive collaborators, and deeply contributed to the shaping of activities. The Trieste LEC, also after the project's end, will continue to expand this partnership especially targeting some particular types of high schools, technical and professional institutes, which are on the margins of the educational system and do not often take advantage of the open schooling offers that Trieste already makes available.

d) Research Institutes / Universities

Most of the local research organisations, including the University of Trieste, are part of the LEC. The participation and enthusiasm has been higher than expected both in number and in terms of the quality of engagement. All have shared the same spirit to contribute to the creation of a better educational ecosystem, which is open and inclusive. The presence of the University of Trieste (that joined the LEC in March 2021) has been a great result that will give the LEC a much broader and more relevant horizon.

e) School Heads/ Policy Maker/ Government

Only one school head directly involved in a LEC working group. However, all schools involved got an official endorsement from their school heads and PHERECLOS is included in their programmes and educational plans. The involvement in the Trieste LEC of policy makers and government has not particularly improved during the project. The Municipality of Trieste is the promoter of the Trieste Città della Conoscenza network and of the CCRR (the Youth Council of Trieste), but because of the political situation (election time) and of the pandemic, at the beginning of the project its involvement did not get deeper. The Municipality Department of University, Research, Education was always kept informed and has always given its external support. After the renewal of the City Council, which took place in October 2021, SISSA Medialab's CEO and project manager of the LEC for SISSA Medialab presented the project to the CIty Counselor for Education (the town equivalent of the Ministry of Education) and received a warm interest. Another meeting with the City Counselor for Education was held in SISSA in the presence of SISSA Dean, again to discuss the sustainability of the LEC and other outreach common projects. In the next months it will be seen if this interest will be translated into a more proactive participation in activities and/or in financial support.

Implementation process – Collaboration in the Implementation Team

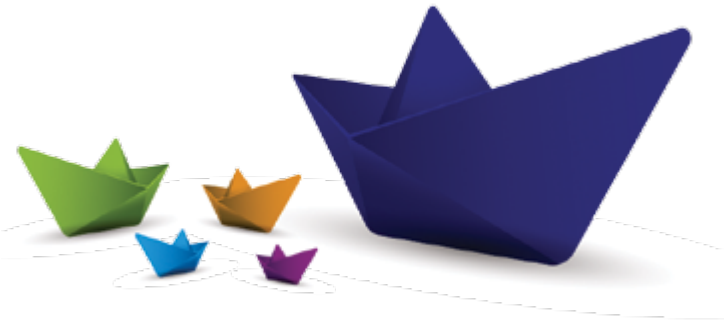
Communication between the members of the working group took place in the following ways:

- Collegial meetings of all participants (every 3-4 months)
- Small group meetings on specific topics (with frequency modulated on the actual needs)
- Individual or meetings in pairs to explore needs and desires, work on specific topics or tasks (i.e. the online platform), collect proposals in a more relaxed way than in collective meetings where only a few people can speak and have their say (during January 2021)

- Personal communications through various means
- Mails with synthetic reports of all meetings (large and small), decisions and conversations sent to all partners and stakeholders.

Communication has been based on a great mutual trust, sharing of the vision, desire to reach a common goal. There were no tensions or competing agendas.

Unfortunately, due to COVID restrictions, all group meetings for LEC implementation (but the last) took place digitally and only a few meetings in pairs or small groups could take place in person.



Impact and Sustainability

Despite the Covid pandemic, many public events were organised directly by the LEC partnership or by single organisations belonging to the Trieste science system, so that science and technology themes and people have been a visible, relevant presence in the town. The gap between the research community and society has been slowly but constantly decreasing in the last decades, and PHERECLOS' project has significantly contributed to this process, fostering the coordination between entities and with its special emphasis on transforming a top-down approach to the school-research institute relationship toward an open schooling, participatory approach. During the project life the collaboration between scientific institutions and schools has grown, if not always in numbers surely in quality, as the open schooling idea has widely percolated. This is a strong basis on which the future of LEC can build.

All scientific institutions are aware of a sustainability issue and many are ready to activate themselves to solve the problem - if it is true that much work is based on in kind contributions of the organisations, projects need also direct funds for services, professionals, materials, locations, etc. The discussion on sustainability is the main task in the last months of the project.

Quotes, Quotes and Quotes

A researcher, representing one of the universities/research partners said:

> *We thought it was important to be part of this project because we believe that in a Trieste, so full of research institutions and excellences, it would not make sense to develop the didactic of schools without taking into account this particular context and taking advantage of it. Therefore, there must also be a willingness on the part of scientific institutions and institutions for higher education to interact with schools. [...] This perspective of scientific institutions open to citizenship and especially to schools, is the reason why we want to continue the adventure of this project of open schooling. "*

A 15 year old student, representative of the Youth City Council:

> *The online platform of our Local Education Cluster is a functional place and very rich in opportunities. We could imagine it as a public square to exchange a lot of ideas and information. It is an excellent opportunity for a generational exchange: students desire to learn, schools desire to make their students passionate about the various subjects studied, and Trieste has so much to say about them through its leading scientific organisations."*

Creative Space

The following is a representation of the Trieste LEC:

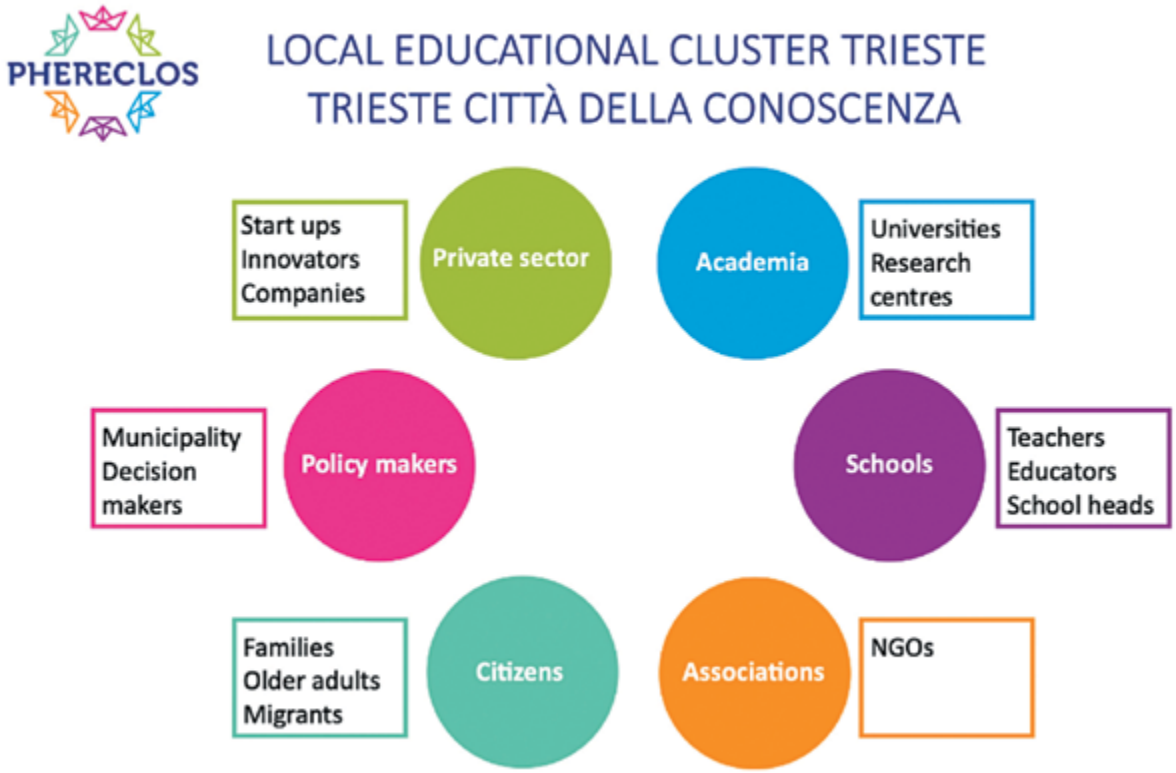


Photo of the T-shirts produced for the Trieste LEC. There are different types of T-shirts corresponding to the different stakeholders as indicated in the previous visual representation: policy makers, private sector, schools, academics...

2.3.6. LEC Vienna

Karoline Iber and Thomas Troy

Short Description of the LEC

The *Bildungsgrätzl*[1] and the Vienna Children's University (including seven universities) are two networks in Vienna that put into practise innovative education projects for young people with a strong perspective on social inclusion. Although both networks follow similar purposes, previously no direct links nor mutual support existed.

Within PHERECLOS, the Local Education Cluster (LEC) Vienna connected the networks and promoted the establishment of a shared, sustainable and structural cooperation between different actors. The aim was to bridge the gap between educational sectors (primary to tertiary) alongside non-formal educational institutions. As an alliance in innovative science engagement for the future, LEC Vienna will strengthen holistic, open and lifelong learning for 10.000 children involved in Children's Universities activities and 70.000 children connected to the *Bildungsgrätzl* (BG). It will bring science in the neighbourhoods and the perspectives of children and schools in the universities.

[1] The Austrian dialect word *Bildungsgrätzl* can be translated to „education (in the) neighbourhood".

„Future Goals of the LEC"

According to the work plan, the LEC Vienna started with three *Bildungsgrätzl.* In the course of the project, more *Bildungsgrätzl* and various other institutions expressed their interest in joining. Therefore, the widening of the already achieved impact and the development of mutual project ideas in cooperation with all interested parties will be in focus for the future. A detailed definition of the strategic direction and the general role of the network will bolster the sustainability of the LEC Vienna.

LEC Activities

In the initial project proposal, PHERECLOS intended to establish one of the six LECs in Mersin/Turkey. However, in the early planning phase, it became obvious that this LEC cannot be developed successfully due to organisational changes on the part of the partner organisations in Mersin. As the aspect of six different LECs as case studies to pilot diverse Open Schooling approaches was important for the PHERECLOS project design, the consortium decided to implement an alternative LEC in Vienna/Austria in agreement with the PO. With this project modification, the core theme of the respective LEC changed from individual work with school partners and a focus on technology in classroom settings (LEC Mersin), to a focus on the benefits of combining already existing networks in the formal and non-formal education sector (LEC Vienna).

The LEC Vienna pilot activities lasted from October 2020 until May 2022. The implementation process is completed and the cooperation between both parties will continue beyond the project lifespan. New projects are already in development, the collaboration is established and several "Letters of intent" for different project applications have been shared among the partners and made visible that collaboration is intended with a long-term perspective.

Within the *BG Kaisermühlen*, the LEC Vienna team jointly developed various experiment boxes with

household materials for a low-threshold approach and to foster enquiry-based learning. As immediate response to the pandemic the topic "virus" replaced the initial thematic subjects in the activities focusing on three main aspects:

- strengthening the immune system
- visualising invisible particles
- staying in contact despite of the pandemic situation

Besides the boxes, further online material from the Children's University network was provided to the children as well as to the teachers delivering additional background information.

All experiment boxes and materials are meanwhile in frequent use by the children and embedded in the teaching practice.

The main activity with *BG Wallenstein 2.0* was conducting the "First Generation" workshops. Initially planned for up to 15 school students, 35 first generation school students assigned for the program and attended continuously. Due to the high number of participants, two sessions were organised for each module. For a deeper insight, the implementation team invited guests connected to the tertiary sector to share their knowledge and introduce various support offers for all (future) students.

Month	Topic	Guests
June	Acquaintance	
July	Orientation	Students from University of applied science and University of Vienna
October	Information	Psychological Counselling Centre
November	Concretise	Austrian National Union of Students (ÖH)
February	Miscellaneous	Students from various universities and study fields to give personal insights

Due to the very strict COVID-19 regulations for universities and schools in Vienna, it was unfortunately not possible to realise joint projects with the *BG Am Alserbach*. Nevertheless, the Vienna University Children's Office maintained close contact and joined the *Bildungsgrätzl* in April 2022.

From the beginning, the LEC Vienna planned the expansion of the network beyond the pre-selected *Bildungsgrätzl*. In various meetings with stakeholders, the team actively asked to share ideas and to contribute to the network. To this day, more *Bildungsgrätzl* as well as other formal and non-formal institutions intend to join the LEC Vienna.

Parallel to the network activities, a *Science Engagement Projects for Schools Repository* and the *School Usability Check (SUC)* have been compiled within the LEC Vienna and are available on our website: https://kinderbuero-uniwien.at/en/science-communication/phereclos/

LEC Outcomes and Results

a) Children:

2100 children actively participated in the implementation phase of the LEC Vienna. Moreover, many other young people were informed about our projects and results within the other strands of STEAM engagement implemented by KUW. The modification of *BG Kaisermühlen* and the programme, which did not come to reality with *BG Alserbach*, resulted in fewer children involved than stated in the work plan. Additionally, the structure of the *Bildungsgrätzl* is different from how it was anticipated originally. Regardless of this fact, children from elementary to upper secondary educational institutions were involved in the LEC Vienna. They have helped bring the networks together and connect the elementary with the tertiary sector.

Despite the situation, both online and outreach formats were used to involve as many children as possible in the LEC activities. Due to the restrictions, it was impossible to invite large numbers of children to the premises of the university or to the "DOCK". The ongoing cooperation, along with formats that are in development, enable workshops and programmes to be conducted at the university.

b) Parents:

In a counselling meeting with the advisor of the International Parents Alliance (IPA) the involvement of parents and their significant role in Open Schooling culture was discussed. Valuable input was received concerning parents as an important stakeholder group, which will be taken into account for future scaling-up activities of the LEC Vienna. Considering the current structures of the involved *Bildungsgrätzl* and the initial set-up of the LEC Vienna, it was nonetheless decided to focus on a parent involvement at a later stage after the fundamental implementation of the LEC.

However, in cooperation with the schools, the LEC team reflected on the possibilities to involve parents. An important focus in the LEC Vienna was the social dimension and the inclusion of vulnerable groups, causing increased language barriers. As no face-to-face meetings were possible and most parents could not be reached through online activities, the parents were involved via the children. Exhibitions and school newspapers informed the parents about the LEC activities. As an example, all crafts designed by the children of the kindergarten were exhibited publicly in the foyer of the UNO City in Vienna.

c) Researcher/Universities

All seven universities of the Vienna Children's University network and 167 researchers actively contributed to the LEC Vienna. In various meetings and events, researchers from universities and other non-formal organisations showed their interest and requested further information of upcoming projects.

As an unintended outcome the Austrian Academy of Science decided to celebrate the 175th anniversary with a comprehensive school programme for 900 children supported by the Vienna University Children's Office as a direct consequence of visible achievements of the LEC.

Moreover, and potentially even more relevant, the University of Vienna announced the inclusion of First Generation into their performance agreement, valid from 2022 to 2024, at the end of 2021 – which can be considered one of the most important outcomes with respect to policy and structural embedding.

d) Teachers

In the course of the LEC Vienna, 155 teachers were actively involved. Their contributions range from conducting experiments together with children or serving as contact persons, to advising the implementation team regarding the needs and ideas of the various target groups. In the annual *Bildungsgrätzl* meetings and by promoting the LEC, more than 90 additional teachers stated their interest for future involvement.

e) Teacher Training Students

Since the aim of the LEC Vienna was to connect both existing networks, which have no explicit focus on teacher-training students, the implementation team agreed not to include them during the

process. Nevertheless, the outcomes of the activities were distributed among different communication channels of teacher training students (social media) and especially the "First Generation" activities were discussed by approx. 100 teacher training students, who are actively involved in social inclusion activities of the Vienna University Children's Office, like the "UniClub" initiative

f) School Heads/ Policy Makers / Government

Among school heads, policy makers and governmental organisations, setting up one mutual network ranging from elementary to tertiary sector was seen as an important step and in consequence assured their support beyond the project period. Overall, 25 school heads, 16 governmental organisations and 10 policy-related individuals helped develop the network with many more to promote the LEC Vienna idea.

Furthermore, two school heads and one governmental organisation declared themselves committed to a sustainable partnership.

As an unintended outcome and result of the cooperation and triggered by the positive achievements within the LEC Vienna, two school heads from BG *Kaisermühlen* applied for the very first time for the "*Young-Science-Seal of Approval for Research Partner Schools*" awarded by Austria's Agency for Education and Internationalisation (OeAD), which represents just another unintended but highly impactful outcome.

Implementation Process – Collaboration in the Implementation Team

Since the beginning of the cooperation, frequent meetings between the core group of the implementation team were held to discuss and monitor progress, challenges as well as next steps. The frequency was necessary since various tasks were overlapping and therefore discussing strategic alignments were crucial. Additionally, the team had numerous meetings with both *Bildungsgrätzl* to exchange further ideas or detect challenges as soon as possible.

The annual *Bildungsgrätzl* meetings as well as a meeting with special focus concerning the LEC Vienna were highly important for the promotion and implementation process. Due to the great number of participants, all relevant stakeholders got at least an overview of the LEC Vienna

Bildungsgrätzl Meetings:

- December 15th 2020: 121 participants
- December 1st 2021: 132 participants

Meeting with special focus on the LEC Vienna:

- April 13th 2021: 50 participants

In the progress of the project both partners focused on reaching out to smaller groups of stakeholders to disseminate the learnings and outcomes as well as discussing further project ideas and the option to participate actively in the LEC Vienna.

Impact and Sustainability

The LEC Vienna had a broad impact regarding cooperation both on the individual level as well as on a policy level.

As stated, the University of Vienna expressed strong commitment in the First Generation Program from the beginning of the development period. The implementation team continuously shared updates and feedback with the vice-rector. As a result, the University of Vienna integrated the program in the current performance agreement, the leading document of commitment between the Austrian Federal Ministry of Education, Science and Research and the University of Vienna, valid from 2022-2024. Therefore, the First Generation Program will not only continue but expand and is going to be sustainably embedded into the strategies in the field of "social dimensions" of the University of Vienna (including diversity strategies and improvement of the service units for students in terms of accessibility). The program will be adapted and further developed in consultation with school students from the Gymnasium am Augarten and, as a new partner school of *BG Enkplatz*, the Gymnasium Gottschalkgasse. This organisational anchoring is one of the most important achievements of the LEC Vienna and a major policy success. (Further information and news at www.first-generation.at)

Although the cooperation with *BG Alserbach* could not be executed due to COVID restriction, the Vienna University Children's Office reached official agreement to directly join the *BG Alserbach* to become an active member from now on. Vienna University Children's Office will open a new space for science engagement projects for schools (called "The Dock") by the end of the PHERECLOS project and as a starting point for mutual projects as a part of the *BG Alserbach*. First ideas and relevant topics were already discussed and agreed on. Joining the BG is a direct effect of the LEC Vienna cooperation. The concept of the "DOCK" is highly influenced by the learning in the LEC Vienna and will become a hub for Open Schooling in Vienna (www.dock.at).

In the same manner, the cooperation with *BG Kaisermühlen* will continue, both on an organisational level as well as on the level of individual schools. Two primary schools shared a letter of intent expressing their interest in a leading role in a national project funding call regarding climate, which is under review currently. Letters of intent were also sent by the central administration of the *Bildungsgrätzl* initiative as well as the Council of Education of the City Vienna. In case of approval, the project will start in September 2022.

The successful implementation of the LEC Vienna will continue beyond the PHERECLOS duration and the cited cooperations. With several *Bildungsgrätzl* like *BG Enklplatz* or *BG Ottakring West* meetings were held to discuss their needs and ideas and possible contributions. The LEC Vienna team will continue participating and presenting Open Schooling culture in the annual *Bildungsgrätzl* meetings. Since the implementation process is successfully completed, the next steps are discussing and planning the future strategic direction. Additionally, the new DOCK will give all stakeholders of the LEC Vienna an opportunity of participation in a self-supporting network to ensure a lively and low-threshold exchange among all participants.

Quotes, Quotes and Quotes

Kindergarten-educator *Bildungsgrätzl Kaisermühlen:*

The project "The Virus and Ourselves" took its course via special input and led to a unique dialogue between the Vienna University Children's Office and our Kindergarten. This cooperation has taught me that the best materials and the best initial conditions are not always the primary criteria.

Rather, I found more important:

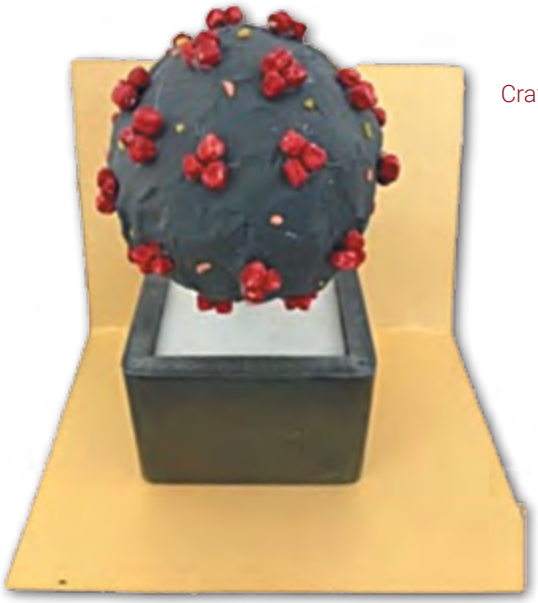
- *to have partners for other perspectives and impulses (Vienna University Children's Office).*
- *to get a feeling of not working alone on an initiative (networking).*
- *to be a part of something bigger ("Bildungsgrätzl-Kaisermühlen"), where the experience of one can be beneficial to others.*

The cooperation with the Vienna University Children's Office has raised my pedagogical work to a new level.
I am very grateful for that."

Quotes from four First Generation school students

The workshop is very helpful. I take a lot of information from the workshop. I learn new aspects all the time. Now I have an idea which study programme I can or will choose."

Creative Space



Craft from BG Kaisermühlen children of the UNO-City kindergarten:

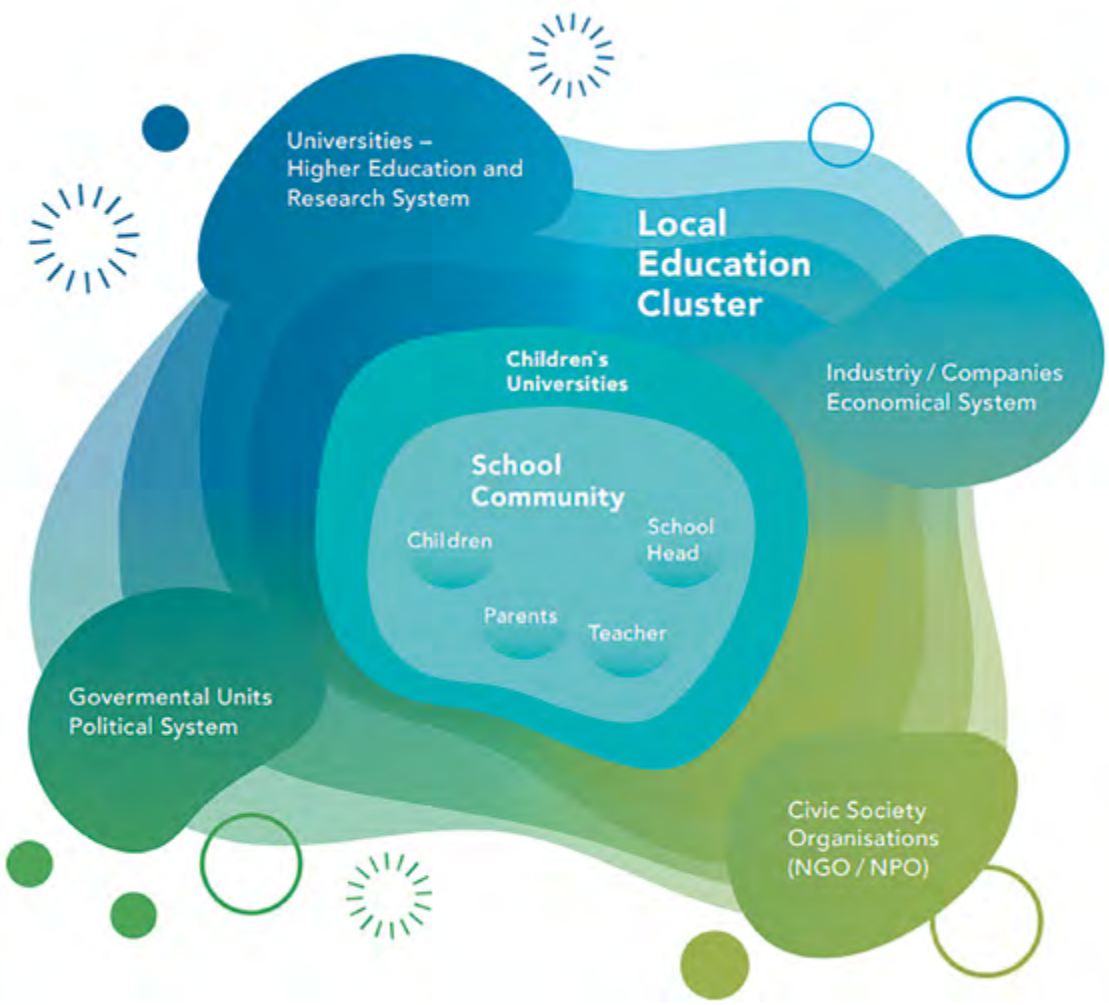
Workshop group with Vice-Rector Maier (University of Vienna), Zaya Ahmad (District Mayor 9th District) and Karoline Iber (Managing Director Vienna University Children's Office)

Evolution of the local ecosystem of education via the LECs

In the course of the implementation and evolution of the LEC, there were growing reservations about the modified structure (see chapter 1.1: Initial Structure and Targeted Structure), not being truly reflecting the relationships being developed in the respective LECs: In a joint process, our pilot LECs found new vocabulary that better describe an image of LECs: fluid, organic, diverse, colourful, in motion, non-linear.

PHERECLOS has revealed: LECs do not act like machines, but grow and develop in an agile way.

Therefore, a new image was developed:



The partners around the school structures remain as fluid as the activities in the schools including all members of the school community (children/young people, teachers, school heads and parents). The four headlines "Civic Society Organisations", "Governmental Units", "Universities" and "Companies" are still important keyplayers, but in a much more dynamic way, and new players appear, like journalists, refugee organisations, womens networks, voluntary groups, sport clubs... symbolised by stars and bubbles around the key dimensions. Some are more active than others, some are continuously involved, others selectively.

In conclusion, it can be noted that a LEC structure is never complete and remains in a constant state of flux, continuously evolving in a very organic way. That's why LECs remain interesting, useful and innovative places of learning for all participants in the long term.

2.4. TRANSNATIONAL EDUCATION MENTORING PARTNERSHIPS (TEMPS)

Jerzy Jarosz and Karen Pesjak-Brownlee

2.4.1. Introduction

The TEMPs Programme

The Transnational Education Mentoring Programme (TEMPs) was an important means for the PHERECLOS project to promote and disseminate the Open Schooling approach in European education systems.

The TEMPs programme was established between entities representing at least four organisations active in at least in two different sectors and located in at least two different countries. European organisations from various areas of the education sector, industry and administration with different experiences and profiles took part in the mentoring programme. The international nature of the partnerships and the adopted work plans ensured the combination of their locally defined educational activities with the pan-European context.

The task of the TEMP Programme was to create a snowball effect in European countries in terms of implementation and dissemination of transferable results (models, recommendations and studies) obtained from the inventory and analysis of good practice cases (CROSS-REF), as well as from the implementation of Local Education Cluster (LEC) models.

> *This project has helped us realise that the education of young people cannot be reduced to the confines of a classroom, but that we must make an effort to open it up to society and the community."*
>
> *(TEMP 1)*

After completing the recruitment and selection of applications, ten TEMP partnerships were selected, encompassing 44 institutions, with each TEMP consisting of at least four partner organisations located in at least two different countries and belonging to various sectors. The organisations were operational in a total of 15 European countries.

Each TEMP developed its own work plan and has functioned as a kind of incubator, connecting well-experienced actors and newcomers in both formal- and informal education sectors in the development and application of Open Schooling models.

	Type of TEMP partner organisations	Number of organisations in TEMPs Programme*
1	SCHOOL OR SCHOOL AUTHORITIES	18
2	HIGHER EDUCATION ESTABLISHMENT	11
3	TEACHER TRAINING INSTITUTION	1
4	OTHER EDUCATION PROVIDER (NON FORMAL)	2
5	RESEARCH ORGANISATION	1
6	CHILDREN'S UNIVERSITY	6
7	CIVIC SOCIETY ORGANISATION, NGO	12
8	COMPANY, INDUSTRY	1
9	FORMAL EDUCATION ENTITIES	30
10	NON-FORMAL EDUCATION ENTITIES	22

Table 1. Participation of educational and other organisations in the TEMP partnerships established.

The implementation of the Mentoring Programme increased the number of countries participating in the PHERECLOS project from 10 to 18 thereby significantly increasing the number of institutions and communities involved in the project implementation.

Table 2. The distribution in Europe of the organisations forming the PHERECLOS consortium and the TEMP partnerships.

Open Schooling in the TEMPs Programme

TEMP partnerships were formed in line with the fundamental understanding of Open Schooling as a driver for innovation in education as part of the overall mission of the PHERECLOS project. "*Running a school in a way that reflects external ideas, themes, and challenges and incorporates them into the school teaching approaches and daily school life. In return, it provides creativity and potential as an asset to students and teachers for the community around them.*"

The individual work plans adopted by the TEMPs included tasks aimed at creating collaborative and community models that encompass a wide variety of education providers - in both formal and informal settings. This premise influenced the way schools operated in a way that allowed them to reflect on external ideas, themes, and societal challenges. Schools were allowed to integrate this input into their day-to-day teaching methods and school life, also in interaction with out-of-school teachers.

At the same time, Open Schooling increased the openness of schools to the surrounding community and made it possible to support the involvement of people and nearby, non-school, organisations systematically. In this way, schools could provide and support their 'students and teachers' creativity and potential as assets for the community - and vice versa - to use the (educational) local community resources that surround them.

Incorporating external ideas into everyday school practice and enriching approaches to education with elements and topics that broaden the core curriculum allowed schools to reflect and respond to external challenges - thereby linking education to real-life experience and to seeing the world as it looked like for children and youth.

The PHERECLOS approach considers this combination of the educational and everyday spheres to be a fundamental principle of accumulating scientific capital and critical thinking which can increase STEAM education and understanding.

TEMPs' activities and programmes stimulated new approaches to teaching and education and enhanced teachers' existing knowledge and competencies.

Two periods of work plan implementation

The various mentoring partnerships started their operations in February 2021 following the approval of the individual work plans by the University of Silesia in Katowice, representing the PHERECLOS project Consortium. The individual work plans described a programme implementation in two stages, starting with a first stage of four months (February to May 2021), followed by a second stage from June to December 2021 or seven months.

The first stage of the Mentoring Programme coincided with the very high intensity period of the COVID-19 pandemic in Europe, and consequently, all planned mutual on-site visits between TEMP partners had to be cancelled and many activities had to be continued online. The work plans were modified accordingly and most of the TEMPs made use of the work plan extension until the end of March 2022, and they were therefore able to implement many of their earlier planned activities.

2.4.2. Ten different TEMPs

The table below lists the different Transnational Education Mentoring Partnerships.

Transnational Education Mentoring Partnerships (TEMP) Highlighted - TEMP Coordinators					
Temp Number	Partner 1	Partner 2	Partner 3	Partner 4	TEMP Countries
1	UNIVERSITY OF PORTO **PORTUGAL**	UNIVERSITY OF SANTIAGO DE COMPOSTELA **SPAIN**	PORTO BUSINESS SCHOOL **PORTUGAL**	PROFIVAL – ESCOLA PROFISSIONAL DE VALONGO **PORTUGAL**	**PT - ES**
	IES LUCUS AUGUSTI **SPAIN**	IES ARCEBISPO XELMIREZ II **SPAIN**	IES A NOSA SEÑORA DOS OLLOS GRANDES **SPAIN**	ASSOCIAÇÃO TEMPOS BRILHANTES **PORTUGAL**	

2	OSEDA Association Open Source Software **AUSTRIA**	CITILAB **SPAIN**	Stichting Montessori Lyceum Amsterdam **NETHERLANDS**	Stichting Sctratchweb **NETHERLANDS**	**AT- ES - NL**
3	Kinder Uni Gottingen **GERMANY**	NEANIKO PEDIKO PANEPISTIMIO ELLADAS **GREECE**	GRENZLANDMUSEUM EICHSFELD E.V. **GERMANY**	DEUTSCHE GESELLSCHAFT FUR BILDUNG **GERMANY**	**DE - GR**
4	FUNDACJA UNIWERSYTET DZIECI **POLAND**	M-Powered Projects Limited **IRELAND**	OPEN FUTURE INTERNATIONAL SCHOOL **POLAND**	UNIVERSITAT AUTÒNOMA DE BARCELONA **SPAIN**	**PL- IRL- ES**
5	UNIVERSITATEA DE ȘTIINȚE AGRONOMICE **ROMANIA**	LICEUL TEORETIC BILINGV ”ITA WEGMAN” **ROMANIA**	EDUPLUS SOCIO - EDUCATIONAL ASSOCIATION **SPAIN**	PLANETA CIENCIAS ASSOCIATION **SPAIN**	**RO - ES**
6	ASOCIACION DESES3 **SPAIN**	UNIVERSIDAD DE VALLADOLID **SPAIN**	M D.O.E. ESCHOOL EDU GROUP **GREECE**	DIEYFTHYNSI DEYTEROVATHMIAS N. KARDITSAS **GREECE**	**ES - GR**
7	RIGA TECHNICAL UNIVERSITY CHILDREN’S UNIVERSITY **LATVIA**	SNITFLADEN KLIMA ZIRKUS -BUILDING WORKSHOP **DENMARK**	BABITE SECONDARY SCHOOL **LATVIA**	STUDIE17 DANSBORG **DENMARK**	**LV - DK**
8	FACULTY OF GEOGRAPHY, UNIVERSITY OF BUCHAREST **ROMANIA**	GIRESUN UNIVERSITY **TURKEY**	GIRESUN BULANCAK YALIKÖY ŞEHIT PRIMARY SCHOOL **TURKEY**	“SF. ANTIM IVIREANU” TECHNOLOGICAL HIGH SCHOOL **ROMANIA**	**RO - TR**
9	LIGET MŰHELY ALAPÍTVÁNY **HUNGARY**	SALGÓTARJÁNI ÁLTALÁNOS ISKOLÁJA **HUNGARY**	KLG KOSSUTH LAJOS ÁLTALÁNOS ISKOLÁJA **HUNGARY**	PETŐFI SÁNDOR ÁLTALÁNOS ISKOLA **SERBIA**	**HU - SRB**
10	ISIS EUROPA **ITALY**	UNIVERSITA DEGLI STUDI DI NAPOLI PARTHENOPE **ITALY**	COLEGIUL TECHNIC CONSTANTIN BRANCUSI **ROMANIA**	LICEUL TEHNOLOGIC ”DIMITRIE LEONIDA” PETROSANI **ROMANIA**	**IT - RO**

Table 3. The 44 partner institutions and organisations formed 10 TEMP partnerships.

It is not only the composition of the individual TEMP partnerships that varied considerably. Also, the nature of each of the partnerships and their primary areas of activity varied greatly. Most of them used the previous experiences of the organisations forming the TEMPs, which, modified and expanded, became the common denominator of the partnership tasks.

TEMP 1. STEAM for Entrepreneurship - STEAM4E (Portugal – Spain)

Eight organisations created the partnership in the neighbouring regions of Galicia, Spain and Northern Portugal: two public universities, a higher education institution, two associations, and three schools.

The need to transfer the Local Education Cluster (LEC) Porto's activity to Galician high schools and enable the partners, especially the XuvenCiencia at the University of Santiago de Compostela, to apply the mission goals in Galicia independently was the impulse to create the partnership. The project's fundamental base was the excellent background and long experience organising scientific camps and other activities promoting scientific and technical vocations of the two university partners, the University of Porto and the University of Santiago de Compostela.

Galicia belongs to one of the least developed areas in Spain. The rate of business creation is also one of the lowest. Within this context, the integration and reinforcement of entrepreneurship within the Open Schooling activities of XuvenCiencia in Galicia are of particular relevance and impact. In this pilot project, the STEAM4E concept was first offered to students and teachers of the existing *STEMBach excellence initiative* of the Galician Government, which provides both very motivated and well-trained teachers and qualified and interested students in the last two years of secondary school. As Galician STEMBach does not integrate entrepreneurship into its objectives, broadening the initiative's vision became one of the project's significant tasks.

Target Group

Target groups were students from Galician baccalaureate of scientific excellence who collaborated with students from the fourth year of compulsory secondary education and students from training cycles in health, aesthetics, hair care, and beauty.

Achievements

The key achievement was the creation of a cross-border network involving different actors: universities, institutes, vocational schools, children's universities, and private sector companies and organisations which provide educational services and training to ensure quality education.

> *It was the first time doing a project about Open Schooling but I think we were doing Open Schooling already for many years. We collaborated with many students, we brought the students together with different companies and universities. We helped the teachers at schools to have a wider vision as a primary school teacher. This was a big problem in Spain, not teaching 'learning by doing'. So, this project helps them to learn to get out and to have hands-on learning. The idea of entrepreneurship – that was more difficult than we thought but we definitely want to go on with this vision."*
>
> *(TEMP 1)*

The pre-university students understood the project's philosophy and were able to create groups, work in teams, and develop business ideas rooted in the territory and based on the sustainable development goals (SDGs). Students were able to defend them in public in front of other students and teachers from the rest of the participating schools. Satisfaction with the knowledge that a small community, which is beginning to operate as a pilot project, can function on a larger scale was an important supporting factor.

> *Galicia and the North of Portugal have a lot of cultural and historical connections which made it very interesting to meet and to have such a programme. For the students it was very interesting to learn that our cultures are very similar but also different. It was a very beautiful experience for the students and teachers."*
>
> *(TEMP 1)*

As a result, an effective introduction of an entrepreneurial culture combining content linked to scientific and technological innovation, local needs and sustainable development appeared to be successful.

TEMP 2. NL Turtlestitch: stitching and learning across borders (Austria – Spain – the Netherlands)

Two NGO organisations, a foundation, and one Montessori school created a very successful partnership.

The main goal of this TEMP was to improve the use of *TurtleStitch*, a freely available educational web application based on the practices and experiences of its active international community. The tool is about generative design constructed with a graphical programming environment and is mainly used for output on embroidery machines. It perfectly combines coding and computational thinking with the "A" in STEAM – the arts. The participating partners in the TEMP group work in different educational contexts have all met through TurtleStitch.

All partners already had significant experience in teaching and learning with TurtleStitch. It has a highly creative approach and attracts people from different backgrounds, cultures, and geographic locations. Citilab from Barcelona, a leading living lab in Cornella, Catalonia, focuses on an inclusive approach to technical development, prioritising bottom-up development and the self-articulated needs of local communities and citizens. As a formal education partner, Lyceum Montessori from Amsterdam addressed the possibilities and limitations of a school framework. In contrast, Oseda from Vienna has supported specific software development, always with a focus on open educational concepts.

Target Group

About 150 people were reached directly through the workshops. At conferences, more than 400 people participated, mainly professional educators and developers. Through the website and social media, an estimated 5000 people were reached.

Achievements

The significant achievement was the intense bonding of the partners in the programme, despite no possibility to meet in person due to the Covid pandemic. A productive culture and framework for collaboration creating synergies out of institutional and contextual differences was established.

A great success was the global outreach to different target audiences in two high-profile conferences: SNAP! conference and Mozilla Festival. In the keynote "The power of diversity" at SNAP! conference, TEMP partners were able to present their work. Partners mentioned the success of agreeing on concrete work packages and the methods of realising them as detailed above. Also, there has been considerable improvement of the TurtleStitch infrastructure, particularly for the registration of groups (school classes, workshop participants, etc.).

> *By getting to know the different practices of our partners, a realisation has arisen in dealing with new target groups."*
>
> *(TEMP 2)*

TEMP 3. Dilemmas in Sustainability (Germany and Greece)

The partnership was formed by two Children's Universities from Germany and Greece, and two associations - non formal education providers.

The main task of the partnership was to introduce children aged 10-14 years to the assumptions and goals of the idea of sustainable development. Proposed activities enabled them to discover playfully, analyse theoretically, and get in touch practically with the conflicts from aligning the theory of the SDGs and their reality. They addressed the question of which dilemmas exist between the different sustainability goals. In this way, children's resilience in the face of ambivalence was strengthened with young people seeing how they can actively shape social transformation together.

The starting point for the development of the teaching programmes for children in grades 3 to 6 were stories (developed by Neaniko Pediko Panepistimio Elladas) from Greek mythology and legends that make connections to the SDGs. The courses were planned as Children's University seminars. They were developed to sensitise and make students aware of the importance of cultural aspects and questions of democracy and human rights. For example, by using the myth of Hercules and Augelas' stable, children quickly came upon the dilemma between SDGs 6 (clean water), 11 (sustainable communities), and 14 (life underwater). It was an actual situation because the creek flowed through the village where they lived or even through their school campus so that they could treat the problem and dilemmas by being personally involved and concerned.

Target Group

The leading target group was school pupils 6-13 years old – about 1400 children benefited from the TEMP products.In addition, over 70 teachers got prepared materials, and about 200 web visitors used offered sources.

Achievements

The most important result of the programme has been the intensive exchange and close cooperation with other Children's Universities established between partners with very different backgrounds. Many educators and educational organisations were given the chance to get involved and provide diverse perspectives. There were innovative ways of developing - especially artistic - approaches to communicate the abstract SDGs to children. This is one of the key strengths of a TEMP - a collaborative educational programme that addresses real-world challenges. All TEMP partners profited from this cooperation by exchanging ideas and concepts, with the collaboration continuing beyond the project end.

> *In particular I liked the blended activities that lead to learning and that can be used in both physical and digital spaces, the collaborative thinking and the opportunity to create tools for analysing and rethinking the teaching-learning interchange."*
>
> *(TEMP 3)*

TEMP 4. Design Thinking Education (Poland, Ireland and Spain)

This partnership brought together institutions from 4 different sectors from three countries: a foundation - a children's university, a company supporting educational institutions, a public university, and a primary school. Each of the partners had different, unique, experiences related to developing STEAM competencies, which was the greatest value of this TEMP.

The main topic of this TEMP's activity was 'STEAM in primary schools' – how to develop, implement and manage educational programmes to meet the needs of students and teachers, by involving scientists, professional staff, and experts in many fields. Based on each partner's experience and specialisation, the TEMP focused on aspects such as creativity, questioning and experimental methods, motivating teachers, and future competencies.

What made this approach innovative was the perspective in which the teacher is at the centre. The TEMP was committed to supporting teachers in developing social competencies, conducting lessons using project tools and design thinking methods, paying attention to work-life balance and well-being.

Target Group

About 500 teachers participated in the programme.

Achievements

The essential result of the programme was learning and developing the design-thinking method. It was a very efficient method to identify barriers and needs in the education sector. The technique was appreciated as a work tool both by the Children's University (CUF) team and by the Open Future International School (OFIS) teachers and students.

Further achievements were the enhancement of partners' knowledge in STEM education, as well as the mutual exchange of experiences which resulted in many new insights in this field (the role of curiosity and stereotypes in STEM education, building STEM identity, etc.). Also, the building of a network between partners – collaborating with project partners provided a sense of community, the possibility to learn from each other, and the opportunity to create more things together. The cooperation resulted, among others, in a webinar for the community of primary school teachers gathered around the Children's University in the Classroom programme and additional training for OFIS led by M-Powered; and the dissemination of the materials and lesson plans between OFIS's teachers.

TEMP 5. Hands-on the Ground (Romania - Spain)

This TEMP emerged from an agreement between the state University in Bucharest, a high school, a non-profit educational organisation, and an NGO association supporting teaching science.

The goal of the cooperation was to create a network of professional support to increase the professional skills of scientists, researchers, teachers, school managers, and trainers through creating educational programmes about healthy and sustainable lifestyles, capitalising on the Waldorf methodology related to openness to nature and science. The implemented programmes and the

university environment were used as a platform for TEMP activities and enabled students to obtain effective cognitive development through practical activities.

Target group

Scientists, researchers, teachers, school managers, children's university students.

Achievements

The most important result of this TEMP activity was a solid foundation for a long-term collaboration between teachers in Romania and Spain to innovate together in the field of education.

New learning methods in the Romanian school were introduced in cooperation with the University of Agronomic and Veterinary Sciences through exchanges of good practice, activities, and projects bringing students closer to nature and considering the social context. The projects were developed in partnership with the Children's University of Bucharest managing to activate and explore students' own resources and letting them work as task organisers and leaders.

The practical workshops conducted in Tenerife revealed how important it is to capitalise on local resources, crafts, traditions and local culture. The intercultural exchange was a highly beneficial exploration method for finding new horizons and practical educational possibilities.

A significant result was also the increased understanding among students that through simple things, working with their mind, hands, and heart, we may find new ways to learn, innovate and create new values in education (and life).

TEMP 6. Tuning Methodologies to Educational Fields (Spain and Greece)

What makes this TEMP unique is the diversity of educational fields represented by the partners: a youth association, a university, an adult education centre, and a directorate of secondary education.

The partnership aimed to create a cohesive and collaborative educational system that may provide knowledge, transferable skills, and competencies according to the requirements of current globalised societies. The critical need for that was to create an extended, lasting network of essential actors of the educational system, to share experiences, best practices, and innovative educational methodology in working with different target groups (children, youth, adults) blending formal and non-formal didactic methods.

Each partner benefited from the experience and expertise of professionals in the most diverse educational fields. By bringing them together, it was possible to map the needs not only of the teachers but also the learners in terms of innovative methodologies and activities suitable for acquiring current knowledge and skills.

Target group

The leading target group involved in the project contained youth workers, trainers, facilitators, and university professors, especially the ones teaching in the educational and pedagogy field and their students, adult educators and learners, public administrators officials, and teachers from secondary education and their pupils.

Achievements

The significant result of the TEMP was the creation of the Educational Guide, containing a theoretical part describing the innovative methodologies and their appliance in the different educational sectors and a practical one with proposed activities based on these methodologies for each educational field (school, youth, university, adult education).

The actual suitability of the guide was checked by involving educational professionals in the training course, piloting the activities, and using feedback to validate the guide and demonstrate its real value.

The scientific article, which had its grounds in the entire work performed by the TEMP, was published in UVa's magazine. It provided the TEMP results and PHERECLOS project more comprehensive visibility and reached other target groups.

TEMP 7. Experiment as the Engineering education tool (Latvia and Denmark)

The Latvian-Danish TEMP was set up by the Children's University at the Technical State University in Latvia with two secondary schools in Denmark, and a teacher training consultant house in Denmark.

The TEMP's main focus was promoting interest in engineering studies among young people. Problems and topics, and issues of interest to teachers related to STEM teaching that could be used in their daily work were identified. All school environments in Latvia were involved, and a permanent cooperation was established with partners in Denmark.

The programme aimed at improving the material and technical base of students' teaching. The engineering teaching materials were designed and created to be used individually by each student and to help with the recognized lack and shortcomings of the current didactic equipment. Experimental boxes for students, to be used by teachers in both countries, were developed. Several types of education boxes have been produced that can be sent to students all over Europe.

> *We need more support for teachers with hands-on activities and teaching materials that help students work in practice. We will create new teaching materials in STEM areas."*
>
> *(TEMP 7)*

Target group

Several hundred teachers were involved in the project, including STEM teachers from all over Latvia, several dozen university lecturers, PR specialists, and students from partner schools.

Achievements

The mentoring programme established the successful collaboration of Latvia and Denmark partners, creating an energetic team and acquiring experience in engaging students in performing experiments related to many science topics. The material and technical base have been significantly improved to make learning more convenient for students by creating the teaching material as 'an experiment in a box.'

An ongoing dialogue has been established between teachers, the university, and public education authorities, and many new ideas and collaborations are planned for the future.

> *There are lots of opportunities to work further together based on our experiences in this partnership. During Covid- time, I understood that the teachers were overwhelmed and challenged with their own students, and had no time to deal with others. There were huge challenges but we have the perspective that when Covid slows down there will be more opportunities to motivate teachers to participate in Open Schooling activities. We got many ideas from this project."*
>
> *(TEMP 7)*

TEMP 8. Education In a Virtual Amphitheatre (Romania and Turkey)

This TEMP came about due to an agreement between Romanian state university and Romanian high schools and Turkish state University and Turkish primary schools.

The TEMP focused on creating an online educational HUB present on the sites of the four partners that contained: resources for teachers (lectures, models of educational activities, resources for research projects in the community) and students (academic lectures in a Virtual Amphitheatre). The HUB also shared curricular recommendations for any interested person and created innovative learning experiences for students.

The goal was to create an educational community that uses local and national resources to multiply and enhance collaborative methods between the university and the pre-university environment to increase the attractiveness of education among students and to make academia more accessible to them.

Another aim of the TEMP was to create a solid connection between the four partners and to build the basis for further collaborations.

Target group

The main target group was represented by students of pre-university schools (primary, secondary, and high school) who participated in the project activities. The Virtual Amphitheatre hosted almost 3,000 children from 47 high schools and 51 middle schools from over 20 Romanian counties. On the Turkish side, over 100 primary school students actively participated in the project.

The second target group was represented by pre-university teachers who benefited from pedagogical training to increase the attractiveness of educational activities and to better stimulate learning among students. This group consisted of a total of about 200 teachers.

Achievements

Online educational resources have been created by academics and have been shared with thousands of students and hundreds of teachers.

Strong communication between school teachers and academics has been created. The academics had a chance to better understand the learning and training needs of the school environment.

> *We better understand that there are many ways to build a learning environment: we can provide expertise to select exciting contents for pupils, and we can organise new learning activities with different resources that they use every day."*
>
> *(TEMP 8)*

A team of experts was emerging to identify content from pre-university programmes that could be developed/detailed by the pre-university environment to increase students' learning achievements.

An environment has been created for teachers to be more willing and courageous to include current issues and methods in their classroom practices.

Primary school students had the opportunity to learn by doing and experiencing many current and relevant issues from everyday life. They also had a chance to see and experience many scientific experiments in the science centre.

Last, but not least, a key achievement has been the initiation of an Erasmus agreement between the universities to continue the collaboration between teachers who participated in the activities of the mentoring project.

TEMP 9. Future Memory (Hungary and Serbia)

> *We activate the same brain areas to remember and forecast, so if we have no good memories, we can "manufacture" them by simply talking about our plans and creating "future memories."*
>
> *(TEMP 9)*

The main characteristics of this TEMP was the co-operation of a Hungarian NGO with two Hungarian schools, and one Serbian primary school, where teaching is conducted in Hungarian. The project focused on supporting disadvantaged students of the Roma minority in Hungary and the Hungarian minority in Serbia. As the partner schools struggle with various social problems of families, it was also essential to involve the students' families in the activities. The teachers received continuous professional support in conducting weekly innovative workshops designed with an emphasis on STEAM, which these children especially need.

The methodology was based on brain research and aimed to create a strong foundation for school success and the future life success of children and their parents. A group of experts developed an experimental learning programme. The local implementers had a great deal of flexibility to adapt it to the specific needs as each of the three schools works with different groups of children. The children in Serbia were the youngest; the children in Hungarian schools were all Roma girls in one and a mixed group of boys and girls of various ages between 10 and 14 yrs. in the second school in Hungary.

Target group

The target groups were schoolchildren of Roma and Hungarian minorities and almost 300 teachers interested in the method used from Hungary, Romania, Slovakia, and Serbia, teaching in Hungarian-speaking schools.

Achievements

The most crucial element of the TEMP was gamification, mainly drama games and art education that were combined with environmental education. These are adaptable to all languages, so all workshop plans were translated into English and posted on https://en.futurememory.eu so they could be easily downloaded for free.

The essential achievement was engaging children in the workshops and collaboration and change in children's behaviour, school engagement, and successes, and most of all – an observed increase of self-esteem among the children.

> *The partnership has changed the perspective of the schools, as all three teachers are very eager to go on with the programme even without funding. They also reported using the activities and equipment during their everyday school work."*
>
> *(TEMP 9)*

TEMP 10. Drops of STEAM (Italy and Romania)

This TEMP connected the university and three state schools. The main goal was to raise students' awareness of the importance of science and to recognize and understand the fundamental role of science in everyday life.

They also wished to monitor and demonstrate to students the scale of environmental pollution for which humans are responsible and to search for practical solutions to reduce the problems that are within our reach.

The project programme included both formal and informal education, independent of the curricula of both countries.

Grade 11 students were tasked with building measuring equipment and using technology that may help reduce carbon footprint and improve quality of life. The task of all students was to also demonstrate skills and creativity in using appropriate technologies by preparing documentaries with the help of IT tools.

Target group

The target groups were about 60 students from schools participating in the project.

Achievements

A great achievement was the effective collaboration between the TEMP members who carried out activities following the approach of the Open Schooling model, benefiting from the experience of the project partners.

Students built weather stations and measured the weather parameters using *Arduino* (www.arduino.cc), creating an artistic map (tree) reflecting the current situation in many places. The map raised awareness about domestic pollution. During the workshops, students calculated the carbon footprint, compared it with others, and implemented ways to reduce it.

An installation was created for measuring the air's temperature, pressure, and humidity that is mounted on a drone, and can be used at various altitudes. The students combined elements of programming, electronics, and mechanics to carry out this assembly, together with elements of physics and statistics for the interpretation of measured values. Developed equipment was also sufficient for the determination of soil, water, and air pollution. The project was a success that will be remembered fondly.

> *During these two years we have seen a lot of change in students and teachers. From a teacher's point of view, in class I cannot observe students like this. When you observe them outside of school, they have a different attitude. They don't realise that they study much more outside and it is easier for us teachers to be understood."*

> *Italian students are scared of speaking English but they made themselves understood, especially during mobilities. The students didn't think about books or theory but they just went for it. It improved their soft skills, they had to lead projects which helped them with their leadership skills. All activities helped them to improve themselves. The result of this partnership is much deeper than we have ever thought. Also, to just be able to meet other people and also for teachers to share their work."*

(TEMP 10)

2.4.3. Key Learnings and Successes

Implementing the mentoring programme and work plans through TEMP partnerships has resulted in many different effects, changes, and benefits for schools and local communities. Often unexpected, some immediate, others long-term, resulting from a difference in the ways of working, introducing new elements, discovering new areas and opportunities, or new permanent local and international contacts and established co-operations.

The following success stories and also challenges encountered during the TEMPs programme are based on discussions with and reflections by all TEMP partners.

Main Challenges

A significant obstacle hindering the work of TEMPs and implementation of all project plans was the Covid 19 pandemic. It resulted in various sanitary restrictions, school closures, the inability to travel, and the need to work online throughout the whole project duration.

A novelty, which also generated difficulties in many cases, was the need to work with a different audience and partners who were far away. For many TEMP partners, this was a new experience. The expansion of the areas of activity was also motivating, and the partners quickly adapted to the joint TEMP program, gaining experience working in new places. There was also a wide variety in age and gender of students, and also in the specificity of target groups with cultural differences and national minorities being targetted.

Some TEMPs also reported difficulties in finding or adapting universal tools and means of work related to the different realities of work among the partners in other countries. This difficulty, however, was also a benefit because it made it possible to learn about and understand the wide range of problems faced by different educational institutions and organisations across Europe.

Another challenge in the cooperation and communication between partners from different countries was the lack of a common language which affected both students and teachers. This was particularly evident during the online workshops. Live translation was often necessary, and sometimes some of the students took part in workshops as listeners and observers only.

Innovative aspects of the TEMP partnership

The most recognisable innovative elements of cooperation in partnerships was the mutual transfer of previously unknown techniques and of new teaching and learning methods.

The cooperation among partners with different experiences and approaches often led to completely new solutions in the joint implementation of various activities. Many exciting applications of otherwise unknown methods were discovered.

The relationship between STEM and raising awareness of global problems, such as global warming and climate change, was analysed. An interdisciplinary perception of the issues was applied - a concern for human health and air quality was combined with the care for properly managing polluting waste and reusing materials whose production costs are very high, both in economic and environmental terms. TEMP mentoring partnerships were seen as an *in vivo* - procedures, implemented through technology as a continuous workshop on collaborative thinking and learning. This procedure and approach helping to gain deeper insight into the different learning methods and strategies

corresponding to the different profiles of learners.

Due to the international nature of TEMPs, the programme has become an honest cultural dialogue and collaboration for a peaceful common future. Many partners also described the multiplying-effect of links between universities and the scientific community with pre-university environments as innovative. They emphasised the lasting nature of the established relationships, which will continue even after the programme's end.

Rewards for society

Students and teachers, as well as other participants who took part in the activities organised by TEMPs, valued above all the 'active formula' of the programme and that classes did not consist only of watching and listening, but consisted of teamwork in solving various tasks, sharing experiences, finding answers to questions, expressing emotions, or a common physical activity.

Practical training in the field, visits to universities, trips to museums and/or science centres were highly appreciated, and most importantly, partners highly valued visits to partners in other countries. This opportunity to cooperate and communicate with colleagues from other countries, requiring the use of a foreign language, was one of the highlights for TEMP partners.

Most of the partnerships also emphasised that the main benefit was the mere possibility of cooperation with other partners, sharing ideas, knowledge, and new teaching methods.

Transferability

Interestingly, interdisciplinarity and multidisciplinarity are perceived as essential aspects of the work of partnerships that can and should be implemented in local communities. This is related to the perception of the interdisciplinary approach as a current need and necessity in solving current global problems.

The role of appropriate tools used by TEMPs, which may be applied and adjusted universally all over Europe, was highly appreciated. For instance, both online and multimedia tools, such as the 'Virtual Amphitheatre' (TEMP 8), which can introduce students to university halls were a huge success; also, physical, real tools such as affordable scientific experimentation kits or educational boxes, containing materials and teaching aids necessary to perform real live experiments were greatly appreciated (TEMP 1 and 7).

Key Learning

Key learning includes general concepts, such as understanding that school education should react and respond to current social problems. For example, economic growth cannot be a goal pursued at all costs. The TEMP 1 approach emphasised the importance of teamwork and the search for business ideas rooted in a community that considers people, their environment, well-being, needs, and circumstances, which contribute to prosperity. An example is the science experiment kits that were designed by the XuvenCiencia Teaching Innovation Group at the Lugo campus laboratories of the University of Santiago and which were sent to secondary schools across Galicia.

The acronym STEM does not exhaust the full content of such an approach, in which social and hu-

manistic values are also important. This approach favours inclusive science that does not require access to large laboratories or large budgets and will also be available to students from peripheral schools with fewer resources and away from large financial and research centres.

There was a strong realisation that it is impossible to develop a universal method of implementing STEM education for the whole of Europe. This is not only because education systems in different countries are different. The key issues seem to be also differences in the degrees of teachers' autonomy and their well-being in a given system, as well as the integration of the learning environment.

Partners highlighted the fact that universities and local communities can be of significant importance and paramount support for teachers and pre-university students.

New Programme Elements

The mentoring programme has resulted in many new elements introduced into the daily practice and durable solutions proposed by individual partners.

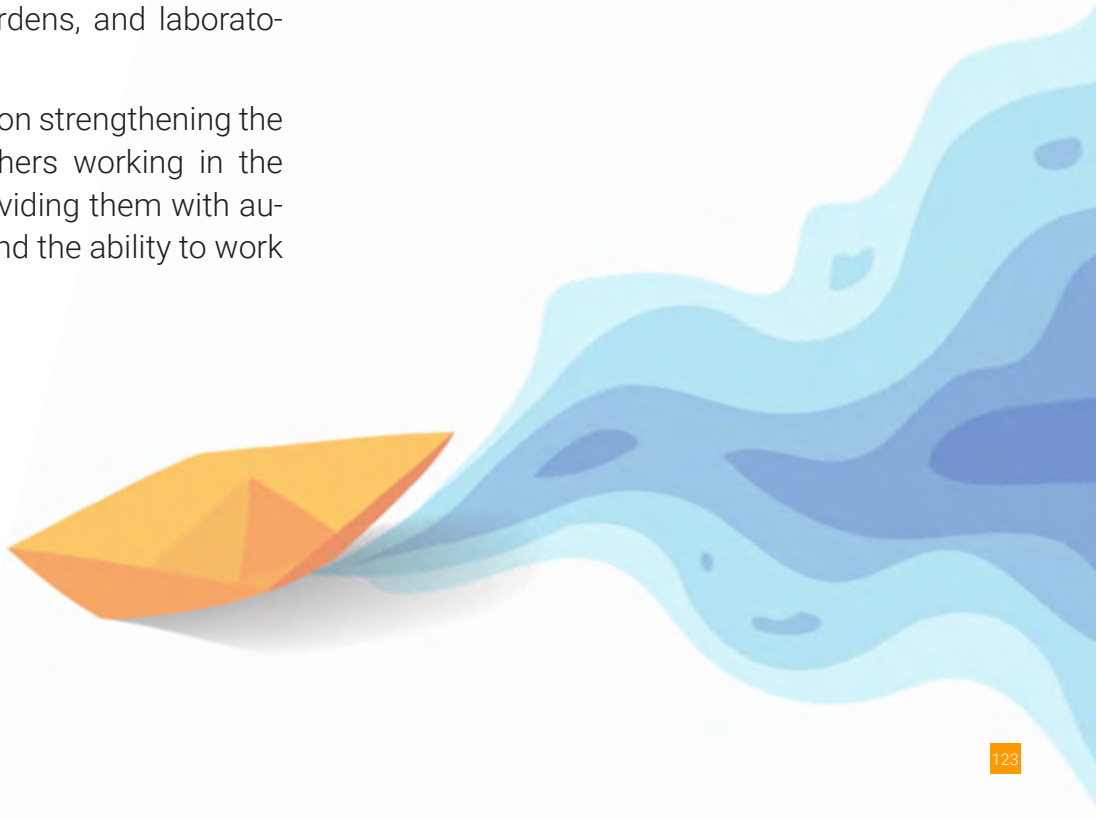
The concept of Open Schooling caught on very well in the programme and resulted in many activities for children and teachers. A lot of new teaching materials, lesson plans, stories and games, scenarios, and podcasts were created. TEMP 3 made interesting adaptations using Greek mythology as part of the cultural heritage of Greece, using them as an intercultural tool to introduce the concepts of democracy and human rights.

Many partnerships have devoted great attention to academics' work for school students, such as TEMP 5, where children discovered agronomy in fields, orchards, botanical gardens, and laboratories.

TEMP 4 put a lot of emphasis on strengthening the social competencies of teachers working in the mentoring programme by providing them with autonomy, a sense of security, and the ability to work in a project team.

In the educational materials for teachers and students, great importance was placed on the correct development of research questions so that they aroused curiosity and forced them to search for solutions creatively. The importance of joint reflection on problem solving and prototyping was appreciated.

TEMP 9 introduced gamification as one of the most essential child activation tools used in the programme. These were mainly theatrical games and art education, combined with environmental education. They can be adapted to all languages. All workshop plans have been translated into English and are posted on the website for a free download (https://en.futurememory.eu).



Change in Perspectives on Open Schooling and Future Outlook

The PHERECLOS project and participation in the mentoring program helped raise awareness among many TEMPs, and thus a large number of European teachers, that the education of young people cannot be limited to the classroom and traditional school framework but that it must also be open to society and the community. Although culturally this is a significant challenge for many.

The experiences of TEMP partnerships have shown that over the course of the programme, educational resources and procedures for reaching children, adolescents, and adults have been significantly improved.

The perspective of many TEMP partner organisations towards Open Schooling has widened considerably and, thanks to their great participation in the programme, has been supplemented with the individual TEMP partners' knowledge and wide variety of experiences.

In particular, the TEMP 1 practice (Portugal - Spain) has shown how important it is to use the linguistic, historical, and cultural heritage shared in Galicia and Northern Portugal in education.

Similar conclusions were drawn from TEMP 5, whose activities in Tenerife showed how important it is to use local resources, crafts, traditions, and local culture.

The examples of the use of STEM in humanities education turned out to be very inspiring. A very important aspect was the identification of the core values that every STEM teacher should follow, such as social justice, equality, and inclusion.

In many cases, the concept of Open Schooling was implemented through collaboration between universities and children's universities. In the work of TEMP 8, academic experts from various fields supported the education of primary school students in cooperation with teachers.

The learning environment was growing in many ways - academics provided expertise to select exciting content for students, or new learning activities were organised using local resources that students use daily.

An example of such an activity is the Virtual Amphitheatre created in TEMP 8. During its two editions, thousands of students from Romania and Turkey had the opportunity to enter universities - from their homes or classes - and see scientists, listen to them and learn about the results of their research and experiments.

Open Schooling changed the perspective of many schools. As a result, many teachers are willing to continue the program even without funding. The Open School System will be the learning system of the future. Its effectiveness in practice is evident. Students are much more interested and collaborative, learning from their own experiences in an open environment.

The mentoring programme was a great success and TEMP partners were happy to share their fond memories of the programme and their experiences. Moreover, TEMP partners expressed their eagerness and plans to continue the collaboration and to apply the learning in their own environments even beyond the programme end.

> *The Open School system will be a learning system for the future. Its effectiveness in practice is obvious. Students are much more interested and cooperative, learning from their own experiences in an open environment. We discovered a big number of possible collaboration ways that were unthinkable before. We were just used to a certain kind of collaboration but now we understand we can do much more."*
>
> *(TEMP 10)*

2.5 SUSTAINABILITY - POLICY PRACTICE, ADVOCACY AND UPSCALING

Eszter Salamon and Luca László

2.5.1. Advocacy for Open Schooling "PHERECLOS Style"

In this section, you will find a summary of the advocacy approach that has proven to be successful in PHERECLOS, including resources – policy briefs and evidence-based policy recommendations – that can be used in your own local or national advocacy.

The implementation of Open Schooling as a strategy requires a process of institutional learning and a fundamental change in how schools are perceived by various stakeholders. In order to get their commitment, evidence needs to be based on authentic first-hand insight into well proven practices, as well as on a thorough analysis of policies and structures which are relevant for the school sector. This is especially true when advocating for non-formal education providers to play a steering role in Open Schooling collaborations. For this reason, PHERECLOS has dedicated a separate Work Package to advocacy activities, delivering policy recommendations and supporting upscaling to ensure the long-term and widest possible impact of the project.

The following definition of advocacy has been used as a starting point:

> *(Policy) advocacy is the process of negotiating and mediating a dialogue through which influential networks, opinion leaders, and, ultimately, decision makers take ownership of your ideas, evidence, and proposals, and subsequently act upon them."*
>
> *(Eóin Young & Lisa Quinn, 2012)*

Sustainable policy and practice change takes time and likely to not happen immediately. In case of the Children's Universities movement – that had a key role in PHERECLOS as an important type of non-formal education provider-, it took a few years of appreciation to see recognizable effects in policies, e.g. particular governmental/public funding schemes for such programmes like in Austria or Poland.

Moreover, it took a while before institutional policies on the non-formal education providers' side had changed, and reflections on science engagement became visible and manifested in university mission statements or in CSR strategies of companies and alike.

School systems are undergoing the necessary changes to embrace Open Schooling and non-formal education providers in it, accelerated by deteriorating test results and learning outcomes, disengagement with school and an increased interest of stakeholders in renewing education. The engagement of various stakeholders, especially that of non-formal education providers and parents is in its infancy in many countries, but one of the few advantages of the school closures of 2020-2022 was that the discourse on the need to renew education has become more topical.

School closures also made stakeholders, especially school leaders, teachers, parents and the students themselves aware of the fact that learning is happening everywhere, and several initiatives have been launched to recognise learning outside of school and not directly related to knowledge-based curricula. PHERECLOS is built on the notion of Science Capital that can help reinforce this message.

The advocacy efforts suggested are to utilise this momentum.

The PHERECLOS consortium proposes two main advocacy targets:

1. At the initial phase of Open Schooling activities, they should target those who can be enablers or gatekeepers of such provisions, and advocacy should focus on making the activities possible.
2. At later stages, the main goal of advocacy is ensuring that what works well for the learners locally is sustained and, if necessary , improved.

These phases need different advocacy tools and approaches.

Preparation for advocacy

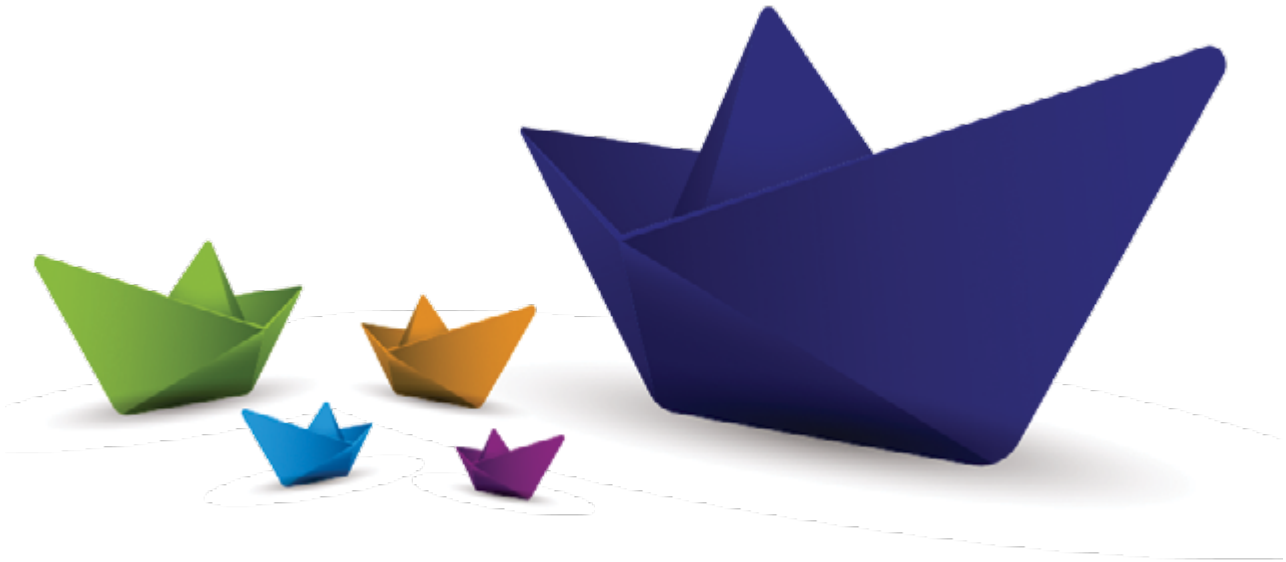
Analysing the policy environment

When designing advocacy work at your own level, it is of utmost importance to understand the policy environment to understand:

- The enabler in policy that might be utilised
- The boundaries set by policy
- European and international policy recommendations that can be used to change policy in the immediate environment
- To see any discrepancies between legislative strands, especially the (mis)alignment of education/open schooling policies and international treaties ratified by the country

In preparation for supporting the establishment and implementation of the LECs, a policy inventory was created in PHERECLOS primarily focused on the LEC countries (Austria, Colombia, Finland, Italy, Poland and Portugal), but also on countries that have been the project's secondary target for upscaling, already participating in the project, namely Denmark, the Netherlands, Romania and the UK (*download link to be included)*. It was primarily aimed at informing the later advocacy work in PHERECLOS: by helping to understand the above mentioned policy contexts it supports the definition of advocacy target groups. The analysis can be used for advocacy efforts in the reader's context. For countries not covered by the report, the summary of relevant European and international policy trends can be good guidance for a national policy analysis. Its main elements are:

- the right to quality inclusive education in international treaties ratified by all European countries (and also ratified or endorsed by the EU),
- the right to free, quality education in Europe according to the Charter of Fundamental Rights of the European Union and the European Pillar of Social Rights, and



- European headline targets and related policy incentives in education.

The task undertaken was to identify framework conditions and properties in national and European policies, programmes and other policy tools, that are relevant for the development, implementation and upscaling of open schooling, also by transformation of systems, for advocacy. This includes a compilation of specific characteristics and influencing factors in the school systems of the participating countries that either create opportunities or have hindering aspects for open schooling.

The overarching context in the case of each country was the legislative framework on conditions for collaboration between formal and non-formal education as well as any policy incentives, including financial support, for such collaborative programmes. Another major area of the analysis covers decision-making processes, school autonomy, the engagement of stakeholders and the role of school leadership in it. Another important aspect of such collaborations is the physical possibility for a school to collaborate with external providers. Thus, the analysis is also focusing on legislation that supports or prevents such activities, especially the regulations around organising school activities outside of the school or activities within the school that involve external people, the necessity to obtain permission for such activities and similar factors. The last element of the analysis is about cost as the success of open schooling also depends on the financial factor, namely that for a wide recognition of this approach it should not burden families any further.

Analysing the education environment

The other crucial element of preparation is the analysis of the local education environment you wish to influence with your advocacy efforts, namely

- to identify the influential networks, opinion leaders and decision-makers mentioned in the definition of advocacy, and
- to identify local conditions relevant in advocacy

Stakeholder identification and analysis

One of the greatest challenges to advocacy activities is identifying and understanding the target audiences. At the planning stage you need to consider that policy and decisions in general are made by people, not institutions. Therefore, advocacy activities must be targeted at individuals. Successful advocates carefully analyse their target audience to ensure their efforts and resources are directed in the most efficient manner.

When making the first steps in identifying and understanding the target audience, it might be useful

to create a distinction between primary and secondary audiences. In other words, advocates need to answer the questions:

- Who has the authority to make the changes that need to be made? and
- Who influences them?

The primary audience includes decision makers with the authority to directly affect the outcome of the advocacy goal – be it policy change or other crucially important factors like funding. These are individuals, for example, who must approve a change of legislation. The secondary audiences are individuals and groups that can influence these decision makers. The opinion and actions of the latter group of individuals are important in achieving the advocacy objectives, since they have the potential to affect the opinions and actions of the decision makers – both as supporters or as adversaries. However, in open schooling, it is rare to experience real opposition. However, there can be fear and reluctance, mostly due to a lack of experience and/or information.

For this reason, in PHERECLOS, we have been using a simplified structure to visualise stakeholder groups. LEC partners have used this model in identifying their target audiences when planning advocacy actions. We call them stakeholders as they actually have a stake in your wish to implement an Open Schooling programme. While identifying the groups, you also need to identify these diverse stakes.

For each target group (and in the case of very influential people eg. a minister or mayor, each target) you can make decisions on which quadrant they belong to and what tools can be used for engaging them answering a few simple questions:

1. What do they know about Open Schooling in your context?

If you provide too basic information, that may be redundant and you lose their interest. If you do not ensure a common ground, it can cause problems later on.

2. What beliefs may influence them in supporting your goal?

How do they see the goal of schools? Do they see the benefits of student-centred methods? Do they believe in shared leadership? Do they like to control things? Do they truly support child rights? Do they know the limits of the schools' responsibility? – you can ask these questions and similar ones here.

3. What personal interests can have an impact on their support?

Do they have children who may participate? Are they up for re-election? Could it offer media coverage for them? and similar factors can have major influence

4. What can be the impact of their support on your goals?

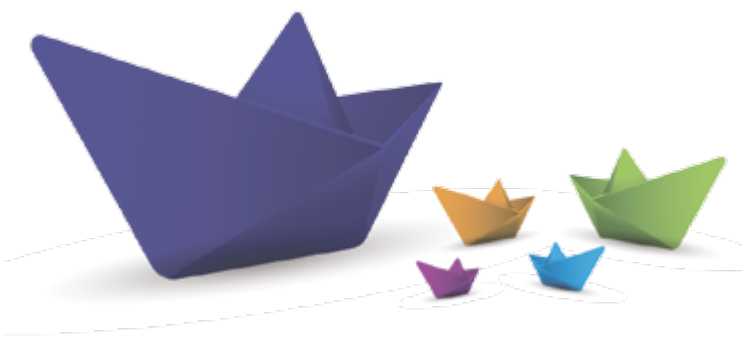
It is important to understand how their direct support can help you in implementing your Open Schooling programme, but it is equally important to see what might be the impact of their not doing anything or directly acting against your goals.

Local conditions for advocacy

It has already been established that advocacy is targeting people, not institutions. Similarly, you usually wish to target your advocacy work to a limited local context. Global advocacy is more or less impossible, and given that you are advocating on the level of individuals within a target group, the more specific your context is, the easier it is to plan advocacy. In simpler terms, you need to explore and understand the local context for Open Schooling. There might be similar situations in different local contexts, but the closer you focus, the more solid points you can find for your advocacy.

In the case of Open Schooling, this local approach is even more important. Every context is different with regards to demographics, student needs, accessibility challenges, but also the Open Schooling offer available (and physically reachable) and motivated local stakeholders.

In PHERECLOS, the consortium used a simple SWOT analysis for exploring local conditions impacting advocacy. The strength and weaknesses of the institution the advocate belongs to – be it a school, a non-formal education provider or even a group of informal educators – have a major impact on advocacy actions. We want to show our strength and hide our weaknesses, but the latter also needs to be considered carefully as neglecting or completely hiding them may backfire and undermine credibility. At the same time, a careful exploration of opportunities and threats greatly increases the chances of success. Both may need advocacy actions. While exploiting opportunities can be the basis of a successful advocacy plan, eliminating some of the threats might be an important goal in your advocacy plan.



Don't be afraid to start small

Any school leader or even a teacher can start advocating for Open Schooling locally. You only need to identify unfulfilled student needs and internal opportunities for catering for them. Before applying for extra funding, or engaging external people, you can do Open Schooling for no cost by using already existing school infrastructure and people. Teachers may have knowledge and skills beyond their core teaching duties that can be activated. The non-teaching staff of schools, such as cleaners, kitchen staff, nurses, gardeners possess lots of knowledge that can be easily shared with the pupils in an open schooling way. Similarly, you can also engage parents, building on their professional knowledge and/or passion, in your small-scale activities. You can also plan on students' peer-to-peer education as many children and young people have talents and experience in fields they cannot use (enough) as educators in the classroom. Showcasing the success of such an internal open schooling project may help with your advocacy work, and to better understand the concept.

Consistency is key

The consistency of communication is key to successful advocacy and communication in general. Thus, the PHERECLOS Advocacy Team has put together and maintained a Glossary of Terms to support a common understanding of key notions in Open Schooling. Advocacy often struggles with the difficulty to use a translation that expresses the same complexity as commonly used EU English

terms. This has been supported by giving a clear definition that can help translation but might also be used for clarification in country contexts. Phrases commonly used in EU English may not even be that straightforward in the context of English-speaking countries such as the UK or Ireland (See Annex 2 on p.207).

Inventory of advocacy tools available

Advocacy tools can take more or less any shape and form, but you need to differentiate between tools used for introducing, starting something new and those used for maintenance, sustaining and improvement. At the same time, there are tools specifically developed for advocacy, and those that have an advocacy potential as a secondary use.

Develop your own

In the advocacy chapter of this White Book, the PHERECLOS consortium is offering two important tools that you may find useful: evidence-based Policy Briefs and Policy Recommendations. They also show examples of tools that can be developed internally for the different phases. The Policy Briefs were developed in the initial phase of the project and are built on external evidence, independent from, but relevant for our project. The Policy Recommendations were developed in the final phases and are built on internal experiences during implementation, and thus quote evidence from within the partnership. Similarly, you can develop your own tools, for example you can create an analysis of your national education landscape if it is not included in the PHERECLOS Policy Inventory.

The outcomes of your Open Schooling activities can also be utilised as advocacy tools. The following list is aiming at giving you some ideas and sparking your creativity:

- Collect testimonials – see examples in the PHERECLOS LEC reports (*include download link)*
- Showcase results – eg. create a virtual gallery, an exhibition or create a publication of student products
- Use the outcomes of evaluation cycles – including surveys, focus group outcomes, interviews with participants
- Compare results of external measurement – eg. standardised test result improvement over time during your programme implementation, improved numbers in enrolling in further education, decrease in truancy
- Create visual summaries – for example, in the PHERECLOS Sustained Modelling and Scenario Building Reference Guide as well as in the Advocacy Toolkit Adventure Book you will find several examples
- Use the power of photos – however, the PHERECLOS consortium recommends to only use photos that do not show any participants who can be recognised, and in case you decide otherwise, you must have consent of those in the photos (in case of minors, you need to have consent for each image and each use separately by the minor, and you also need the consent of the parents or guardians)
- Invite them to focus groups, workshops, conferences, trainings – personal engagement in the programme creates attachment
- Maintain your presence online and use your constantly updated website and social media handles for advocacy

Use tools developed by others

There are several tools that are already available, have been developed by others and are suitable for your own advocacy. All PHERECLOS outcomes mentioned in this chapter are examples of that. However, when using such tools, you always have to tailor them to your own advocacy needs by highlighting, summarising or tweaking them (making sure that proper referencing is also included). Sometimes, you may even turn a tool totally upside down and use it for showing how not to do something.

Some examples of external tools you can use for your advocacy work:

- Relevant research evidence – We recommend not using evidence older than 5 years or at least verifying that there is not major research evidence contradicting the one you are using as the landscape is changing rapidly. Similarly, it is important to understand that most research is biassed to a certain extent, but some are more likely to not be objective, thus it is worth checking who paid the researcher.
- Policy papers by international or European bodies such as UNESCO, OECD, the European Commission
- Labour market outlooks
- Outcomes of relevant projects, for example ones financed by the Erasmus+ or Horizon2020 programmes
- Comparing national or local results to European benchmarks in education – However, you need to be careful with their relevance. The early school leaver benchmark of the previous period for example resulted in better results in the number of young people leaving school early, but did not prevent a substantial decrease in the level of basic reading, writing and arithmetic skills.
- Popular science publications can be very useful in engaging audiences, especially non-professional ones, including politicians
- Relevant articles in mass media can also be used as an anchor, although with the decline of proper journalism, it might be worth double-checking the article you want to use and verify the contents from another source

2.5.2. Open Schooling Policy Recommendations

Introduction

In November 2017 European leaders proclaimed the European Pillar of Social Rights and committed to delivering on its 20 principles, the first of them on education: "Everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market." The policy and public discourse have long been about the best way towards such provisions, and it has just been amplified during the school closures of 2020-2022.

Open Schooling as an approach that creates an engaging environment for children's learning while strengthening links to local communities has proven to be an effective approach to address the challenges of the Global Learning Crisis that has also been addressed by recent EU policy. Local expertise and experience incorporated into learning at school, making links to the real world offers ways to learn more meaningfully and leads to better motivation of learners, but also of teachers. Thus, Open Schooling approaches can contribute to the creation of an education environment that provides the quality and inclusion demanded by the commitment EU Member States have made. This commitment is also present outside of the European Union as it is in line with Sustainable Development Goal 4.

Non-formal education providers play a very important role in successful Open Schooling programmes being the interface between the community and school - given that they are often more deeply embedded in the local societal context than formal education providers - and have the pedagogical expertise to more easily engage with the professionals at school than informal educators with non-educational background.

In the PHERECLOS project, 15 partners from different European countries and one non-European one, have come together to promote Open Schooling, the benefits of such approaches in the STEAM domain, and to promote the crucial and possible coordination role of non-formal education providers, especially Children's Universities.

The work done in the PHERECLOS project is based on the science capital concept, building on the sum of all the science-related knowledge, attitudes, experiences and resources that an individual builds up

through their life. The concept, developed at the King's College London identifies the elements of a person's science capital making it clear that it is built everywhere and at all times, making the case for the collaboration among the learning venues: the home, the community, the local informal and non-formal learning provisions and possibilities, and the school.

The basis of the policy recommendations that follow are built on the step-by-step approach of PHERECLOS. The foundation is a thorough analysis of research on Open Schooling and science capital, accompanied by a review of international, European and national policies. Based on this, six main advocacy areas have been identified, and described in a series of Policy Briefs. The PHERECLOS partners have collected and analysed Open Schooling case studies and this analysis formed the first round of bases for policy recommendations. The model of Open Schooling with schools in the centre, but the activities coordinated by non-formal education providers - in this case Children's Universities - was piloted in six different educational and geographical contexts in so-called Local Educational Clusters. The consortium also published an open call for establishing Transnational Education Mentoring Partnerships, and ten such partnerships, coordinated by various non-formal education providers, not only Children's Universities, were established in order to have a wider sample that can validate the approach.

Based on these experiences, the PHERECLOS partnership has developed the following recommendations for policy on European, national and local levels:

First Policy Recommendation:

Make the benefits of Open Schooling on STEAM learning known and acknowledged

What we know:

- Open Schooling can support STE(A)M learning better for the majority of students than traditional methods
- Open Schooling brings the benefit of active citizenship through community engagement into STE(A)M education

How we know it:

The Scientix Observatory report *STEM Education Practices in Europe* (2018) has established the need for student-centred methods in the STE(A)M classroom and the limitations of using such methods in formal education alone.

An analysis of inspiring cases from all over the world was undertaken by the PHERECLOS consortium, and the outcome clearly shows the benefits of Open Schooling as well as the participatory nature of it. The analysis states that "Open Schooling enables individualised learning for school students because Open Schooling takes care of learning needs of the individual, but also of the group - team work as an appropriate education method supports the understanding of each team member and the learning from each other. Discussions in the group and with the stakeholders foster an atmosphere of questioning, thinking and also critical thinking.

An important benefit is to learn to have an own and valuable opinion and to learn to think critically. In a lot of school systems and also family systems obeying, following and reproducing stand in the way of the learning process."

In PHERECLOS, 6 Local Education Clusters (LECs) were implemented with diverse foci and methodologies. However, individualised learning as well as active participation were at the core of each LEC. The final report introduces these approaches and how they were suitable for supporting the diverse learning needs of students. The outcomes of LEC activities reinforce the benefits for individual learning as well as for active participation.

What policy can do?

At European level:

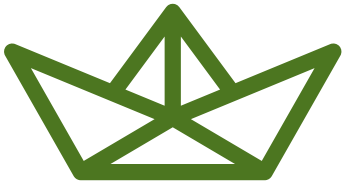
- Continue financing opportunities for educators to learn about the benefits and forms of successful Open Schooling programmes, especially by upscaling and mainstreaming the outcomes of successful projects.
- Create opportunities and incentivise mutual learning, especially between professional educators working in formal education and non-formal educators by making mobility available for all active stakeholders of Open Schooling, not only teachers.

At national level:

- Foster the exchange of experiences, especially among formal education professionals, non-formal providers and families through regular events and communication such as press publications, newsletters, fairs, etc.
- Create opportunities for showcasing inspiring practices within the country and beyond.
- Create national funding opportunities for the capacity building of educators, especially non formal educators and parents as currently EU-funding is hardly available for them

At local level:

- Assess, promote and showcase local science capital
- Local policy makers should facilitate collaboration among key stakeholders in order to share experiences as well as concerns



Second Policy Recommendation:

Enable school autonomy and ensure stakeholder engagement for successful Open Schooling

What we know:

- Successful Open Schooling initiatives in STE(A)M education require a certain level of autonomy in formal education
- Various stakeholders with different roles and responsibilities are to be engaged in designing, implementing and evaluating Open Schooling initiatives

How we know it:

Since Open Schooling is an approach that reflects on the individual learning needs of students, decisions on provisions are best made as close to the student as possible. This means that decisions are best made at the class and school level. This is only possible if the school has the necessary autonomy – with regards to curriculum, methodologies, and finances – to make these decisions.

One of the core elements of Open Schooling is that the education offer is designed collaboratively. Various education stakeholders have different competences and experiences in STE(A)M education provisions and thus need to be engaged from design to evaluation.

The PHERECLOS inspiring cases analysis clearly showed the need for both autonomy and stakeholder engagement. One of its key conclusions is that an Open Schooling approach requires "a relatively high level of autonomy for the school leader to choose their partners and also for teachers to choose teaching tools and methods". An analysis of policy in the PHERECLOS partner countries has also shown that in most countries schools enjoy wider or less wide autonomy already. At the same time, stakeholder engagement is less typical. Non-formal providers, students and parents rarely take part in decision making, although their voices are considered to a larger or smaller extent. Another key conclusion on stakeholder engagement states that "change processes and Open Schooling need well-meaning and open-minded stakeholders, facilitators for change. Well-disposed, emphatic and goal-oriented collaboration between the stakeholders is a requirement to reach the goal, the stakeholders should be team players and should trust each other. The common goal is focussed upon the project, not the personal interests."

The PHERECLOS LECs, being based on a non-formal provider at the core, were all designed to engage a range of stakeholders. They operated within the reality of national legislation, but in all LEC countries some autonomy is already provided at school level. However, curricular autonomy is not present in most LEC countries that resulted in successful actions and increased STE(A)M engagement, but often as an extracurricular activity. It clearly shows that curricular autonomy is also an important part of successful Open Schooling activities as they are not only to support better learning outcomes in general, but better learning related to schooling.

What policy can do

At European level:

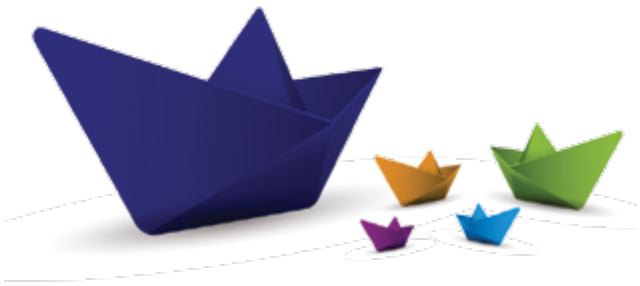
- Provide funding schemes for mutual learning with special focus on exchange programmes for school leaders, non-formal education providers and parents
- Introduce a showcase of initiatives, similar to the European Alliance for Apprenticeships that rewards successful practices
- Ensure that key stakeholders are always engaged in European level policy actions, eg. as members of the Working Group on Schools

At national level:

- Create a legislative framework that provides the necessary autonomy for schools
- Accompany the legislative framework with capacity building and counselling programmes

At local level:

- Offer local support to schools to collaborate, to be aware of all local Open Schooling opportunities and how to navigate them
- Offer logistics solutions (eg. school buses) that autonomous schools can use in implementing Open Schooling
- Facilitate an exchange of experiences and capacity building of stakeholders locally



Third Policy Recommendation:

Raise awareness among school leaders and teachers about Open Schooling and provide appropriate capacity building opportunities for them

What we know:

- Teachers and school leaders need professional autonomy for successful Open Schooling programmes
- Appropriate training and support as well as remuneration are necessary factors for any education innovation to succeed

How we know it:

The European Education Policy Network on Teachers and School Leaders researched the attractiveness of teaching professions in 2019. Its research outcomes clearly show the need for appropriate professional support as well as a feeling of being overworked without proper remuneration as keys in personal decisions to remain in the teaching profession or leaving it. Teacher and school leader burnout has also been identified as a main challenge schools are facing by the same research as well as numerous others. Teachers also report that a growing percentage of students require special attention and science results of standardised tests in general show a decline. These are definitive signs of the need for professional support for formal education providers.

In the PHERECLOS inspiring cases analysis, a set of key conclusions is about capacity building and lifelong learning. It has found that "capacity building and training are important to reach and sustain professionalisation, it is a "must do" in our quickly changing world. In principle all stakeholders of Open Schooling projects/processes are requested to train and learn new and appropriate skills, not just the students at school." It also concludes that "as far as formal schooling and the connection with informal learning outside the school is concerned, the potential for long-term implications of Open Schooling lies in the teacher training perspective." The analysis of practices especially highlighted capacity building needs with regards to including the Arts element as an addition to STEM for appropriate and attractive STEAM provisions.

The LECs have summarised 12 success factors based on their implementation experiences. They have highlighted teachers as the key actors in Open Schooling STE(A)M success and emphasised their need for capacity building. Most LECs included such activities in their programme with great success. However, they also have found that being engaged in activities also builds capacity in itself.

What policy can do

At European level:

- Promote school autonomy and related capacity building needs by further disseminating outcomes of European-level education Working Groups

- Utilise the Open Method of Coordination to facilitate the exchange of inspiring policy practices

At national level:

- Curate and facilitate an appropriate continuous professional development offer for teachers and school leaders that has elements of Open Schooling at its core
- Issue legislation that acknowledges and properly remunerates school leaders and teachers for Open Schooling activities and the extra effort it requires

At local level:

- Celebrate successful Open Schooling collaborations and share it in local media
- Create a local pool of professional support to make capacity building during school time possible for teachers and school leaders with time off while their professional duties at school are covered

Fourth Policy Recommendation:

Make arrangements for non-formal education providers to be systematically engaged in Open Schooling provisions

What we know:

- Non-formal education providers are to be considered as main partners in Open Schooling for better learning outcomes and catering for diverse student needs
- Non-formal education offers more flexibility through its own structures while schools play a main role in setting safe frameworks

How we know it:

The Science Capital approach, PHERECLOS promotes, considers STE(A)M learning happening in all walks of life, especially emphasising the importance of learning happening in non-formal (and informal) settings. UNESCO had promoted a similar approach to education since the publication of their document "Rethinking Education: Towards a global common good?" (UNESCO, 2015) that considers education as a common good, the responsibility of all. These combined, require a systemic approach to recognise and celebrate learning happening everywhere. And as professional education institutions that children must be enrolled in in many countries, it is relevant for schools to take the lead in this.

The PHERECLOS inspiring practice collection brought together 63 successful cases, whereas 43 of them built on regular and organised collaboration between formal and non-formal education. The analysis of the cases has found that "non-formal education can be seen as an addition, alternative and/or a complement to formal education. It has generally more flexible structures, making them more suitable for innovative activities, answering immediate and diverse needs." As one of the main goals of Open Schooling is to provide for diverse learner needs, the flexible and innovative nature of non-formal providers is a great asset for formal education. This is reinforced by the fact that 35 cases were also highlighted for their inclusive approach. Non-formal provisions also make the transition from school subjects to more complex STE(A)M easier according to experiences, which is another great asset in STE(A)M.

A children's university, a non-formal education provider was at the core of each PHERECLOS LEC. Similar starting points, but very different approaches, methods, topics and arrangements were experimented within the various LECs. In their implementation phase, they demonstrated the vast possibilities for Open Schooling provisions that build on or strongly and systematically collaborate with non-formal providers. Some LECs, especially the ones in Poland, Italy, Portugal and Colombia, successfully engaged other types of non-formal providers in their clusters. Another rich proof for the benefits of engaging non-formal education providers

is the experiences of the PHERECLOS-financed Transnational Education Mentoring Partnerships (TEMPs) some of which were built on collaboration with non-formal providers other than children's universities. In the TEMPs not only transnational mentoring has proven to be a successful approach, but – as in the case of LECs, too – the role of non-formal providers as capacity-builders of formal educators was also recognised and highlighted.

What policy can do

At European level:

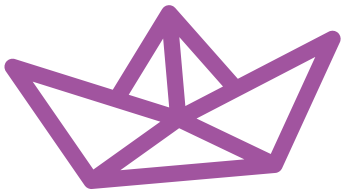
- Provide funding arrangements for non-formal education providers to actively engage in mobility actions together with their formal education peers
- Use the Open Method of Coordination for sharing policy experiences for inspiration
- Use major European education events for showcasing inspiring practices

At national level:

- Create financial and professional incentives for Open Schooling initiatives that are built on collaboration with non-formal education providers with special focus on systemic rather than ad hoc ones
- Organise fora for exchanging experiences between non-formal education providers
- Arrange for non-formal providers to train and coach school leaders in collaboration with them

At local level:

- Create a catalogue of non-formal provisions available locally and keep it updated
- Offer matchmaking provisions between schools and non-formal providers
- Promote non-formal provisions to the general public making it possible for school leaders, teachers, parents and the students themselves to make the match with their schools



Fifth Policy Recommendation:

Ensure stable, long-term financing for Open Schooling and ensure that these provisions are available within the realm of free general education

What we know:

- Open Schooling initiatives need continued funding from their initial phases throughout the life of the programme
- Funding can be allocated with the school or other actors of Open Schooling programmes, and need to ensure that families do not have related financial burden

How we know it:

One of the starting points of the PHERECLOS project was a policy inventory, identifying key policy areas for successful Open Schooling actions. Based on the analysis of international policy documents and treaties, and having an accompanying reality check, one of the main red flags raised was the lack of regular, systematic financing for these actions. Organisations that have successfully applied for EU-funding and wish to further the use of tools developed have long advocated for making funds available for mainstreaming and upscaling. The overall success of inclusion efforts largely depends on sustained funding (it was made obvious by school systems being shocked again in 2022 by refugee influx while funding was present to prepare them for such an event during the 2015 refugee crisis.) Provisions can be channelled to the school (making autonomous decisions possible, but with the potential danger of having too little funding available for a programme if schools are not acting in clusters, but individually), to the child (that makes parental engagement in decision making an absolute necessity) or the non-formal provider (creating a "market" that needs to be adjusted to

schools' needs rather than the offer leading schools). This means that good and sustainable funding is strongly linked with previous recommendations on autonomy and the engagement of stakeholders by co-decision-making.

A Europe-wide survey of parents done in 2015 and repeated in 2019 clearly shows that out-of-school activities as well as activities with external actors in the schools – the two main types of Open Schooling activities – mean a financial burden for families in most European countries. In some countries, these activities are already included in the free provisions of the school, in some countries external funds are available for parents who struggle paying for these programmes, but in the majority of cases the provisions are not universally free.

In the inspiring cases analysis, one of the key components was funding and it was also identified as a main obstacle to implementing successful Open Schooling programmes. In most case studies, the funding identified was temporary, namely project funding. In other cases, the sustainability of programmes depends on short term operational funding available for 1-3 years that also makes long-term planning and mainstreaming difficult with the constant uncertainty about the renewal of such funds. Also, in some cases the funding is totally detached from the school that makes the choice for the most appropriate programmes more difficult, resulting in schools opting for those funded externally.

One of the biggest challenges the PHERECLOS LECs and TEMPs are facing is sustaining their activities after the funding period. The TEMP-funding ended about half a year before the current document was created, and in some cases, collaboration could be maintained – but without funding. All actions that were initiated in LECs and TEMPs largely depend on the availability of further funding. One inspiring example used throughout the PHERECLOS project is from Denmark - that makes the availability of services provided by the Danish project partner UCPH ensured -where funds were made available by national policy for each school for their Open Schooling programmes.

What policy can do

At European level:

- Promote the regulations of the Charter of Fundamental Rights of the European Union that require Member States to provide free education
- Include appropriate funding and free access as one of the core elements of inclusion in education in all policy documents on inclusion
- Prioritise upscaling and mainstreaming of successful evidence-based Open Schooling STE(A)M projects developed using EU-funding to make them sustained and financed programmes with at least as much funding made available as the amount assigned for innovation

At national level:

- Assess and monitor the real costs of education by regularly consulting schools and families
- Set up a specific fund accessible for schools and/or non-formal education providers to ensure free access to quality non-formal provisions in a systematic way, discouraging short-term provisions and encouraging co-decision-making of schools, families and non-formal providers.
- Include regular funding for Open Schooling activities in school budgets

At local level:

- Monitor the changing needs of local schools and learners, set up an alarm system to flag changes that affect access
- Engage with local businesses and make it possible for them to collaborate with non-formal providers and schools for more accessible Open Schooling programmes
- Celebrate and showcase successful long-term collaborative Open Schooling programmes

Sixth Policy Recommendation:

Remove physical and legal barriers to student participation in Open Schooling

What we know:

- Accessibility is a complex issue of legal and physical considerations should be the highest priority in Open Schooling
- Open school provisions need to have a universal design approach so that they cater for the needs of all students

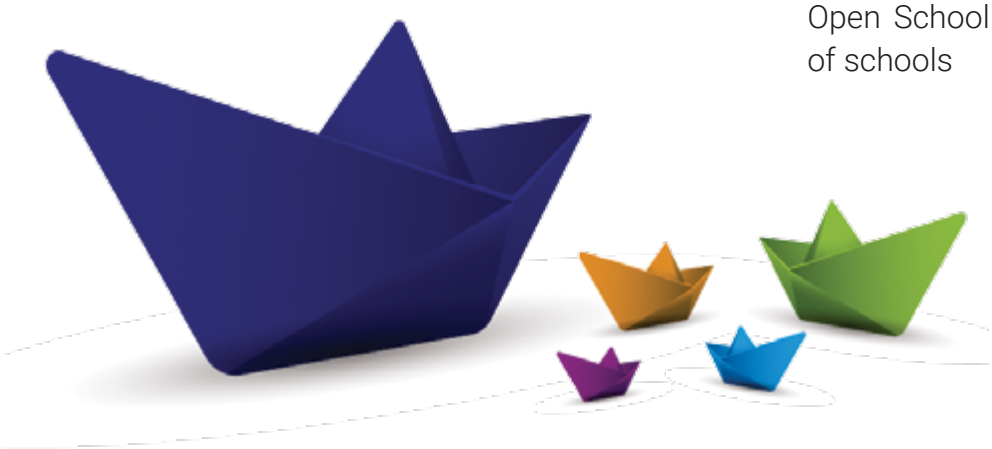
How we know it:

Education as a common good – as promoted by UNESCO – acknowledges that learning happens everywhere, and everybody is responsible as a learner and as an educator. This means that basic rights must be ensured to allow all students to benefit from all available provisions, and within Open Schooling this must happen within the realm of "schooling", but not necessarily in the school building. Research – for example the recent outcomes of the Child UP project - also shows that children have a much higher level of agency, and are able to make more complex decisions for themselves and others than most adults, including policy makers assume.

The policy analysis undertaken at the beginning of the PHERECLOS project has identified access as one of the key barriers to Open Schooling. Apart from the financial provisions, two more factors have been identified within this realm: physical barriers and legislative ones with regards to the personal interaction of minors and Open Schooling providers external to the school. The former can be removed by implementing a Universal Design

approach, not planning education provisions for some kind of "average", but considering the diverse needs of students, be it their physical or learning disability, restricted knowledge of the main language of instruction, learning style and others. Legislative barriers are being set up by more and more countries thus not only violating child rights and backtracking on their commitment made at the ratification of the UN Convention on the Rights of the Child, but also making Open Schooling much more difficult. In the analysis of Open Schooling cases attitude has been identified as one of the main barriers that includes a limited understanding of child agency.

The implementation period of most LEC activities coincided with restrictions countries introduced, quoting Covid-19. The lack of access was manifested in many countries in the form of preventing non-formal providers from operating properly, especially by banning access to school buildings. LEC experiences show that in some cases virtual access can be part of the solution, but not a replacement to in-person participation. Another helpful solution in this exceptionally difficult period that can inspire providers in less turbulent times is moving activities outdoors – that also requires free movement during school hours as well as physical accessibility provisions (including ramps, safe crossings, maintained outdoors spaces, etc.).



What policy can do?

At European level:

- Promote child rights and risk mitigation in Open Schooling as part of the EU's commitment to ensure the implementation of the UN Convention on the Rights of the Child
- Organise peer learning activities for making Universal Design in Education (UDE) known by professionals and incentivise including the topic of UDE in initial teacher education as well as continuous professional development
- Make provisions for UDE innovations and their upscaling/mainstreaming
- Make child agency a focal topic of the Open Method of Coordination

At national level:

- Revise national legislation that may prevent Open Schooling programmes inside and outside of school with special emphasis on legislation on who can enter schools and how minors can leave the school building
- Remove age restrictions on minors being on their own, and promote co-decision of parents and children in this area
- Make provisions – financial and training alike – available for UDE
- Introduce a "trusted and inclusive provider" badge or similar to guide schools and families

At local level:

- Assess potential physical barrier of participation and invest in accessibility
- Incentivise the mutual learning of community stakeholders to build trust and confidence for Open Schooling activities inside and outside of schools

2.5.3. PHERECLOS Policy Briefs

The implementation of Open Schooling as a strategy requires a process of institutional learning and a fundamental change in how schools are perceived by various stakeholders. In order to get their commitment, evidence needs to be based on authentic first-hand insight into well proven practices, as well as on a thorough analysis of policies and structures which are relevant for the school sector. For this reason, PHERECLOS has dedicated a separate Work Package to advocacy activities, delivering policy recommendations and supporting upscaling to ensure the long-term and widest possible impact of the project.

This set of Briefing Papers, based on a mapping of needs of PHERECLOS LEC partners, has been developed in a way that can support local advocacy work towards various levels of policy making, focusing on thematic areas identified by LEC partners as possible barriers, but each taking the perspectives of main open schooling stakeholders: school students, teachers, school heads, parents and teacher training into account. Further on, the Briefing Papers and experiences of LEC partners with using them will provide a basis for the formulation of the Advocacy Toolkit and Policy Recommendations in the final stages of the project.

Based on input from LEC Partners the following thematic areas have been identified as relevant for local advocacy:

1. The Benefits of Open Schooling on STEAM learning
2. School Autonomy and Stakeholder Engagement in Open Schooling
3. School Leaders and Teachers in Open Schooling
4. Non-formal Education Providers in Open Schooling
5. Financial Aspects of Open Schooling
6. Physical and Legal Barriers to St udent Participation in Open Schooling

Each Briefing Paper is an individual document that can be used separately for advocacy work. They were developed bearing in mind that LEC partners, or any advocate for the PHERECLOS model or open schooling in STEAM education for that matter, will use ones relevant in their context and not use others. This is why each paper is formatted separately and there is an extra section on PHERECLOS in each of them.

POLICY BRIEF #1

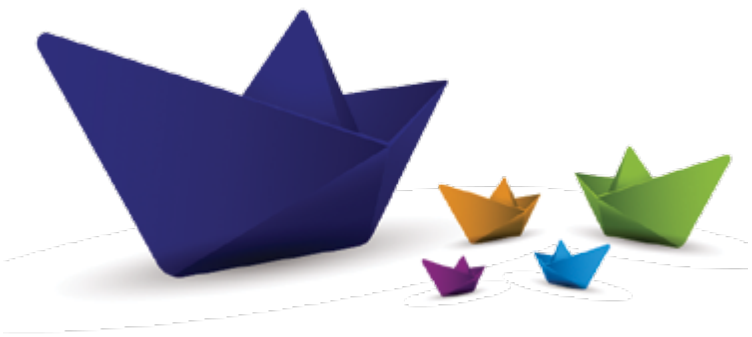
The benefits of Open Schooling on STE(A)M learning

Key messages

- **Open schooling can support STE(A)M learning better for the majority of students than traditional methods**
- **Open schooling brings the benefit of active citizenship through community engagement into STE(A)M education**

Open schooling has been promoted as an approach that creates an engaging environment for children's learning while strengthening links to local communities. Local expertise and experience incorporated into learning at school, making links to the real world offers ways to learn more meaningfully and leads to better motivation of learners, but also of teachers. Open schooling brings the arts element into STEM learning in a natural way, and thus paves the way for higher levels of STE(A)M competences.

The purpose of Open Schooling is to bridge the gap between formal, informal, non-formal; institutional and non-institutional education. The development of technology and infrastructure of our modern society is so fast that nowadays school systems are educating students for jobs that do not exist yet. Therefore, teaching cannot be based on knowledge alone, since this knowledge may be obsolete by the time the student enters a workplace. Transition towards a more contemporary and competence-based education system has been on-going in many countries for some years now. To achieve this, it has been crucial to redefine the framework for the education of children. Education needs to be engaged with real life and not isolated from it. This new educational landscape demands collaborations between members of local communities that traditionally were not involved.



A paradox of the open schooling approach lies in the meaning of the Greek word for 'School', which means "free from work" or "leisure". Open schooling in general is shift in paradigm from school as an isolated island, towards engaging school in multiple ways with the local society and the world of work in the process of educating students. Although the benefits of open schooling constructions are widely accepted, there can still be several interpretations for the core values and objectives of concrete open school activities can be based on:

1. For some, external institutions the focus is on formation, and the aim is to prepare student to be critical thinkers and engaged citizens.
2. For others, an open school has a clearly defined and transparent learning objective, with summative assessments.
3. Yet others build on developing innovation and project competences, for example through the methodology of problem-based learning (PBL). eg. Learning STE(A)M by solving actual problems in local society.
4. Creativity as a single purpose for engaging in open school partnerships is also legitimized in several cases, eg. arts and crafts in focus. This is done without expectations of a certain learning outcome, since this kind of aesthetic process is a personal experience.

Inspiration #1 – Copenhagen Honours College

Copenhagen Honours College (CHC) is a new 2-year talent programme (started in 2018) driven by the University College Copenhagen for teacher training students. The program offers a small group of students the possibility to pursue certain extracurricular activities and, at the same time, provides a scholarship in order for the scholar to dedicate all available time to studying. The honour programme involves among other elements a journal club, project management education, tools in innovation processes and networking. The 30 ECTS given amounts to a semester, which is done on top of the mandatory college courses. As a part of the 2 year programme, all students are paired to a public school. There they focus on practical projects within the field of certain learning outcomes in line with the aims of CHC, eg. on developing sustainable and qualified open schooling activities. A recent project presentation from an intern has proven what the extra resource of having a CHC student at a school can achieve. The teacher training student developed two partnerships, and planned, professionally defined and project managed the learning activities beginning to evaluation. The feedback from the mentor at the local school stated that the effort put in by the teacher training student was of great importance and a resource that really made a difference in order for these open schooling activities to happen. Teacher training students can make a significant difference and get valuable, on-the-job training experience, given the right conditions and motivation.

(More information: https://www.folkeskolen.dk/)

There is not necessarily a contradiction between different motivations for engaging in open school programmes, and it is important to be aware of this pedagogical and didactic diversity. The combination of approaches and objectives will often be unique for the individual educational landscape, and also definitive for how the local collaborative strategy on open schooling is developed and implemented. The benefits of open schooling lay in this construction, getting it right for all by uncovering nearby educational resources and bringing them into play by local partnerships. In some cases, the external educational environments do not have pedagogical nor didactical competences, and yet they still represent an authentic framework for learning. Interaction between teachers as formal scaffolders of learning and the external agents/providers provides a potential cradle for innovative learning and education, also within the field of STE(A)M. An open schooling educational landscape has the potential for creating a broad framework of learning activities that accommodates the wide variety of ethnic, cultural and traditional backgrounds, approaches and perspectives, interests and motivations for learning among students. It also has a potential to meet the criteria of equity and inclusive education. Innovation, creation of new practices and reflections on the effects are core values in this transition from traditional formal education towards education in an open schooling environment.

Sources: OSOS, DPU

Inspiration #2 – OSOS

The three-year (2017–2020) Open Schools for Open Societies (OSOS) project aimed to help a thousand European primary and secondary schools with opening up to its community. In this project, schools can count on support around curriculum, pedagogy and assessment. Schools that participated in the first round of implementations, school year 2017-–2018, acted as HUBs for the schools participating in the second round of this project. This method stimulated a growing support network between schools.

The OSOS model proposes a process and this process starts with the Change Agents who are becoming Inspiring Leaders of the school community. It supports school leaders to capture the needed steps for innovation with constant reflection being part of the process. The OSOS Open Schooling Model provides a powerful framework for school leaders to engage, discuss and explore how their schools need to evolve, transform and reinvent for personalized science learning and teaching; how schools can become innovation incubators and accelerators.

By the end of the project 1169 schools joined the movement, with 2222 teachers as part of the OSOS community over 1188 projects carried out.

(More information: https://www.openschools.eu/)

POLICY BRIEF #2

Autonomy and Stakeholder Engagement in Open Schooling

Key messages

- Successful open schooling initiatives in STE(A)M education require a certain level of autonomy in formal education
- Various stakeholders with different roles and responsibilities are to be engaged in designing, implementing and evaluating open schooling initiatives

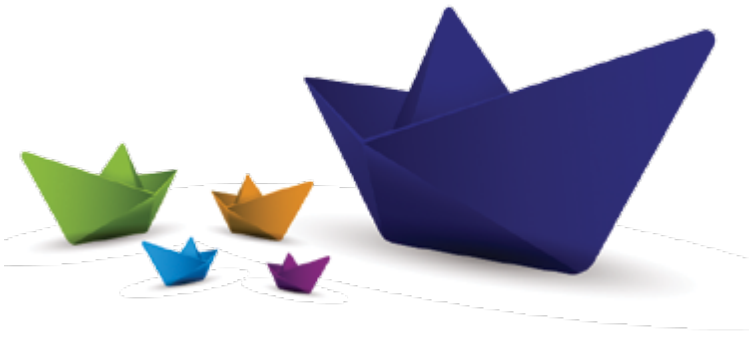
Open schooling has proven to be more successful when combined with stakeholder engagement in decision making. To create the link to local communities, their representatives need to be part of the planning and delivery processes. Teachers, parents and the students themselves are the first groups to engage, but other local stakeholders that can become part of the open schooling environment are also key. As open schooling reflects local needs, the school needs to have autonomy in designing their own network. Open schooling is per definition a local collaboration between the school and other stakeholders. To establish such relationships, the school needs to have a certain level of autonomy to decide on such partnerships, allocate necessary resources and arrange their activities accordingly. Open schooling initiatives are great testbeds for curricular experimentation, and thus a respective possibility for autonomous decision making is also desirable. Autonomy is to be accompanied by clear accountability settings by stakeholder groups. Stakeholder engagement in open schooling requires an identification of stakeholder groups and a deep previous analysis of diverse expectations and needs. Engagement into developing, planning, implementing and evaluating creates a sense of ownership in any stakeholder group, and thus enhances the outcomes by sharing a close vision and common or parallel goals. Multiple viewpoints often result in thinking-outside-of-the-box solutions. What potential role different stakeholders play in collaborative, open STE(A)M provisions? First of all, school students will always be the enduser stakeholders. All schooling initiatives, and for that matter, all open schooling ones are supposed to be respondent to their needs. A "nothing about them without them" approach is to be implemented and there is a need to introduce ageappropriate methodologies for that. Professional educators play a central role in providing quality instruction. Their engagement is crucial and needs to be supported by Continuous Professional Development as well as incentive evaluation and endorsement methods to ensure they excel in their job, bring in and embrace innovative practices. Parents have proven to be crucial stakeholders being legally responsible for the education of their children, but also as the most impacting educators, having the largest influence on the learning outcomes and also learning mindsets of children with their previous and real-life experiences making them crucial for innovation. School leaders at different levels of education are key for the success of any open schooling and/or STEM(A)M initiative being responsible for offering educational services and establishing competent and suitable learning environments. Non-formal education providers are often provide methodologies and practices that engage more stakeholders in learning, have useful experience in working with diverse groups, in more flexible forms and settings, and also often more technologically savvy. They bring in more potential for innovation. Local businesses play a dual role as providers of inspiration and resources. Having corporate responsibility for their local communities and being engaged in educating their future workforce and customers give them a high stake in education, while they often also possess suitable know-how. Policy makers on national, regional and local levels are also crucial,

creating the legislative and financial framework for open education. The local level is often easier to engage in activities that target the local community they are responsible for. Researchers, scientists and academia members can also be leading stakeholders in a number of areas of STE(A)M education, such as teacher training or policy advocacy. There is a global effort to bring research closer to the public, to promote citizen science and overall, active citizenship by this engagement.

Inspiration #1 – White Paper on Schools The White Paper Higher Standards, Better Schools for All (2005) in the United Kingdom, proposed that schools and services must be 'opened up to new and different providers and ways of delivering services'. The aim was to enable successful schools to establish and manage entirely new schools and federations'. Schools themselves were encouraged to form 'foundation partnerships and federations that will work together to raise standards but also take on new responsibilities'. The business and private sector, in addition to the churches would not only extend their increasing control and provision of state schooling, but also play an emergent role in a new system of local governance, offering 'some local brokerage to make it work' as well as coordination to ensure joined-up provision. 'This cannot just be a partnership of state providers – the voluntary and community sector, business and private enterprises need to be a part of this partnership to provide joined up services.' Nevertheless, there are also a number of challenges that can arise from multi-stakeholder partnerships. The most common challenges arising from stakeholder governance are related to traditional power structures and the understanding of accountability. By stimulating broader decision making and promoting inclusive and participatory initiatives, some may argue that they can suffer from a potential weakening of traditional key stakeholders. Therefore, such structures need to be designed with care, and taking real accountability into consideration.

Scientix Inspiration #2 – the Netherlands Compared to education systems in other member countries of the OECD, schools in the Netherlands operate in a highly autonomous policy context, based on constitutional provisions since 1917. Within a framework of learning objectives, standardized examinations, and block grants set by the national government, the administration of Dutch schools is highly decentralized, schools have been free to choose and follow their own pedagogical visions. In lower secondary schools, 86% of "key decisions" on matters regarding the organization of instruction, personnel management and resource management are made at the school level, as compared to the OECD average of 41%. Schools are free to decide what to teach and how to teach it, as long as they meet established quality standards and learning objectives. School autonomy is balanced by a set of standards, attainment targets, and a national examination system developed by the government. The Inspectorate of Education, under the responsibility of the Minister of Education, monitors both quality of education and compliance with statutory and financial rules and regulations.

Sources: OECD, Scientix



POLICY BRIEF #3

School Leaders and Teachers in Open Schooling

Key messages

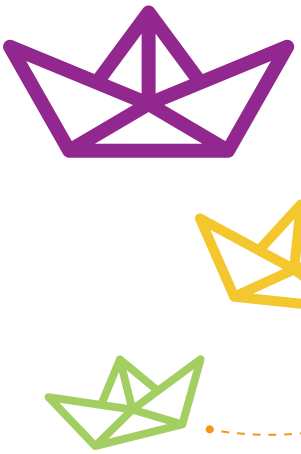
- **Teachers and school leaders need professional autonomy for successful open schooling programmes**
- **Appropriate training and support as well as remuneration are necessary factors for any education innovation to succeed**

Teachers and school leaders are the cornerstones of introducing open schooling activities at any school. They need to have autonomy to make such decisions and they also need professional support – training, coaching, mentoring – to introduce new ways of teaching. Introducing and maintaining open schooling activities require time investment, and this needs to be acknowledged in their workload.

While teachers have been identified as key actors in achieving the EU education targets and goals as well as Sustainable Development Goal 4, experience and statistics show that there are several aspects of teacher career paths that need to be addressed to overcome the main challenges in relation to attracting and retaining teachers for the goals to become reality. This is especially true in the context of open schooling delivery.

One of the most important aspects is training: initial teacher education is as crucial factor in assuring an effective functioning of an education system as Continuous professional development (CPD). Such programmes can be considered compulsory in all EU countries, but their extent varies from country to country. There are also major differences between time and budget provisions for CPD. Training needs are to be considered when developing open schooling programmes as a key element of success. Appraisal systems can also be considered as an incentive for open schooling and play a very important role in reviewing and determining professional development needs. Appraisal systems also have a role in detecting low performance and they lead to supportive/remedial measures.

Motivated teachers are inevitable for good school provisions. Financial benefits such as salary, pension and insurance are often mentioned in research as extrinsic factors motivating in-service teachers. For this reason, it is of utmost importance that teachers' overall workload is considered and remunerated, including extra effort in establishing and maintaining open schooling processes. At the same time, these direct factors are closely interrelated with elements such as 'the perceived benefits or convenience of teaching', 'the nature of teaching work' and 'the status of teaching'. A successful open schooling approach can greatly contribute to these indirect factors. A strong professional community and exciting working environment, along with stimulating and challenging colleagues, has also long been considered important by teachers.



Inspiration #1 – E4F

Within the Education for the Future (E4F) project - a joint international Master's level in-service programme for teachers, school leaders and other educational specialists - has been developed, tested, evaluated, adapted and implemented. The programme created a context for supporting teachers, school leaders and other educational specialists to strengthen their leadership capacities and their expertise with respect to school development and innovation.

The programme was developed within a sustainable partnership between three universities and an educational authority in four different countries (Liechtenstein, Estonia, the Netherlands and Switzerland). The programme is unique because it brings together teachers, school leaders and other educational innovators as partners in innovation, by stimulating international exchange at a Master's level, by stimulating intensive reflection about national systems and school practices, and by combining both individual professional development of the participants and school development within their schools through small-scale innovation projects at local level.

(More information: https://edu4f.wordpress.com/)

School leaders usually have a very important role in designing, organizing and evaluating open schooling programmes as well as in establishing, nurturing and maintaining partnerships, but most school head training schemes do not offer training in the field. What is more, research evidence shows that school heads are second only in school to classroom teachers in their influence upon student outcomes. The provision of appropriate CPD, together with mentoring and coaching schemes, for school leaders is of great importance, especially when it is considered that, conventionally, leadership rarely features in initial teacher education programmes, and the most common pathway to school leader positions originates from teacher positions.

EXAMPLE #2 – ELITe

The "Learning in Teaching via e-inquiries" approach for STEM teachers' professional learning is based on the principle that the teacher teaches in such a way in which he/she was taught. Inquiry-based learning (IBL) has been identified as a powerful innovative teaching approach, providing opportunities to develop the scientific literacy of all learners. At the same time, teachers meet difficulties when implementing it in the classroom, due to missing experience in it, as, usually, the teachers' professional development courses are conducted in a traditional way via lectures. The main assumption of the ELITe project is that the implementation of the IBL methodology in teachers' competence development courses will provide them with real situation experience and know-how as well as with a reflection from 'students' point of view'. Something more – the IBL has a very poorly explored potential as an effective teacher training method, which can contribute to effective STEM teachers' competence development.

The majority approaches in initial and continuous training programs focus on subject knowledge, pedagogy and classroom-based training, the ELITe approach addresses knowledge, skills and attitudes needed by teachers to address their challenging roles. The implementation is based on proven links between inquiry skills practice and STEM teachers' competence development. Contextual aspects affecting effective provision of CPD in the above-mentioned countries have been taken into consideration, while challenges and needs in terms of renewing the thematic of STEM teacher training have also been addressed.

(More information: https://www.learning-in-teaching.eu/index.php/en/)

Autonomy is a main factor for both teachers and school leaders to be successful and motivated promoters of open schooling. When teachers are able to choose materials, teaching methods and determine classroom organization and discipline, their motivation is reportedly higher, however only if a high degree of continuous support exists. Research has shown that greater autonomy has a positive impact on the system level, students' achievements are higher in systems with overall higher autonomy and where school leaders can be more independent in their responses to local conditions. One of the key elements in this success is the freedom to choose open schooling approaches in addressing student needs by entering into partnerships. It is also clear that as curriculum autonomy increases, teachers' on-the-job stress decreases and as general teacher autonomy increases, their motivation, empowerment and professionalism increase. All these factors result in a better and more inclusive school climate and greater overall wellbeing of school staff and job satisfaction. However, it must be stressed that autonomy and accountability are interconnected, and that teachers and school leaders need to be empowered and supported in order to be effectively autonomous.

Sources: EACEA, EURYDICE, EEPN

POLICY BRIEF #4

Non-formal Education Providers in Open Schooling

Key messages

- **Non-formal education providers are to be considered as main partners in open schooling for better learning outcomes and catering for diverse student needs**
- **Non-formal education offers more flexibility through its own structures while schools play a main role in setting safe frameworks**

Local non-formal education providers are key stakeholders in open schooling. Non-formal education often already has a complementary role in the learning path of many students, and it makes them a natural ally. Non-formal education providers often have tools or methodologies missing from school, and provide a non-frightening learning environment. As they are embedded in the local community, they can also support the development of open schooling partnerships.

Education is generally understood as a deliberate, intentional, purposeful and organized activity. Formal and non-formal educational opportunities share a main characteristic, namely that they have a lesser or higher degree of institutionalization. However, formal education is generally more traditional and to a certain extent rigid, offering a safe and reliable overall structure. At the same time non-formal education generally has more flexible structures, making them more suitable for innovative activities, answering immediate and diverse needs. A good partnership builds on the safety of formal institutions and the flexibility of non-formal partners for the overall goal of better learning provisions for diverse student needs.

When aiming at delivering on both global (Sustainable Development Goal 4) and European (EU2020, European Education Area) goals on quality, inclusive education, one of the main demands is to re-define responsibility for education as that of all, paving the way for a holistic approach and collaboration between formal, non-formal and informal education providers. Rethinking Education by UNESCO clearly demands for exploring new education ecosystems to be able to cater for diverse needs and educational goals. It also links all education domains, including STE(A)M to well-being and humanistic approaches. With regards to migrant inclusion, the document demands for an open approach to alternative knowledge systems to ensure

that Western cultures do not over-dominate education. This, in the reality of diverse societies, is only possible through a wide understanding of education providers and close collaboration among them. In their document, UNESCO proposes the establishment of learning space networks with the school being part with a well-defined role as a way to prevent them from becoming obsolete. The overall goal, according to this policy document, is to develop open and flexible lifelong learning systems from cradle to grave that are built in multiple learning spaces with formal, non-formal and informal education all acknowledged, valued and recognised.

Inspiration #1 – Children's Universities

Since the early 2000s, Children's Universities were initiated at many universities around the globe. The initial intention was on low-threshold STE(A)M engagement, which enables encounters with role models at eye level, allows children to gain first-hand impression of the manifold forms of academic research and scientific thinking and links it with curiosity, interests and living environment of children. In the evolvement of the model, emphasis was put on social inclusion, acknowledgement of different viewpoints and critical thinking – and increasingly the impact on organisational development of universities and their role in the society around them (Third Mission) became evident. In reaction to that, the European Commission has supported the formation of a Europe-wide network (EUCU.NET), which now includes more than 80 partner organisations from 33 different countries.

Year by year, more than 500.000 children participate in CUs – and more and more universities are still embarking on a journey of opening their doors for children and enter in a dialogue. CUs are about exploring our world in an engaging and supportive way. Voluntary participation is key, irrespective of prior achievements in education or socio-economic background. CUs are perfect examples for learning at the overlapping edges of formal and non-formal education: some CUs work together with schools for better reaching diverse groups of children; some integrate teachers in the didactical concepts or provide material for schools – and on the other end, the universities reacts to that paradigm shift as well, eg. when they integrate CU activities in curricula (eg. for teacher training students) or social skills trainings.

(More information: https://eucu.net/)

The transformation of the educational landscape, the growing diversity of manifest needs, together with other factors, such as the impact of a global digital education market has resulted in an increasing recognition of the importance and relevance of learning outside formal institutions. Globally, we are witnessing a move from traditional educational institutions towards mixed, diverse and complex learning landscapes in which learning occurs through a variety of educational institutions – both formal and non-formal – and non-institutional providers. There is a need for approaching learning as a continuum, in which schooling and formal education institutions interact more closely with other, less formalized educational experiences from early childhood throughout life. While the role of formal education is to provide stability, non-formal providers are offering varied spaces, times and relations for learning to take place, and together they can establish a network of learning spaces where formal, non-formal and informal spaces of learning interact and collaborate for better learning outcomes. At the same time, non-formal providers' flexibility often makes them more capable to address specific needs, such as catering for rural as well as urban realities, diverse individual inclusion needs, or ethnic, cultural and traditional diversity.

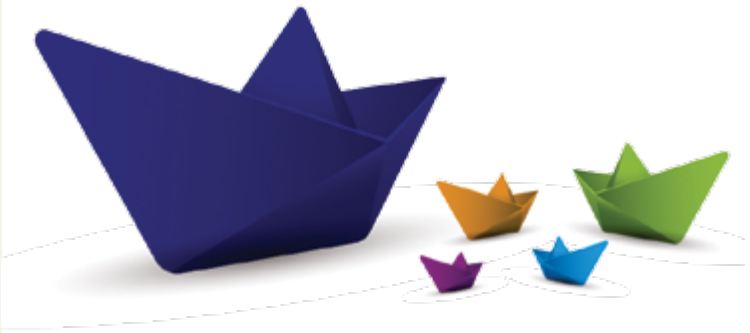
Inspiration #2 – Dragonfly

Dragonfly, an educational programme for elementary school children started in 2008 and it has cooperated with over 300 schools in Hungary, and Hungarian-speaking institutions in Romania, Ukraine, Slovakia, Slovenia and Serbia reaching thousands of teachers and over 10 000 students each year. The main goal is to provide schools with a visually attractive literary and ecological children's magazine for free and instructing the teachers about how to use it in their everyday work. The program's website provides over 6000 different auxiliary materials. Children and teachers have the opportunity to take part in various creative competitions and quizzes. The programme fights for social equality by education, and has had several programs that targeted specific groups of disadvantaged people (disadvantaged teenagers, the homeless, the migrants, children living with disabilities). Based on a network of volunteers of several hundred teachers, professionals and NGOs all over Hungary and in the neighbouring countries, the programme is operated by Liget Műhely Alapítvány, a Hungarian public benefit organization.

(More information: https://futurememory.eu/info-in-english/)

Countries approach partnerships between formal and non-formal education provisions in different ways varying from not prohibiting it to making it a desirable approach, and in many countries, there are legislative or financial incentives for formal and non-formal education providers entering into partnerships. The European Union funding opportunities have reflected EU policies on open schooling, and financial provisions are available for such initiatives.

Sources: UNESCO, European Commission



POLICY BRIEF #5

Financial Aspects of Open Schooling

Key messages

- **Open schooling initiatives need continued funding from their initial phases throughout the life of the programme**
- **Funding can be allocated with the school or other actors of open schooling programmes, and need to ensure that families do not have related financial burden**

Financial provisions for open schooling need to be designed in a sustainable way, and they need to ensure that open schooling activities do not create any extra financial burden for families. These are prerequisites of inclusive education provisions. This means that legislation has to be in place that either gives schools appropriate and flexible budgets to finance their activities, including open schooling ones, or there needs to be a fund available for other open schooling actors to provide their services free for the school. We need to consider it a reality that successful pilots are only sustainable if their operating costs are provided for.

The fundamental rights of children to free, quality education are enshrined in legislation in all European countries through the UN Convention on the Rights of the Child. The European Union made a further commitment to deliver on the right to education and in particular on access to free compulsory education in the EU Charter of Fundamental Rights of the European Union in 2012. This offers the legal basis to approaching the financing of open schooling and innovation in STE(A)M education. When implementing open schooling programmes, there is a need to ensure there is no financial burden on families thus it has a positive impact on equity and inclusion.

Financial provisions for education, their amount, allocation and the level of autonomy of schools in the field of budget greatly varies from country to country. In general, school systems have limited financial resources with which to pursue their objectives, thus funding policies and schemes play a key role in ensuring that resources are allocated in a way that ensures necessary changes and development. When implementing innovative programmes, such as open schooling in the field of STE(A)M education, there is a need to differentiate between provisions for designing and setting up an innovative partnership and maintaining it. Successful open schooling initiatives are only possible in financing environments that provide funding not only for initial phases of such programmes, but also consider and provide for the costs of sustaining it.

Inspiration #1 - Rødovre

In Rødovre, part of greater Copenhagen, there is a systematic open schooling strategy on municipal level. The strategy is inspired by the Norwegian "cultural ruck sack" and involves both STEM-oriented and cultural activities. This strategy is implemented through a new programme for every school year. It contains compulsory open schooling activities for all grades from kindergarten to 9th grade at the seven public schools in Rødovre. These activities are publicly funded $^1/_3$ from local school budgets and $^2/_3$ from the municipal school administration budget. In Denmark, it is not allowed to charge parents for students' school activities. The compulsory open schooling programme is discussed every year and decided on by the municipal administration and representatives of local schools together. It must be emphasized that the compulsory program is a minimum criterion, and is implemented to ensure all pupils are given the opportunity to participate in open schooling activities, regardless of individual teacher preferences. This still leaves plenty of room for teachers to allocate other curricular activities into to an open schooling framework. The municipal open schooling consultant also provides free in-service training to the teachers on open schooling didactics, and thus these activities often get integrated in general learning plans instead of becoming stand-alone visits. In some cases, the municipal administration has co-financed offer by external providers of open schooling activities in order to make the content match local didactical strategy of e.g. innovation and technology competences.

(More information: https://rk-puc.aula.dk/aaben-skole)

In the reality of schools, different bodies are involved in raising, managing and allocating budgets. A growing number of school systems is characterised by multi-level governance, with a growing set of actors including different policy levels, schools themselves and private providers involved in school funding. Central governments should continue to provide the majority of financial resources for schools as it is part and parcel of their legal obligation to provide free education. The responsibility for spending these funds is shared among an increasingly wide range of actors in the spirit of stakeholder involvement and collaborative leadership. In many countries, the governance of school funding is characterised by increasing fiscal decentralisation, placing considerable responsibility on local school stakeholders over budgetary decisions. This generates opportunities for implementing open schooling programmes and establishing partnerships, but also poses

challenges for schools, and thus require adequate institutional arrangements. To support effective school funding and avoid adverse effects on equity in changing governance contexts, there is a need to ensure that roles and responsibilities in decentralised funding systems are well aligned; to provide the necessary conditions for effective budget management at the school level; and to develop adequate regulatory frameworks for the incorporation of private funding into budgets in a way that prevents direct interference.

Inspiration #2 – AEC, Portugal

In Portugal the Government supports this free program – AEC: Atividades de Enriquecimento Curricular (Curriculum Enrichment Activities) They are part of a broad strategy of articulation between the school and the organization of social responses into the field of family support. This strategy is based on three main strategies: Animation and Family Support Activities in Pre-School Education (AAAF); Curriculum Enrichment Activities (AEC); Family Support Component in the 1st cycle of Basic Education (CAF).

AAAF are designed to ensure the monitoring of children in pre-school education before and or after the daily period of educational activities and during periods of interruption of these activities.

AEC happens in the 1st cycle of basic education. The activities are optional and can have playful, formative and cultural nature that focus, namely, in sports, arts, science and technological domains, connecting the school with the Society, enhancing some values like solidarity and volunteering and the European dimension of education.

In CAF the set of activities was designed to ensure the monitoring of students in the 1st cycle of basic education before and or after the components of the curriculum and the AEC, as well as during periods of school interruption.

(More information: https://journals.openedition.org/configuracoes/1438)

There is a need for well-designed funding formulas in distributing funding for current expenditure in a transparent and efficient way. Providing funding to the school directly or financing the costs of non-formal provisions are equally effective and appropriate as long as it is arranged in a well-planned and reliable way for sustainability. Governments should ensure a stable and publicly known system to allocate public funding available for open schooling in order to support the achievement of equity objectives through school funding mechanisms. Funding schemes need to be aligned with strategic targets and priorities. At the same time education budgets should also be flexible enough to respond to new priorities and unforeseen circumstances as well as providing incentives for efficiency, but through transparent regulation and not on an ad hoc basis.

Sources: OECD, European Commission

POLICY BRIEF #6

Accessibility aspects of Open Schooling

Key messages

- **Removing physical, legal, cultural, linguistic and other barriers is key to successful open schooling programmes**
- **Accessibility is a complex issue of legal and physical considerations should be the highest priority in open schooling**

Open schooling has to be accessible for all students, and thus needs to be implemented with inclusion at the heart of activities. It is only possible if legislation supports such activities. While there is legislation in most countries on accessibility for disabled students, there are barriers, especially due to regulations regarding the organisation of school activities outside of the school or activities within the school that involve external people.

Accessibility is a major factor in equitable education provisions. It is ensured by anticipating and mediating social/environmental barriers to enhance access for all learners. The most important element of accessibility is often financial provisions, and this is tackled in a separate PHERECLOS brief. Most education systems require schools to be barrier free for various special needs. This spirit and approach need to be maintained when designing and implementing open schooling initiatives. While courses, technology, and student services are often designed for the narrow range of characteristics of the „average" student, the practice of universal design in education (UDE) considers people with a wide range of characteristics for all educational products and environments. UDE goes beyond accessible design for people with disabilities to make all aspects of the educational experience more inclusive for students, parents, staff, and other stakeholders with a great variety of characteristics. These characteristics include those related to gender, race and ethnicity, age, stature, disability, and learning style. UDE can be promoted as a general approach to accessible, equitable education provisions, and open schooling programmes are especially suitable for providing for these diverse needs.

At the same time, accessibility needs to be in the heart of designing open schooling programmes, both in and outside the school building.

Inspiration #1 – AKIM Israel

AKIM Israel is the national organization for people with intellectual disabilities and their families, operating as a person-oriented organization that upholds human rights and freedoms. Since its founding in 1951 the association acted to realize the rights, promote better quality of living and improve the welfare of people who have IDD and their relatives, using legal and advocacy work. The organization nowadays represents some 34,500 people with IDD, and approximately 140,000 family members and legal guardians. AKIM works towards inclusion of people with IDD in the community, empowerment of people for self-advocacy and integration nto society. Based on its vision, the association promotes integration of positive attitudes towards the people through AKIM's headquarters, 64 branches and activity centres deployed in 87 towns and communities in Israel, in both Jewish and Arab sectors, managed by parents and volunteers. Part of their overall aim is to promote and support the collaboration between schools, museums and historic sites for accessible and inclusive education at these non-formal education sites. AKIM has initiated and leads a national programme to make museums and historic sites cognitively (as well as physically) accessible. They wish to make education more inclusive by offering new services to the intellectually disabled, support the social inclusion of these people by this and to help

bring the level of education to the level of intellectually disabled people. The programme, first implemented in 4 sites was a pilot for legislation that is now in place. It has two main paths: one is training - of staff at the museums and isites, in initial teacher education, social workers to educate hundreds of trained education coordinators; the other is developing aids that the museums and sites can use in their daily education practice. As a pilot it resulted in new policy and legislation. Museums and historic sites all over the country are now using this methodology to become accessible and inclusive, and thus making collaboration with local schools. It is a wide collaboration in which a specialized NGO brings knowledge and innovation to museums and historic sites that work together with inclusive schools in their respective local communities, teacher training to ensure the availability of experts on the long run, and it is embedded in a government commitment towards inclusion and rights. In many countries, schools are obliged to be inclusive but often lack tools to include all children. This initiative is inspiring as it shows how a non-formal provider can help adjust the level of education to the needs of children. It is a programme that caused a snowball effect by causing mindset change that means little to no funding is necessary for sustaining and widening the network.

(More information: https://donation.akim.org.il/eng)

One of the considerations, often related to age, is the accessibility of external education sites for all students. When designing open education programmes that require external participation, schools need to find a healthy balance between protecting access rights with safety. For policy, there is an important message to be conveyed: the spirit and letter of the UN Convention on the Rights of the Child provides children of all ages the freedom of movement and ban any arbitrary restriction of liberty. Thus national regulations preventing children from leaving a place, such as a school without adult supervision or written consent of their parents and guardians can be challenged on the basis of the UNCRC. At the same time, schools and other open schooling partners are responsible for educational measures that ensure the safety of children as well as providing information about their whereabouts to their parents and guardians.

Safety and counter-terrorism concerns have also led to the introduction of measures that may prevent open schooling providers from entering school premises. As open schooling is an approach based on community needs and community provisions, it is necessary that school leaders enjoy a sufficient level of autonomy in making decisions regarding child and school safety in this respect. Legal restrictions that oblige school stakeholders to obtain external permissions for participating at school activities easily lead to major bias in access to best education provisions.

Inspiration #2 – Open School Doors

Open School Doors (OSD) is a programme developed in order to support suitable school and parent partnerships for open schooling. In an OSD school doors should be literally open. In an ideal case it means that parents and other stakeholders are welcome there at all times. Teachers receive training to be more aware of diversity, the needs and role of parents, and the role of family and community in education in general. They are also aware of specific needs of children and parents of migrant background, but they are also trained to consider individual needs rather than generalise. You can expect the school and its teachers to treat parents as an equal partner, to seek their knowledge and expertise in the school. Parents' personal experiences are important for them, and they encourage working together for the best learning and development of children as well as the interest of society and local communities.

(More information: http://openschooldoors.westgate.gr/)

Accessibility is also a consideration when engaging stakeholders, especially parents and the students themselves into open schooling activities. In this sense, potential linguistic and cultural barriers need to be assessed and tackled.

Sources: UDE, UNICEF, IPA

2.6. TEACHER TRAINING INNOVATION TOOLKIT ON OPEN SCHOOLING

Torben Ingerslev Roug

2.6.1. Introduction

The purpose of the Teacher Training Innovation Toolkit on Open Schooling is to deliver a near practice-oriented handbook that will support teacher trainers and institutions that work with teacher training students and in-service teachers in the development of out of school and Open Schooling activities integrated in a school-based context.

The Toolkit, based on the notion of learning-by-doing, offers an approach that makes it possible for practitioners to implement teacher training within their Open Schooling programmes. The guide will help school leaders and trainers external to the school to consciously use the implementation of Open Schooling as an innovative approach to training. Another innovative element is the co-training of professionals already working at schools and their future colleagues, the pre-service teachers. The Toolkit may also inform the university training of future teachers, offering an innovative approach to compulsory professional practice hours/periods.

The aim of the innovation toolkit is to help schools move beyond a project-based approach towards a sustainable mainstreamed approach to Open Schooling. The educational focus will be oriented on transformative learning approaches within the field of STEM and STEAM (Liao, 2016). In this way learning goes beyond simply acquiring knowledge, supporting students to find meaning in their and understanding from 'living their learning'.

The toolkit will be partly based on the experiences of case studies from the PHERECLOS Local Education Clusters (LECs, chapter 2.3.), Transnational Educational Mentoring Partnerships (TEMPs, chapter 2.4) and Inspiring practices (chapter 2.1.) to work with Open Schooling in different contexts and educational cultures.

Teacher trainers will be able to use the toolkit as a stepwise progress in training teacher students or in-service teachers to engage with Open Schooling activities as an active change agent in their local

school and surrounding community. The toolkit is constructed as a timeline that guides the reader/user through succeeding phases of

a) concept development,
b) planning of activities and establishment of external partner network,
c) Implement and practice Open Schooling
d) evaluation of the Open Schooling collaboration
e) mainstreaming into a sustainable ongoing Open Schooling program

2.6.2. Teacher Training Toolkit

a) Concept development

Open Schooling - why would you, as a teacher, get involved?

When the classroom is taken outside school, or the society outside school is invited into the classroom, there is a great potential to develop the formal teaching environment with informal learning situated in authentic and relevant settings. The informal learning situations can bring the pupils in school and the community closer together and add authenticity, sensory impressions and variation to the learning situations (Danmarks Evalueringsinstitut, 2018). Regardless of the setting, the Open Schooling partner or preferred methodology, the focus should always be on creating the best possible framework for the pupils' learning and education.

In terms of teaching in the field of STE(A)M, the integration of Open Schooling has the potential for opening up work with authentic issues and hopefully increasing engagement, motivation and ownership of the process.

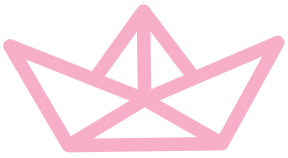
Regardless of whether you're inviting pupils to help solve a real-life problem, investigate an authentic scenario, or just delve into an interesting question, Open Schooling demands different learning approaches than a classic transmissive teacher-led learning strategy.

Introducing creative and innovative methods from the project based learning toolbox to STEM, will make it possible to move towards a more learner-centred learning strategy. With this move, comes pedagogical challenges.

As a teacher trainer, in-service teacher or a teacher team, with a certain amount of autonomy in creating curriculum and/or choosing methodology for the pupils, it should be possible to create motivating Open Schooling activities by using this Toolkit.

A change in methodology demands a lot of training, experimenting and motivation to try and sometimes fail, before success becomes frequent. This goes for all parties involved.

Someone once said that in order to master a new skill, most often there will be a “stinking” phase of undefined length prior to the mastering. Embrace the frustrating “stinking” phase and remember, it’s only a phase. If the “stinking” phase or rephrased, *the courage to fail*, shall become part of the learning process, there needs to be established an environment where the motivation to develop competencies, knowledge and skills are more, or just as, important as achieving high marks and grades and participants who are not afraid to fail.


What could be possible Open Schooling activities to support the aims and goals for learning?

What learning activities would your local Open Schooling partners be able to support?

Creating a catalogue of ideas for more detailed development can happen now or later in the planning process. It could be suggestions like: working with specified **UN sustainable development goals**, design challenges, experiential learning on certain subjects, mentor/expert visits, visit parents at workplaces, field trips, school-business collaborations, school-higher education collaborations, engaging in local NGO work, etc.

What benefits and challenges could an external partner have from cooperating with a school?

Imagine that you were in their shoes, what would the potential benefits, but also the extra work and potential barriers be?

How can I/we as a teacher team build good relations/network to partners outside the school?

Who should be the contact person, who will reach out, should we involve the school head, parents, or others? How could we establish a sustainable cooperation?

There can be several unforeseen bumps on the road of developing new practices. Especially if the national or regional school legislation is hindering a transition towards innovative Open Schooling. Some of these challenges are addressed and handled in the PHERECLOS policy briefs. The purpose of the policy briefs are as guides to different stakeholders connected to or interested in Open Schooling integrated in education.

b) Plan your Open Schooling activity

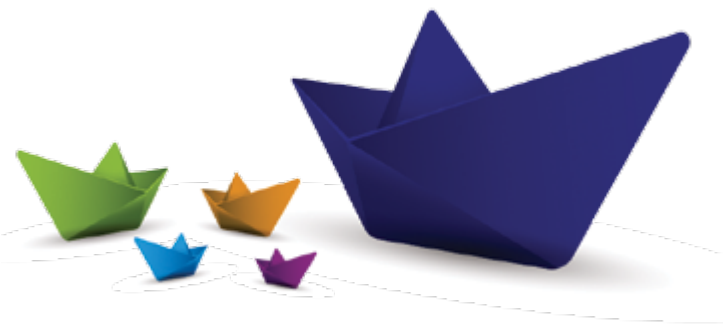
With a thorough Open Schooling plan, you are already halfway there. In this Toolkit a simple planning method - including so-called SMART goal setting - is suggested. It contains a minimum of steps in order to analyse, create choices, reflect and make decisions in order to establish a profound plan that helps to implement a successful Open Schooling project. (The SMART planning section can be found in the full Toolkit publication at www.PHERECLOS.eu)

This section will also introduce

- a method for setting up and conducting participative and meaningful meetings,
- how to develop educational material from scientific articles and scholarly knowledge,
- the relevance and incorporation of 21st century skills,
- innovation competence as practice oriented elements in STEAM,
- different types of activities to navigate in, with emphasis on,
  - how to work with design challenges,
  - creating inquiry-based science activities,
- an Open Schooling assessment tool to validate the core elements of the activity

What is an Implementation Plan in terms of Open Schooling and why is it important to have one?

If you should find yourself as the Open Schooling lead in your school or local community and have a need for creating sustainable plans, an implementation plan could be useful. Such a plan helps to be clear right in the beginning about what needs to be done to achieve certain goals. Even if it may seem to some that it takes a lot of effort to create an implementation plan (according to the motto: "Plans are never kept anyway"), implementation research shows that the creation of such plans are



very helpful in order to actually make things happen like intended.

An implementation plan includes goals, target groups, as well as a description of the planned Open Schooling practice and its context. In an Open Schooling context there can be several target groups to consider, like fellow colleagues, external partners, different age groups of pupils, etc. Define the relevant target group(s) for your specific Open Schooling plan. Then think about the goals that you would like to achieve for each target group. You need to know the major goals leading towards the "big picture", but also the smaller, more specific, ones that are necessary to get there.

Furthermore, an implementation plan contains considerations on how the goals can be achieved. What concrete measures or activities would need to be implemented to achieve these goals? List them for each goal! Then check again whether the implementation of all these measures or activities is realistic or whether, perhaps, one or the other measure or even a certain goal must be dropped.

Next, a description of all planned activities is needed: When will the activity take place (schedule)? Who is involved? Who should be responsible? What (e.g. material) is needed for conducting this activity)? What is our timeline? A GANTT Diagram might be helpful for visualisation.

Last but not least, it is also helpful to think about the context in which the Open Schooling project will take place. On the one hand, the "inner context" (i.e. the school, the teachers and pupils involved) will have an influence on the implementation (i.e. how motivated they are, how open towards Open Schooling, what resources are available). Second, the "outer context" also influences implementation (e.g., which organisations should be involved? What is the motivational situation here? How competent are they in dealing with pupils?)

To sum up: An implementation plan has the function of a step-by-step guide to making changes in practice – it should be realistic, feasible, concrete. Ideally, it is developed with all stakeholders and updated as needed.

Establish network - and professionalise your meetings

INCLUSIVE MEETING PRACTICES

A good teacher colleague once said, "*Too many people are attending too many meetings, where nothing is decided*". The experience of feeling stuck in a meeting is not the best way to foster collaborative innovation. Hence an action oriented and inclusive meeting structure will minimise the risk of 'leaving participants behind'. A fairly simple meeting agenda planner, named *I Do ARRT*, can help in hosting meetings where the intention, desired outcome, agenda, rules and roles and timeplan are transparent and decided together.

The action plan could be like this:

- identify a meeting facilitator, with nothing at stake but to facilitate the first encounters,
- make the final agenda in collaboration with the other meeting participants as the first part of the meeting, to involve everybody in the process from the beginning (the method of I DO ARRT is a possible tool),
    - I - Intention of the meeting
    - Do - Desired outcome
    - A - agenda of the meeting
    - RR - rules and roles for the meeting and the participants
    - T - timeplan - how much time should the different topics on the agenda be granted
- make sure to hear everyone out on expectations of the meeting and the outcomes, so they can be adjusted before commencing,

- make clear decisions and agreements, so that no one walks away with uncertainty of what the plan is, who is going to do what, and when,
- avoid planning meetings where nothing will be decided. People's lives are too short for this.

Inspiration from https://kaospilotradar.dk/2018/03/06/i-do-arrt-making-meetings-great-again/ (accessed May 2022)

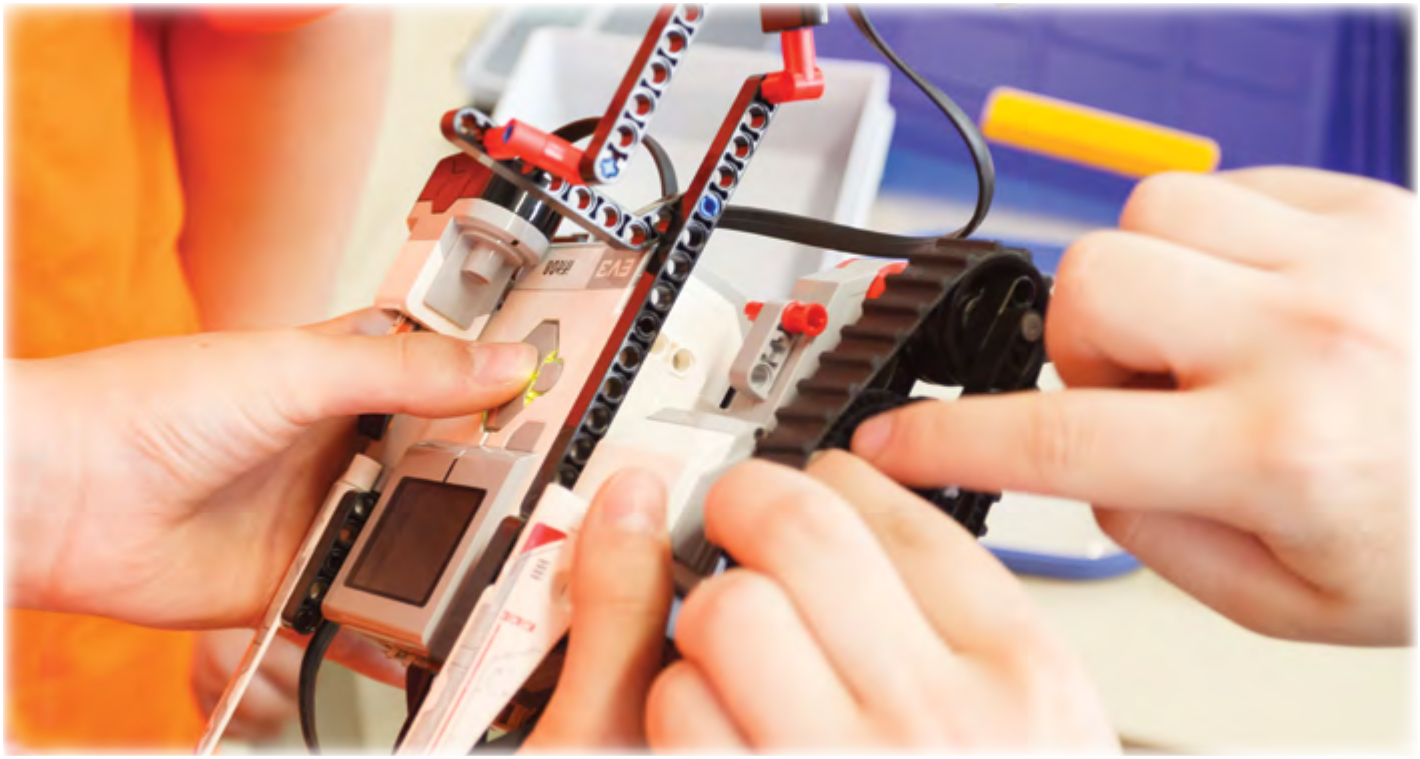
Develop authentic learning cases with external Open Schooling partners

In an Open Schooling collaboration, e.g. with a local company or public institution, the benefit of a meeting with the external partner provides the added value of authenticity, special equipment, physical settings and/or professional expert knowledge. However there is also a dilemma between authenticity and didactisation. If no didactisation precedes the visit, there is a risk that the pupils will not understand what they experience in the meeting with the external partner. On the other hand, too much didactisation risks removing the authenticity, and the difference in settings compared to a normal school day may vanish (Høiby et. al 2020). So the teachers' professional role of being the liaison is critical. It cannot be expected that this responsibility fully or partly to be taken on by the external partner, unless they are trained in education and pedagogy. Here, a professional agreement of roles between teacher and external partner needs to be evident (a true partnership).

Didactical transposition of expert and scholarly knowledge to knowledge taught in school

Whether the collaboration in Open Schooling is with higher educational institutions, museums or local companies, there will be a need to think about how the content is taught appropriate to the age and ability of the students. This must involve the teacher.

Professional and scientific knowledge addressing authentic problems are of great interest in an Open Schooling context. In order for the above mentioned to make sense to a younger target group it is important to adjust the level of complexity in order to be relevant content for their preconditions and the aims of the activity. You can say that there can be a need for deconstructing the content and reconstructing it to fit the pupils' learning situation (Achiam 2014). The challenge here is to conserve the original authenticity in the process and support the pre-understanding by scaffolding the pupils' knowledge about the matter.



Design and facilitate Open Schooling activities with innovative methods

Looking into the toolbox of methods for creating innovative learning activities, it can be difficult to navigate. Simply because there are so many tools and methods, and they do not necessarily differ very much. However there are differences in approach and in the end they are all models that can be changed to fit the needs of your specific Open Schooling team. In this section we will present different innovative approaches with a strong focus on operationalising the ideas of e.g. STE(A)M, 21st century skills and innovation competencies into practice. The intention is also to implement an inclusive and participative approach, simply by focusing on a more learner-centred practice design (Concina, 2019)

A common professional language is the foundation for collaboration in innovation

First of all, it makes good sense to establish a common language to attain a common understanding of the didactics that form the platform for working with STE(A)M, creativity and innovation inside and outside of the school.

KlimaZirkus (part of the PHERECLOS project's Transnational Educational Mentoring Partnership) has developed a project-based learning didactic framework based on SDG's, STEAM and 21st century skills, that we introduce here as a possible general design and assessment tool in learner-centred Open Schooling activities.

The models presented go beyond the project based learning (PBL) approach and can also be introduced as assessment models in short term innovative STE(A)M activities such as inquiry-based science education, problem based learning and design/ engineering challenges.

It is a fact that in education, time is a valuable resource and you do not always have a month available for a full project based learning activity, containing Open Schooling collaborations. Hence, short term alternatives will also be suggested.

Planning participatory oriented STE(A)M

Elements from PBL can be used for reflections on a learning design process, as well as a practical guide for working with pupils in an innovative, learner-centred and formative assessment oriented way.

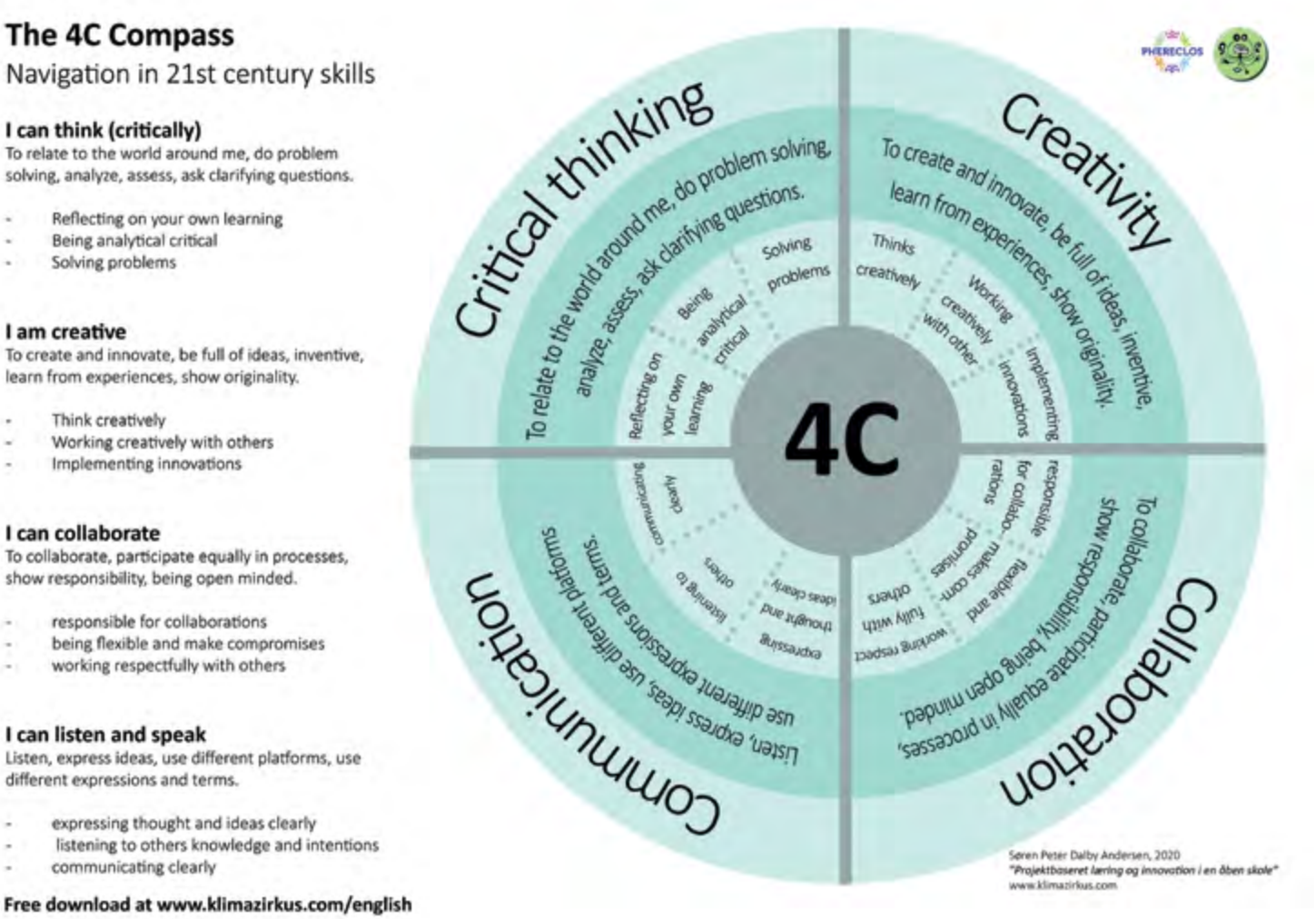
The Klimazirkus reflection guides for planning activities are presented as an example of important steps to consider in the design and facilitation of innovative pupil driven learning processes.

The 4C compass - navigation in 21st century skills

In practice, the '4C' competencies, regarded as 21st century skills that are promoted as essential for being able to act as democratic citizens in our society, are also essential for STE(A)M. The headline skills are: collaboration, creativity, critical thinking and communication. They are all key elements in the process of becoming competent citizens in the society around us and should therefore also be part of our educational strategy in school (Andersen, 2020).

The 4C are visualised in the poster where the competencies have been operationalized into formative assessment statements. The illustrations are models made by KlimaZirkus, TEMP 7, Denmark.

The underlying skills for each competency are shown in the table beneath and are thereby operationalising the competencies in learning situations in school and Open Schooling. The four competencies in the compass are related, and in practice it can be difficult to work with them fully separated. The purpose is to unfold the competencies so that they are addressed when the pupils start to work in a project-based or another participative oriented learning activity.



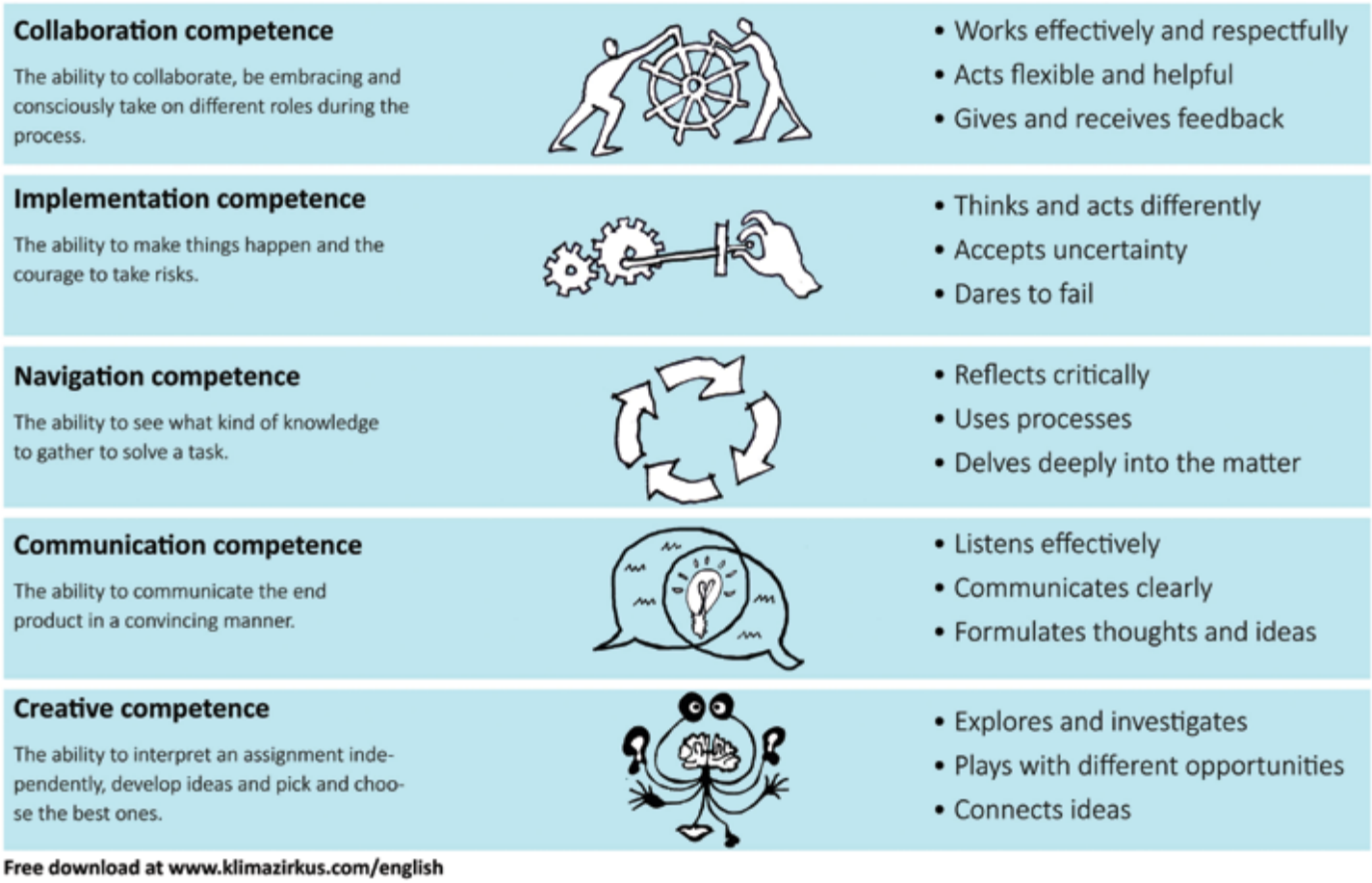
Innovation in Open Schooling

While the 4C's are determined as key skills for citizens in the society we are looking into, the innovation competencies are part of a different domain for the pupils to master. Innovation competencies overlap in terminology with 4C skills, but are more oriented towards meta-learning , or learning how to learn.

It is not necessarily easy to crack the code on how to incorporate innovation into educational practice! KlimaZirkus has developed a tool, where the aim is for the teachers, pupils, external partners and parents to have a common language for talking about the development of the traits and skills that lead to competencies in innovation (Andersen, 2020).

The 15 coupling competencies placed to the right in the table can be elaborated into more detailed "signs of learning" that will give the pupils, as well as teachers an idea of how competencies are or are not expressed. The signs of learning are also a way of assessing the process which often will be difficult to evaluate in an end product. The very concrete examples of 'learning signs' are also an opportunity for having conversations with the pupils about their own experience of the working process.

The five innovation competencies



Process or product?

It is important to emphasise that the main focus is on mastering a process, and less on the outcome of that process. So a group of pupils can work in a very innovative oriented way, without producing anything unique or ground-breaking. Pupils will still be assessed to be on a high level when they master the methods (Sølberg 2015).

The reason why innovation is part of the tool for innovation in Open Schooling, is the focus on creating solutions and solving problems in authentic scenarios and settings.

Innovation for complex problems

In order to be able to learn how to take on challenges and solve problems without a given answer or predefined result, there is a need to be able to define, train and assess competencies that can support this type of learning activities.

These activities could be in a design challenge to a given problem in a human-centred design process, or simply the ability to come up with a qualified experimental design for a science inquiry. Innovation competencies cannot be trained by following conventional fact driven transmissive science teaching. Hence, this focus on innovation competencies in a broader perspective. These are important in all school subjects, and also in STE(A)M and in particular in Open Schooling. The five innovation competencies are inspired by field work in educational research that analysed the most prevalent traits from working with innovation in school (Nielsen, 2015).

Divergent and convergent thinking

The aim is to support the development of innovative pupils that master divergent and convergent actions and can be part of and reflective of the phases that are part of an iterative process.

Divergent thinking is described as opening for possibilities and perception. That means that the pupil searches, scans, enhances, asks and investigates something. *Convergent thinking* is characterised by action where the pupil focuses, compares, narrows down, analyses, synthesises and makes choices (Darsø, 2011).

Determine the nature of the activity - five categories to choose

When working in a project-based oriented way, the preliminary decisions on what kind of approach that fits the situation and the pupils best are important. In this model there are five main categories that can sort out what path will fit the available resources and also the intentions and motivation among pupils, teachers and external partners. As stated before, a real project-based learning process can last weeks but it can also be planned to just last a day or two.

Any of the five categories in figure 2 is applicable to an Open Schooling context. Whether it is a museum visit that addresses an issue or a local company that is collaborating with the pupils over an authentic problem or challenge. The categorisation can also help pupils to navigate how to choose relevant methods.

In the PHERECLOS project there are very diverse examples of Open Schooling approaches. Many of them fall under more than one activity category, but do have a stronger position in one over the others. The inspiring examples below show how the Open Schooling activities have very different characters and yet still live up to the criteria of pupil oriented authenticity and participatory approach. Have in mind that these examples are described from an external partner's perspective.

An authentic problem

A company or a professional person pitches a case for the pupils to solve. The most important element in this category is the collaboration with an authentic recipient about an authentic issue or problem.

The **Medellin LEC led by EAFIT Children's University**, seeks to encourage students to engage with science as a useful tool to the solution of local problems through active learning experiences (called teaching units) addressing, as a pedagogical strategy, eight city-relevant issues (health, environment, economic development, culture, mobility, gender equity, youth and social inclusion). These were co-designed by academia, the private sector, non-profit organisations and the public sector.

An abstract problem

In this category the pupils are not focusing on a concrete problem or product, but rather on immaterial ideas and concepts. They can create a video, a presentation with visual remedies, plays, art installations or a poetry- or science-slam.

The problems could be formulated as: How can I remember my dreams, since I was asleep? Is there life on other planets? What does nature mean to me? Are robots good or bad?

The transnational mentoring partnership between Serbian and Hungarian Schools and the NGO Liget Műhely Alapítvány - Dragonfly, have developed a catalogue of brief science oriented workshops based on the principle of experiential learning. The program targets socially disadvantaged areas in Hungary and Serbia. The description and online catalogue "Dragonfly" can be accessed **here**.

An investigation/inquiry

The category involves the pupils answering a question that is under investigation. This can be done through hypotheses, data collection, analysis and a conclusion. An inquiry-based learning approach can also be adjusted to fit the skills of the pupils.

The transnational mentoring partnership between Portugal and Spain - has been working with entrepreneurship and innovation with young teenagers. Here they explored the synergy between inquiry-based science education, innovation and entrepreneurship. One of the partners, Xuvenciencia from University of Santiago the Compostela offers inquiry-based science activities with socioscientific relevance.

A meaningful question

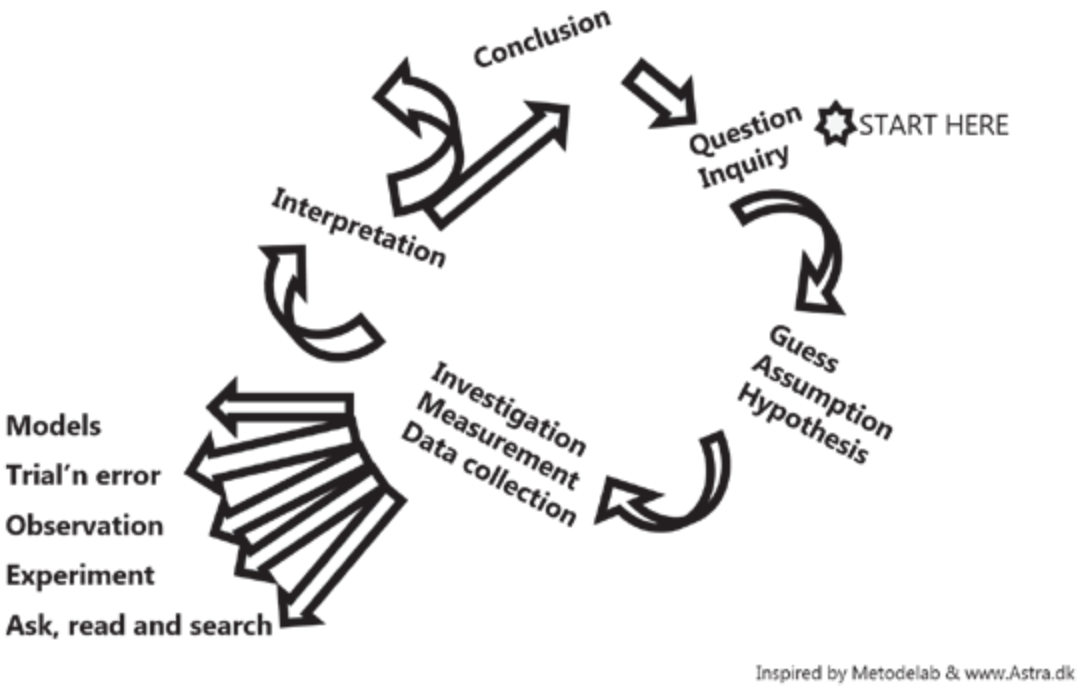
Effective questions have several answers and endless angles that appeal to different kinds of people and invite different kinds of thoughts. For example: how do we decide what news to trust? What do plants mean to us in our daily lives?

The transnational mentoring partnership between Serbian and Hungarian Schools and the NGO Liget Műhely Alapítvány - Dragonfly, have developed a catalogue of brief science oriented workshops based on the principle of experiential learning. The program targets socially disadvantaged areas in Hungary and Serbia The description and online catalogue "Dragonfly" can be accessed here.

A design challenge

The category is broad-spectred and spans from developing and prototyping bridges, new foods or clothing, coding a program or even designing an event.

LEC Lodz, a partner in PHERECLOS, has been supporting pupils' development and design process in creating their children's conferences focusing on the future labour market in tech and science.

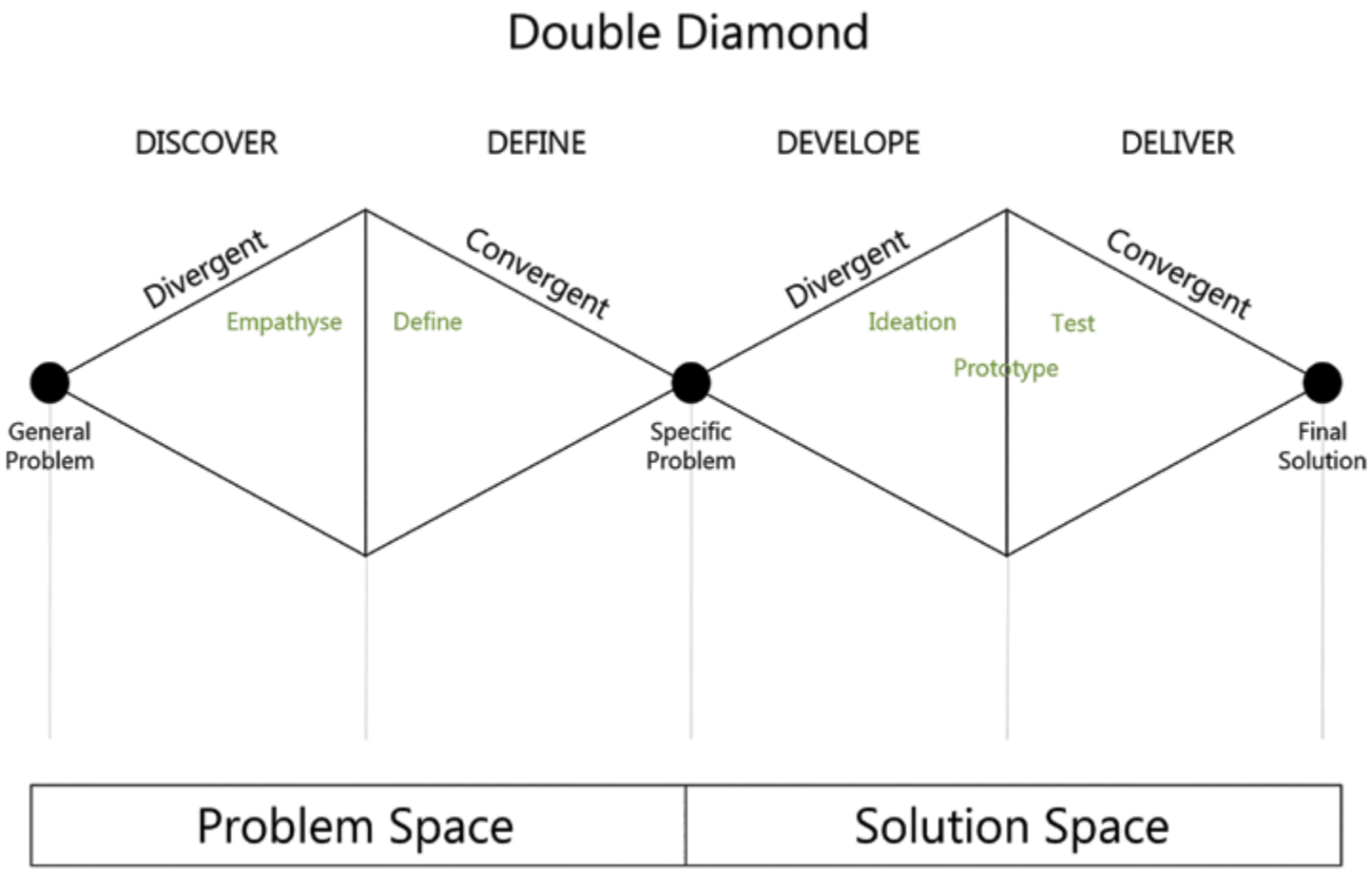


The full circle in the MetodeLab model is a simplification of a scientific process. It goes from single surveys to scientific knowledge and insight. Ideally, the scientific process starts with an inquiry which is being reformulated into a hypothesis. The hypothesis or the presumption is pursued in an investigation design which results in a form of data. This data must be processed and interpreted, so that one can answer the question and draw conclusions. The conclusion ends the process, or it can then lead to another inquiry and the iteration in the model starts over (Kofod & Tougaard, 2014).

The single steps in the circle can be adjusted in autonomy in order to both support and challenge the pupils with the amount of complexity that fits them best.

Example: A design challenge

Authentic problems in school situations that are challenging pupils to develop suggestions for solutions is a qualified way of pushing the autonomy and ownership of the learning process towards the learner. A process that demands competences from creativity, innovation, critical thinking, collaboration and communication in order to succeed. Training the courage to try, fail and try again, when you search for solutions is also a competency that is important in this design thinking domain.



Defining problems and designing solutions, challenges people to be creative and innovative, but also systematic and structured. This activity is based on a design thinking method called Double Diamond, that was introduced by the British Design Council in 2005, and is today used by a diverse spectrum of people, from professional designers, engineers to students and school children. A design challenge could easily be introduced after a more science oriented methodology, where an inquiry has led to a new understanding of a phenomenon, problem or causality.

Validate the construction of the Open Schooling activity

In order to evaluate the structure, focus and methods in play, You can use this model from Klimazirkus, divided up in eight elements, to assess the learning design. An activity does not have to contain all eight elements. However, it is important to be aware of which are there and how they are represented. These elements connect the relation between subject aims and goals, skills, knowledge, methods and meta-learning.

A basic validation activity using the eight basic elements wheel is simply to go through each "spoke", where you assess and discuss whether this element is present or not, and to what extent. As mentioned, there is no defined right or wrong, however there will be some elements that are important for reaching a participative format. Number 4: "Authenticity" and number 5: "Pupils have co-influence", are worth considering whether they can be left out in order to live up to criteria of target group relevance and participative approach. The model is meant as a visual approach for an Open Schooling team of teachers and external partners to have a common ground to assess, develop and make decisions from.

What is the foundation of the project?
In order to evaluate the structure, focus and methods in play KlimaZirkus uses a model of eight basic elements to self assess in order to determine what the project idea is based on. The project does not have to contain all eight elements. However, it is important to be aware of how the methods are involved from the beginning. These elements connect the relation between aims and goal, skills, knowledge, character traits of work competences and meta-learning.

1. Subject content
This can include subject aims and goals, skills, knowledge, character traits and meta learning.

2. A challenge, problem or question
The project is framed by a meaningful problem that needs to be solved or a question to be answered, on an adequate level.

3. Inquiry
The pupils engage in a focused process by asking questions, finding resources and using gathered information in a constructive manner.

4. Authenticity
The project is a real life near challenge or is based in concerns, interests and relevant problems from the pupils' own lives.

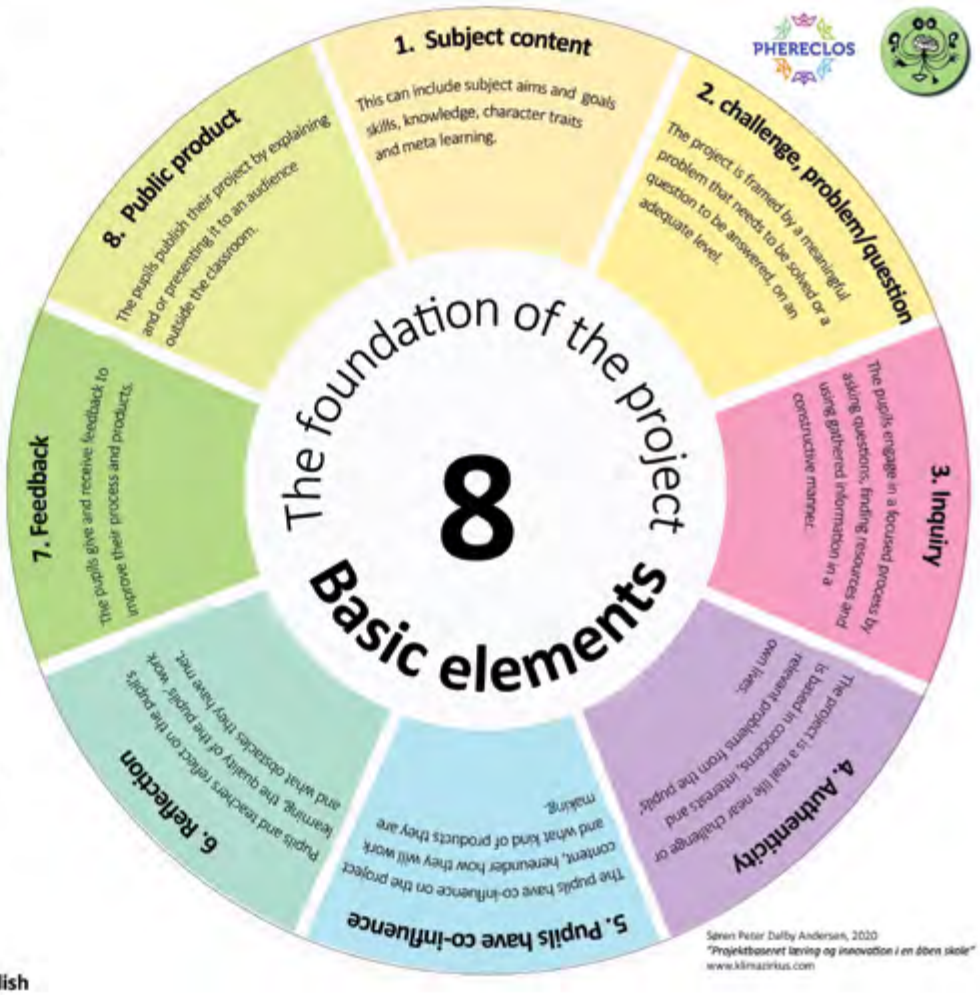
5. Pupils have co-influence
The pupils have co-influence on the project content, hereunder how they will work and what kind of products they are making.

6. Reflection
Pupils and teachers reflect on the pupils' learning, the quality of the pupils' work and what obstacles they have met.

7. Feedback
The pupils give and receive feedback to improve their process and products.

8. Public product
The pupils publish their project by explaining and or presenting it to an audience outside the classroom.

Free download at www.klimazirkus.com/english



Summary: Use the Participative Based Learning approach as assessment tool

Using the tools presented, you can fairly quickly validate whether the Open Schooling activity you are planning contains essential elements in order to live up to criteria that have been set up, e.g. participation, learner influence, innovation, etc.

The tools presented in the PLAN section were:

- The SMART planning tool
- I Do ARRT - A method for setting up participative and meaningful meetings
- Didactic transposition - How to develop educational material from scientific articles or a professional domain (elaborated in the full version of the Toolkit)
- 4C Compass - the relevance of and incorporation of 21st century skills in Open Schooling
- Innovation competence as practice oriented elements in STEAM
- Different types of activities in Open Schooling, with emphasis on
  - How to create activities with design challenges
  - How to Create inquiry-based science activities
  - How to adjust the level of pupil autonomy in inquiry-based learning (full Toolkit)
- An Open Schooling assessment tool to validate the core elements of the activity

This can be used as the final validation of the Open Schooling collaboration plan before the pupils are added to the equation and the activities.

c) Implement and practice Open Schooling

Three step rocket of Open Schooling

The general experience from doing Open Schooling visits shows that well prepared pupils have a stronger learning experience when they are exposed to the out-of-school resources and settings in comparison to unprepared peers. The same goes for the follow-up. The reflection work on what has happened and how it connects to the preparation for the Open Schooling activity has a great significance on the general learning experience for the whole class.

Prepare the pupils - step 1

When working with established Open Schooling partners, the probability for acquiring well produced preparation material is usually greater, than with new informal learning environments. In the absence of preparation material, the school teacher and the partner will most likely have the responsibility for developing and producing the inflight session that prepares for the Open Schooling activity. The content and format for this can be anything from a relevant explainer movie to an article or a discussion on what their own expectations are for the upcoming activity.

Visit, engage and learn - step 2

A shorter visit to an out of school site or a visit from an external partner can function as an inspirational kickstart or a wrap up in a science theme in the curriculum. Rome wasn't built in a day, and neither was STEAM in Open Schooling. It is wise to start up in smaller steps and build upon the successes you gather.

The Open Schooling activity can have many forms, and it is important to have a clear plan of the day and also let the children in on it. There is nothing more frustrating no matter how old you are, than not knowing what's going to happen.

It is worth considering information such as:

- Is the visit involving actual practical activities or is it a guided tour?
- Will there be elements of inquiry, investigation, modelling, problem solving and debating?
- How are they introduced to the program when the day starts? Are they actively involved and asked about their expectations of the visit?
- If they have been preparing for the Open Schooling activity, they will often have some idea of their expectations.

If the school class has been preparing prior to the visit it is of uttermost importance to make sure that the prep-work will be put into use and action, so that they actually experience the relevance. This could be by having a small plenary or group session where the topic is "My expectations for today".

Whether the class goes to visit an external partner or receive a visit from an external partner in school does not matter. Both are relevant models for an Open Schooling activity. Either way the school day will be different from what the pupils are used to. The aim of the Open Schooling session can be different and it is important that the teacher and the external partner are on the same page regarding the content, format, rules and roles across the day.

Often this day will be an opportunity for the teacher to step a little bit into the background, and have the privilege of being more of an observer and secondary facilitator while the primary responsibility is on the external partner. This observer role gives opportunity for the teacher to see how the pupils are interacting and maybe focus on what kind of skills and competencies they are using, for example with respect to the 4C's of the 21st century skills and innovation competencies.

Logistic challenges - duration and transportation

There are no rules for how long a visit or a collaboration should be, or if there should be more of them, or even mutual visits. The change of scenery and educator can bring a different authenticity into the learning experience and the variation can increase the attention form and maybe the motivation in pupils that are not necessarily active in science class. For some schools it will be easy to find collaboration partners and fix transport, while it can be difficult for others. That is why a collective mapping of the local assets and opportunities (Activity 1) can help Open Schooling practice on the way.

Reflect and evaluate with the pupils - step 3

After an open school activity it is important to reflect on the experiences and learning from the pupils. In this phase it can be relevant also to include the preparation activities as a comparison for the pupils' reflections on the outcomes of the meeting with an external informal learning environment. In this approach the preparation activities are used in the after-phase for reflecting on the external partner experience.

In this case, there will be different domains to evaluate on:

The curriculum oriented skills and knowledge that lies within the subjects are important in order to live up to the school legislation criteria for learning aims and goals.

It could at the same time be considered to use a parallel assessment approach that includes the formative signs of learning from the 4C skills model and maybe elements from the 5 innovation competencies.

This is where the model of the eight basic project elements can be a very concrete assessment tool for making it visible where the project focus is, also in terms of evaluation.

The teachers and external partners should also do their own evaluation session while the experience is still fresh in mind.

Case from PHERECLOS: Greek mythology meets German biodiversity issues

In the PHERECLOS Transnational Educational Mentoring Partnership (TEMP) between formal and informal learning institutions from Germany and Greece, the development of an open school concept was formed. The aim was to create a form where Greek mythology, art and culture meets authentic ecological and environmental sustainability issues. There is more information on the collaboration here.

In the following the original plan has been adjusted and downsized in detail and fitted into the "Three step rocket model".

The Legend of Hercules and Augeas' Stable in Sustainability dilemmas

One of Hercules' tasks was to muck out the stable of a king called Augeas. Augeas possessed more than 1.000 cattle, and his stable had not been mucked out for several years. Additionally, Hercules was only given one day's time. Hercules solved the problem by knocking down one wall and digging a channel, thus directing the water of two rivers right through the stable. That way, the stable was mucked out in one day.

Several of the UN sustainability goals (SDG) can be associated with this legend. The workshop below will connect with the SDGs 6 (clean water), 11 (sustainable communities) and 14 (life under water).

The narrative of the myth is used in combination with the physical workshop: "Watercourse as a Biotope" for children of 8 – 13 years.

Initial situation

In the central Thuringian town of Großenehrich in Germany, a creek is flowing right through the town. Naturally, dilemmas between SGD's will arise from this fact. The children participating in this workshop will reveal them and deal with them.

The original content and description of the workshop has been moved around, so it fits well into a 3-step model for Open Schooling activities .

1. STEP: PREPARATION (AT HOME)

The pupils will get told the legend of Hercules mucking out Augeas' stable. At its end, the children will be asked whether they think Hercules did a good job and discuss why in smaller groups.

They will also work with a general introduction to the global water cycle.

Pupils will also be introduced to the upcoming visit at the creek location, where they become familiar with some of the activities on the visit.

2. STEP: THE VISIT (AT THE LOCAL SITE, WITH EXTERNAL FACILITATORS)

Welcome to the external learning environment

For a start, all children will do a pantomime titled „everything's flowing" about the world wide water circulation (with some of the possible interruptions or detours).

Field work

The children will then go out in the field and describe the area and how the different nature types are represented. This will go into the assessment of the creek's structure.

The group will also sample plants, and use the specimens to decide the ecological type in terms of nutrient load etc.

The third step is to make water samples of the water fauna and define the species in order to determine the quality of the water. This is done by analysing the living criteria for the collected fauna specimens.

From the species of the sampled animals and their specific biotope requirements, the teams will be able to judge the quality of the water.

Analysis and conclusion

The final assessment will show that, whereas the structures of the creek are near-natural, plants and animals indicate eutrophic water quality. This is caused by nutrients-load of sewage coming from gardens or small-scale livestock keepings flowing into the creek as it cuts right through the town.

The circular conclusion to the legend of Hercules and Augeas

Just like livestock keeping and gardening close to the creek can cause pollution, Hercules did so by using rivers to muck out stables, since the muck will stay in the water. So, the children will be asked, if they still believe, that Hercules did a good job, or what problems would arise from his solution (water pollution, destruction of two rivers with all the ecological consequences).

Goals

The children learn to understand a creek as an ecosystem, consisting of the creek as such, its shore areas and the biocenosis. They find out that the state of this biocenosis can be derived from

certain plants and/or animals living or not living there. That way, they learn to think in relationships. They get a first idea of biodiversity. They may realise that human activities have an impact on the state of the creek as an ecosystem and that therefore humans have a responsibility.

3. STEP: AFTER THE VISIT AND REFLECTIONS (BACK IN SCHOOL)

Dilemmas to be investigated and addressed:

Having gardens and low-intensity livestock keeping in a community, especially a town, most certainly adds up to the fulfilment of SDG 11 (*sustainable cities and communities*).

As this workshop shows, it can, however, collide with SDG 6 (*clean water and sanitation*) and, in consequence, SDG 14 (*life below water*). Moreover, there's even an intrinsic dilemma, because SDGs 6 (*Clean water and sanitation*) and 14 (*Life below water*) would also be important to reach SDG 11.

The idea of the workshop is for the children to understand these topics in the SDGs and how they connect with their everyday lives. Additionally, they train themselves to find the possible conflicts for example, how do we avoid water pollution, improve water quality and still have gardening and low intensity livestock keeping to have a community worth living in. They also train how to address them and discuss them between themselves, finding possible solutions.

Most probably, there will be more than just one solution to the question. The important thing for them will be to learn to listen to and consider every opinion and get to understand other people's possibly different opinions, before coming to a final solution, or even ending up with more than one final solution.

d) Evaluate your Open Schooling activity

What can be in the focus of your evaluation?

The evaluation of an Open Schooling project is dependent on the defined success criteria and the method: Evaluating on marks and grades tend to put the eyes more on the result rather than the process. For Open Schooling projects we recommend focusing especially on the evaluation of the process – e.g., the development of pupils' creativity, their ability to self-assess teamwork, their development of communication.

You could use the 4C compass and the five innovation competences for defining some of the soft skill outcomes in combination with more subject- and disciplinary oriented skills and knowledge.

However, it might also be interesting not only to consider changes in pupils' competences but also to look at the process of the collaboration with the other partners in the OS project. Gathering such information during the implementation might help you manage your OS project better.

To determine the focus of the evaluation, it might also be useful to revisit your implementation plan and look at the goals and target groups noted there.

How to conduct an evaluation?

We recommend that the Open Schooling team think carefully about the **purpose**(s) of the evaluation already in the planning phase of the OS project. Furthermore, they should determine,

- which **specific questions** should be answered with the evaluation (e.g., is it more about the evaluation of the outcomes on pupils' level – for example how their communication skills develop over time - or more about how the partners worked together; what exactly is of your interest and helpful for you?),
- which **methods** should be used to answer the questions (questionnaires, tests, interviews, focus groups, observations, document analyses, etc.), and
- what are suitable **measuring points?** An evaluation could provide helpful information even before the actual implementation of the OS activities (e.g., how activities really fit to the needs of the pupils)! An accompanying (formative) evaluation of the process and/or a final evaluation certainly also provide valuable insights into the status of goal achievement. During the implementation phase data should not only be gathered and analysed, but also discussed within your team, and communicated to relevant others.

Furthermore, a participatory (Guijt, 2014; Zukoski and Luluquisen, 2002) and utility-based approach (Patton and Campbell-Patton, 2021) has proven successful for the development of such an evaluation plan. This means that the inclusion of stakeholders (e.g. parents, important players in the community) is very beneficial to receive evaluation results that are regarded as useful. Furthermore, the stakeholders get more committed to your project – and will probably also support you best in conducting your evaluation. Therefore, a participatory and utility-based approach is recommended.

Why is it useful to get feedback on your Open Schooling project and document it?

In some cases, there may be no resources at all or too few competencies to carry out an evaluation of the OS project. In these cases, it is recommended to ask for *feedback* at least from the main target groups (pupils, parents, colleagues, OS partners) from time to time and to check for yourself if you are on a good way to reach your SMART formulated goals. Keeping the goals of the OS project in mind helps to keep the focus and to adapt the activities in such a way that they lead more towards the achievement of the goals. Sometimes, however, it will be necessary to sharpen the SMART goals and/or to formulate new, different goals that are even more tailored to the needs of your target group(s).

A good *documentation* of the Open Schooling project may seem tiresome at first sight, but it can be very helpful to document for example agreements made, the implementation process itself and experiences that were made. This is because future other OS projects with similar content and contexts will have a good model to follow. Good documentation thus supports sustainable capacity building at schools for conducting OS projects.

Also communicate and share your experiences and successes within the school, with parents, with partner organisations, etc. This way, they also could contribute their view, learn something, and feel involved. In addition, do not forget to celebrate the completion of the OS project together. You all have achieved a lot!

At www.PHERECLOS.eu you can also find a *Sustained Modelling and Scenario Building Reference Guide* on how the local educational ecosystem can collaborate to create sustainable partnerships between schools and the local community. The findings from the Local Educational Clusters in PHERECLOS states, among other things, that *Teachers are key*.

e) Mainstream the activity to your local Open Schooling program

How to make the OS activity part of a continuous program in the local school community will often be the ultimate achievement from creating a new collaboration with an external Open Schooling partner.

If you are fortunate you will have a resource person, or a local hub that can support the process from project to program. This is the role the Childrens' Universities have had in the PHERECLOS Local Education Clusters. If you are not so fortunate to

have a Open Schooling hub nearby, there are some things to consider in order to lift your collaboration into ongoing Open Schooling activities.

Going back to the evaluation plan, there is a lot of content here to pick up, in order to assess whether the OS collaboration has potential to be a steady part of the local Open Schooling program catalogue, and not just a "one hit wonder".

The evaluation of the collaboration, motivation of the partners, the pupils' learning experiences and stable economy/funding are all elements to consider in the process of mainstreaming.

Is it possible to seek stable funding from public sources? And is it possible to find a way to run this without the financial perspectives taking off?

This part of the process is probably the most difficult part. To transform from a project activity to an ongoing Open Schooling offer is important for the development of the educational opportunities you can draw upon as a teacher and offer to your pupils. This can not be done without the support of school heads, parents, the local community as well as local and national politicians. Some of these stakeholders are covered in other recommendations and resources available at www.phereclos.com.

As a teacher you are the one closest to the children during the school day, but the task of educating them for their future is also a family and community responsibility.

2.6.3. Summary

The aim of the Toolkit has been to be practice oriented and focusing on the teachers' role in the creation and making of Open Schooling. The local environment for Open Schooling is most certainly looking very different from rural areas to bigger cities, from one region to another, from school system to school system, etc. Hence this Toolkit can work as an inspirational platform to start up and, in time, find your own adapted ways of developing motivation, structure and content for your concrete Open Schooling approach.

2.7. THE OPEN BADGES – FROM SAILORS TO SHIP BUILDERS

Cyril Dworsky and Antonija Bogadi

PHERECLOS created a system of digital badges to call involvement and commitment in front of the curtain and to promote Open Schooling and combine it with digital citizenship. The main purpose of this tool is to make the engagement visible and support the diversity of individual and organizational approaches in Open Schooling in an easy to share and visually appealing way.

What is an Open Badge?

Generally, Open Badges are awarded along different criteria depending on the application and issuing institution. This can be the participation at a single event, a training or organization of a whole program. While the Open Badge icon itself reflects the overall engagement, the detailed information on the actual activity and contribution is provided in the meta-data that is included during the process of creating a badge.

Within the PHERECLOS project, badges have been issued to show and acknowledge individual participation in activities, e.g. an Open Schooling workshop, or to show contributions to an online conference, like a presentation. Furthermore the facilitation of activities, the organization of an event or even the multiplication of Open Schooling culture per se, were affirmed with a badge.

Ship Knowledge

To strengthen an aspect of gamification and enhance the attractiveness of our playful approach to learning, PHERECLOS Open Badges have been designed along the main tasks on a ship. Within this framework, the badges represent various aspects of the Open Schooling culture. We did not intend to create a hierarchical system of competition and rankings but rather designed an ecosystem of tokens of appreciation to meet the goals of the project in an empowering and fun way. The PHERECLOS Open Badges are supposed to act as visual stepping-stones in a journey to Open Schooling Culture in our society.

Five PHERECLOS Open Badges represent different types of engagement and contributions to Open Schooling culture:

The Sailor

A PHERECLOS Sailor is a person **showing interest** and **basic knowledge** in the concept of Open Schooling. The Sailor Open Badge is a sign of **involvement and participation**. It is the first sign of being part of an Open Schooling Culture. The criteria to earn this badge is usually related to any kind of participation in activities, events and trainings related to an Open Schooling project.

The Rigger

A PHERECLOS Rigger is a person who is **taking initiative** and plays an **active part** in Open Schooling Culture. The Rigger Open Badges are earned by **contributing and practicing** in Open Schooling activities. This might be collaborating in a project as a trainer or providing elements in didactical material.

The Machinist

A PHERECLOS Machinist is a person who **takes care and feels responsible** that Open Schooling programs are running well and without major hiccups. **Facilitating and instigating** concrete steps in Open Schooling projects can earn the Machinist Open Badges. Machinists are involved in the programs at a more thorough level and provide a secure framework for other participants of Open Schooling programs to contribute with their presence and knowledge.

The Navigator

A PHERECLOS Navigator is a person **who sets the course and realizes** the concept of an Open Schooling program. The navigator plans the journey and advises others with knowledge about timing and the local conditions. The Navigator Open Badge is awarded for **organizing and managing** an Open Schooling program. This involves navigating the program through different phases of the project and keeping an eye on the big picture.

The Builder

The PHERECLOS Builder is a person who **creates and propagates** the ideas of Open Schooling in a wider context and supports the design of new programs. The Builder Open Badge is earned by **blueprinting and multiplying** the culture of Open Schooling for a wider context. Builders foster the concept of Open Schooling, e.g. the PHERECLOS project results and learnings and other activities related to education and science engagement in the formal education context.

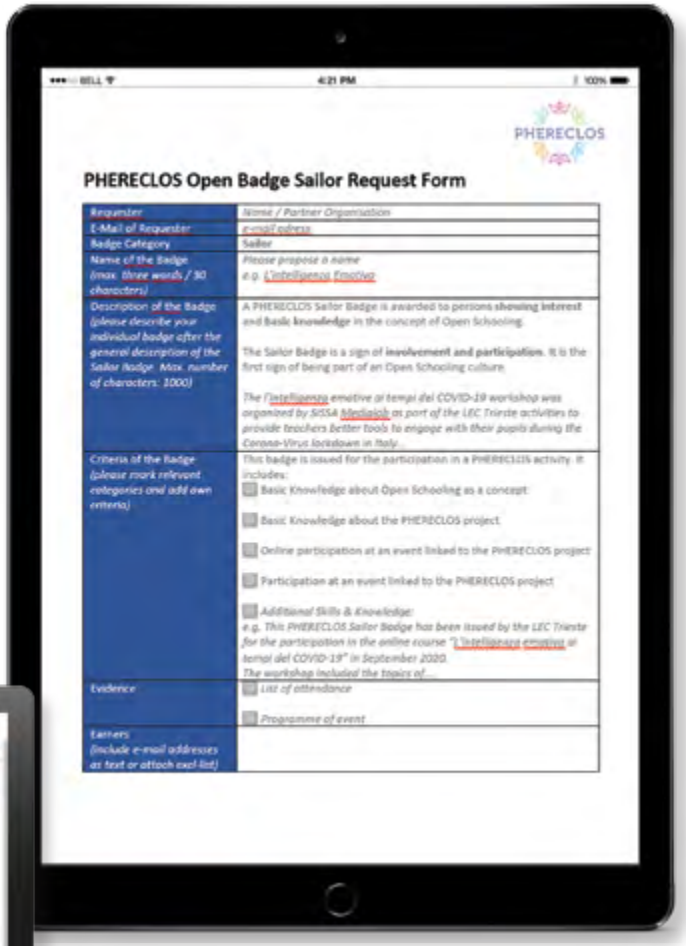
Getting a PHERECLOS Badge in Three Steps

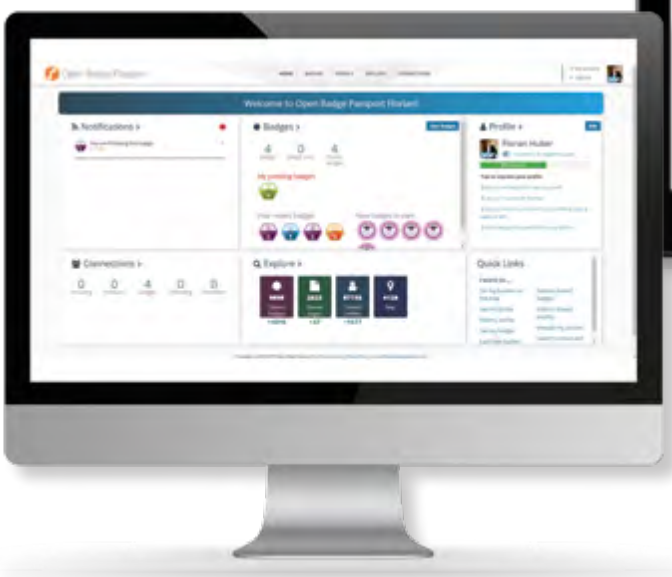
Step 1: After a particular Open Schooling event or during a long-term activity, either the organizers or participants can ask for a PHERECLOS Open Badge. To get the approval for a PHERECLOS Open Badge, a request form has to be filled in, that includes a description of the badge and proof that the set of criteria for that badge was met.

Step 2: PHERECLOS issues a badge to the individual upon receiving the filled request form and data confirmation.

Step 3: The new badge can be stored in digital badge online platforms but also shared on social media channels. Within the PHERECLOS project the Open Badges also appear in the profiles of the registered members of the Community on the PHERECLOS web page at:
https://www.phereclos.eu/badge.

If you are interested in joining our badge ecosystem, contact the project team at kinderbuero@univie.ac.at.





PHERECLOS

Chapter 3

OUTLOOK & CONCLUSION

3.1. IDEAS ON TRANSFERABILITY

Karoline Iber, Chris Gary, Cyril Dworsky, Thomas Troy, Mirela Paraschiv and Laura Cristea

Aiming to provide interested stakeholders with compact information, the PHERECLOS consortium led by the six LEC teams compiled learnings gathered in the course of the PHERECLOS project. This chapter includes three different distillates that are transferable to other educational landscapes, allowing valuable insights and assistance to support the development of Local Education Clusters or new Open Schooling projects:

- The ‚Venice Model' – to help you start
- Nine reference points for Implementation
- Achieving Success: Twelve Factors of Success

In addition to contribute to foster the local educational landscape, all models have a strong emphasis on sustainability in order to secure long-lasting and stable cooperation among stakeholders involved.

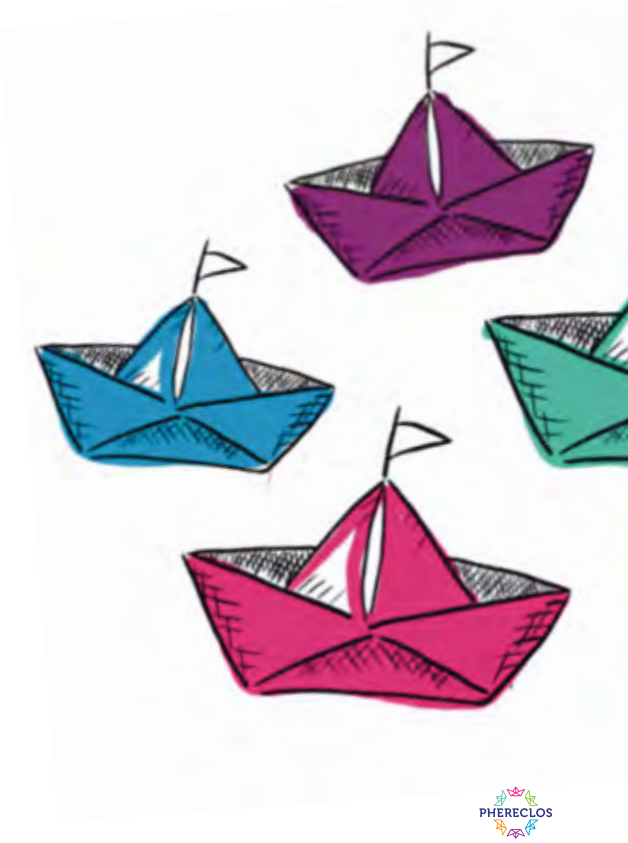
The "Venice Model"

Under the guidance of Pietro Greco, Italian science journalist and intellectual, the Italian science community of science communicators, discussed the "Venice Model" to represent the scientific discourse circulating in the society (Find all relevant articles on https://jcom.sissa.it/author/pietro-greco). Within the PHERECLOS project we used the "Venice Model" to describe in a very easy and compelling way the structure and roles of a LEC.

Transferring the Venice Model to the idea of developing a LEC, all the islands can be seen as different institutions. All islands have certain roles or positions, and everywhere scientific knowledge is developed or used in a specific way. In mapping an educational landscape in this way, institutions or islands are (physically) connected via canals but without direct links in terms of projects. Some basic bridges are already in place, which represent joint projects but often these are in their infancy or not significantly active.

Figure 1: Starting point of the Venice Model without LEC connections (Illustration by Leopold Maurer)

- Canals: there is a general connection, but no projects were conducted so far. The canals are perceived more as a segregating element and not so much as an opportunity for communication and collaboration
- Bridges: there has been limited of cooperation between institutions but not on a regular and strategic scale. Some bridges are very basic and weak. Very few bridges have been planned nor built in a robust way, that will last for a long time period or able to support a large group of people.
- Ports: there is cooperation on a regular basis, ideas for new cooperations are exchanged and traded. The organisation depends on a port authority and the cooperation is rather 'top-down' than 'bottom-up.'



Since most of the islands lack proper connections (bridges), there is a need for easy and non-bureaucratic links to support the development of all inhabitants. A major task of the Local Education Clusters is the promotion of cooperation among all stakeholders. Therefore, the LECs can be viewed as little ferry boats with a crew of dedicated people. The crew are in charge of establishing regular connections between the islands and eventually provide enough material to build and organise new bridges and manage "traffic". In this interim step, the LEC aims to get in touch with every stakeholder, to discuss their ideas and invite them to join the cooperation.

Figure 2: A LEC ferry boat establishing closer connections between the islands (Illustration by Leopold Maurer)

The crew of the LEC ferry boat is flexible and it consists of people with different expertise coming from diverse, professional backgrounds. These important roles have been structured analogous to the PHERECLOS badges (see chapter 2.7. The Open Badges – From Sailors to Ship Builders):

- Sailors are people showing interest and basic knowledge in the concept of Open Schooling. Sailors support the LEC cooperation on every level and they already participated in various LEC activities, events and training related to an Open Schooling project.
- Riggers are people who take the initiative and play an active part in Open Schooling Culture. Riggers contribute, as trainers, or provide material (e.g. didactical material), which helps to build stable connections for the future.

- Machinists are people who take care and feel responsible that Open Schooling programs are running well and without major hiccups. Machinists are involved in the programs in a deeper level and provide a secure framework for the passengers of the LEC ferry boats and can fix problems.
- Navigators are people who set the course and realise the concept of an Open Schooling program. The navigator plans the journey and advises others with knowledge about timing and the local conditions. Navigators take care that all islands are included in the itinerary of the LEC ferry boats (making sure all stakeholders are engaged)
- Builders as essential starting points to establish the connections as they build the LEC ferry boat itself. Builders are people who create and propagate the ideas of Open Schooling with the scope of providing the first ideas and resources, bringing them into a wider context.

The LEC f erry boat crew also includes an Explorer: the person who explores new connections, routes and opportunities.

The more often the LEC ferry boat visit various islands, the more likely a fixed connection will develop. Regular contacts support the cooperation and they provide more opportunities for easy exchange and new encounters. This will bring more passengers (stakeholders/schools/pupils), who will require more permanent structures for safe passage. This will result in bigger and more durable bridges that are high enough to allow for unhindered traffic beneath to enable even more flexible links and do not stop the flow of the channels.

One task of a LEC is to constantly establish new connections between various institutions and to find common ground in which all barriers have been removed and joint activities can be conducted.

Figure 3: Additional bridges and stable connections have been established with support of the LEC ferry boat (Illustration by Leopold Maurer)

The Venice Model and the LEC ferry boat with its crew is a good starting point for long-term relationships in an educational landscape. Be it a city or a rural area, the model helps to reflect about the involvement of various stakeholders and their connections and how to link them in a sustainable way.

The Venice Model also allows an even broader perspective in which the LEC boats will explore the Open Schooling waters more widely and send out additional scouting boats to make new connections and establish new links for new learning. Within the PHERECLOS project this "exploring phase" was represented by the TEMPS (Transnational Education Mentoring Partnerships) and their impact on additional education landscapes.

Figure 4: The Venice Model with an elaborated system of new connections and a perspective of new Open Schooling projects beyond the borders of the LEC
(Illustration by Leopold Maurer)

Nine reference points for Implementation – the LEC logbook to support your LEC development

Are you interested in shaping the local educational environment in your area and in creating a LEC to foster the system? Let's sail to new shores together! The LEC Logbook provides you with guidelines to start your own journey! It consists of nine reference points identified by the PHERECLOS LECs as important considerations during the implementation of their LEC. It is worth noting that all the LECs had school representatives in a co-leading role. Enjoy the exciting journey!

1. Aim

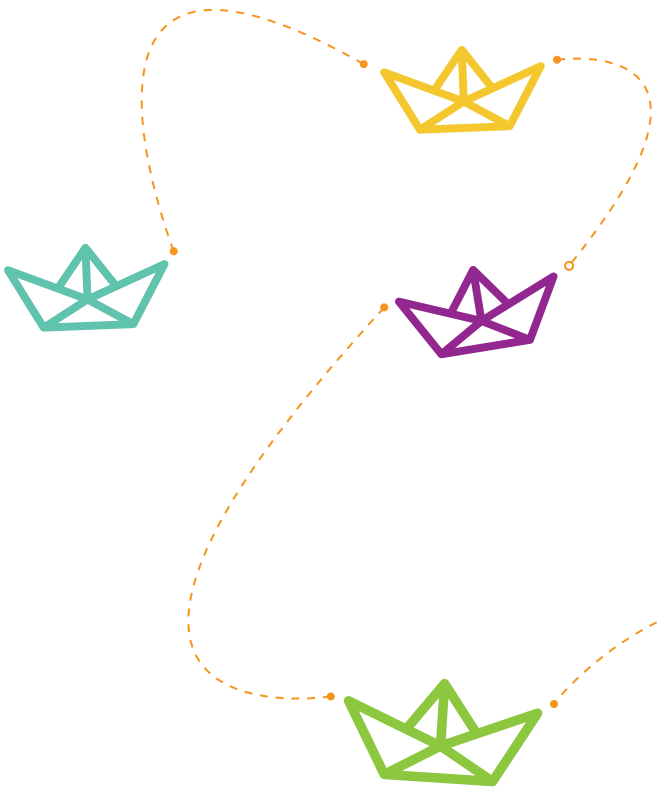
Before setting sail, sailors and merchants think of the situation at the point of destination and which goods and services they want to trade or get in return. Similarly when setting up a LEC, you have to take a close look at your starting point and your overall aim. So before establishing a LEC, important questions need to be considered:

- What is the current situation of Open Schooling in the local area?
- Which challenges are most urgent or need to be prioritised by the implementation team?
- Which formal and non-formal educational providers are present in the local area?
- What kind of materials and information do you need to reach the aim of setting up a LEC?

Besides reflecting the current circumstances, it is important to think about the future impact the LEC should have:

- What kind of change do you want to initiate?
- What outcomes do you want to achieve?

Questions like these help to shape the LEC and its tasks and are important for all partners to consider in order to develop a shared vision.



2. Crew

Every ship needs a crew – so far so good. However, a proper crew is the most important aspect of a LEC. The responsibilities and positions on a sailing boat are different to those on a cargo ship. The same applies to the establishment of a LEC. Only with a compatible crew will tasks be accomplished, and ideas realised. Invite formal and non-formal stakeholders to realise the change you agreed on in the first step:

- Who is sailing with you?
  - School heads/teachers/students
  - Non formal institutions
  - Policy relevant actors
  - Teacher training students
  - Parents
  - Other stakeholders
- Is there a network you can already rely on?
- Is the crew willing to accept new members?

Define and discuss the role of each member together with the expectations of each stakeholder. It is important to match this to what others expect from them. A well-defined role assignment and task definition facilitates teamwork.

3. Navigation and Compass

A central component of a logbook is the route and navigation, which are documented regularly by the crew while sailing. It is not only necessary to reflect on past events but it also enables an outlook regarding the next steps. The development and implementation of a LEC needs time and challenges will occur en-route. Hence, navigation tools and compass are key elements during the journey.

There are several questions that will impact upon your ion navigation:

- Which methodologies do you use?
- Which target groups will be approached?
- Which of the challenges do you want to tackle first?

Plan ahead and avoid rough waters (if you can):

- Define milestones you want and need to achieve

- Define a timeframe and share it with all your partners

Do not forget to share your route with your:

- Provide status of the current situation on a regular basis to you team
- Disseminate the current results and findings among all stakeholders

4. Adaptability

Regardless of how carefully the route was planned in advance, you need to be prepared to adapt your journey along the way. In the case of ships and ship routes, for example weather conditions and strong currents may make you change the route, possible slowing you down. However, adaptions may also lead to positive effects! All six PHERECLOS LECs adapted their initial workplan and it turned out to be one of the key success factors in the long run.

Adaptions may be necessary due to:

- Political changes,
- Structural changes (team members change)
- Societal circumstances
- Stakeholder involvement (some.are no longer participating)
- New ideas from partners
- New important challenges to adress
- New partners coming on-board

So, do not be afraid of making changes, adapt and make sure that your teams stays agile!

5. Emergency Plan

If your compass is out of order or you are stuck on a sandbank: use your emergency plan:

- Have a risk assessment
- Know where to get help
- Have a backup plan
- Prioritise your tasks

6. The Pilot

Always remember: you and your team are not alone! Foreign ships will be piloted through canals and straits by 'local' experts or they will be guided by a tugboat to ensure safe passage. You too can rely on help.

- Ask advisors for support when challenges occur or to gain different perspectives and ideas. They are experts in their fields and a problem shared is a problem halved. Exploit the diversity of expertise in your team! Use this strength.
- Consult external stakeholders or experts: do you need help to reach your target group? Are you uncertain of the way you want to implement your LEC? For every challenge, there will be institutions willing and able to support your team

7. Catch the wind

You have worked hard to develop the LEC and to reach your goals – now it is time to use the momentum and to exploit the opportunities. Your LEC will take off with a tailwind!

- Prioritise your tasks to use the wind and to sail further (if appropriate)
- Promote your LEC in the local community
- Use the support you get for sustainable (structural) change
- Start expanding the network
- Apply for additional funding

8. Dropping the anchor – secure the ship

After a varied journey, your ship arrived at its destination. It drops the anchor and it is tied to the port. Your LEC has reached its goals and it is time for you to think about the next steps:

- Implement your sustainability plan
- Everyone needs to know you are in port! Disseminate your achievements and your outcomes. Let visitors on board and expand the existing network
- Merchants are constantly looking for goods and services: think about next projects and develop new ideas with your expanded network
- Guide other LECs with your knowledge and experiences

9. Reload the ship and aim for your next destination

Your journey starts again. You have new partners and the loading area is full of ideas. Prepare for your next project and set sail! Hopefully, our seaways will cross one day to trade knowledge and maybe to sail part of the way together. Online tools enable this to happen far more readily than for the mariners of the past who had to physically pass to make connections.

Achieving Success: the 12 Factors of Success

The upcoming 12 factors of a successful collaboration and innovation in education were distilled from multiple discussions between the 6 LEC teams of the PHERECLOS project. They are considered important for successful and sustainable implementation. Especially in the beginning of the LEC development or after its adaptive phase, these factors provide a framework that you can rely on!

1. Common motivation is the starting point

The unifying element of each participating LEC institution is passion for adapting the present local educational system and motivation of all stakeholders to contribute to bring about change in the system. Maybe there is a challenge in the area, maybe organisations are struggling with circumstances, maybe there is simply enthusiasm to learn from one another. The starting point for the learning journey is an open conversation on the needs and aspirations of the partners and a discussion of the strengths of both formal and non-formal educational system. The result is meaningful learning!

Reflect, how all the institutions can benefit from the cooperation and what the added value for the community is. Use this motivation to start and shape a mutual process of developing a system which supports and prepares the education system for the future challenges.

2. Giving opportunities not solutions, more listening than knowing in advance is the attitude

Far too often, schools, teachers and students hear about solutions to their problems. Ready-made concepts and elaborated ideas are brought to schools with the intention of supporting schools and contribute to broadening the thematic scope.

Well-meant, is not always well done!

Open Schooling LECs see themselves as open and honest facilitators of a process with the objective of mutual learning, which requires listening and attention to the culture and problems of all participants.

For a LEC coordinator, it is important to facilitate as many opportunities for dialogue as possible in order to create joint solutions in a creative process that provides rich of learning for all.

3. Co-creation is the way

Children, teachers, teacher-training students, researchers and many more stakeholders are all

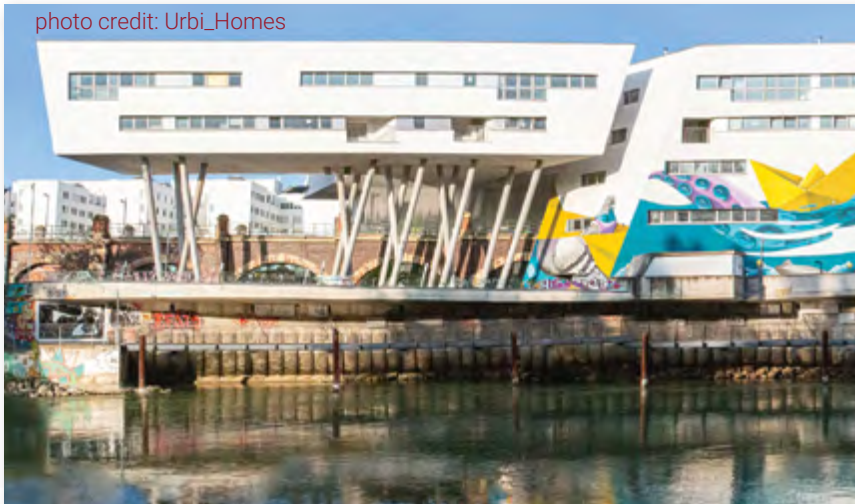


photo credit: Urbi_Homes

part of a LEC. Each of them are experts in their field and have important knowledge that can be used to set up a LEC that empowers all institutions to thrive and that is designed to address the need of the local community.

The co-creation methodology ensures the integration of all voices and visions included in the process of the LEC development. What all adults have to learn is to "rely on the creative power of children" in generating ideas, trust them in their decision making, dare to have a dialogue with them, invite them to investigate their questions and listen to their ideas.

4. Teachers are the key

Developing new and adapting existing learning scenarios need to be conducted in close consultation with teachers. A sustainable and long-term cooperation can have impact on the methodological way of teaching as well as imparting new learning content.

The role of teachers comprises both leaders of learning as well as capacity building for children. As experts regarding the every-day school life, they are the engines of adjustments, and therefore crucial for the development of a LEC.

Being ready to reflect, to learn and to change is key for innovation – both on the side of educators and learners – and those teachers are most capable of becoming true agents of change who are able to take both positions in a learning scenario.

5. Openness to the unplannable and flexibility brings everything into flow

Setting up a LEC is a long-term task, starting with a plan. But learning cannot be rigidly planned and the adaptation of the initial plan has to be part of the process. Adaptability may become necessary both due to structural developments like political changes or institutional changes as well as due to adjustments to accommodate new ideas and emerging issues. Co-creation is based on curiosity and innovation and triggers surprises, changes and unintended outcomes.

Being agile and responding to recent developments are important elements for the successful evolution of a LEC. Openness to the unplannable and flexibility is not only the plan, but also a strength to be embraced!

6. Diversity and inclusion of everybody is the glue

If we want to make new connections possible in an education cluster with enrichment for all, it is also important to bring together different perspectives. Without differences and distinctions, there is no learning! A truly inclusive community.

Learning from different perspectives requires courage to bring together people from different backgrounds, to work on the differences and to tolerate that some perspectives will remain different.

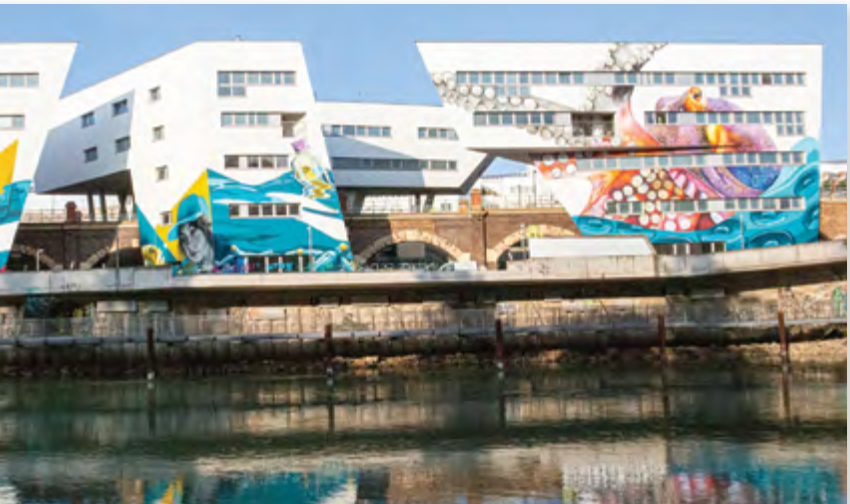
In order to benefit from diversity, it is important to live inclusive strategies. Inclusion is the key to make everyone feel their voice is being heard and giving opportunity to all to actively participate in the learning process. The better this is achieved, the more successful the learning will be.

7. Caring culture brings coordination and structure

Learning in a LEC needs people who care about the process of learning, who know how to keep the process active, take into account different perspectives and needs.

A caring culture is an organizational culture in which leaders consistently act in ways that help all LEC partners to thrive, and they themselves consistently act in ways that help others to thrive.

For all stakeholders in the LEC to get the best support possible and to participate actively, that also includes transparent structures, shared understanding, a culture of respect and mindfulness!



8. Activation and engagement builds capacity

Doing things together creates a lot of new scope for everyone involved. An idea from a child can become a project for a company, a school activity can become food for thoughts for politicians. The commitment of all participants motivates them to try out new things in a meaningful way.

The result of the creativity of all stakeholders involved are didactical innovations, new ideas for research projects, adapted lessons and curricula.

A LEC can let you feel that enthusiasm is contagious and encourages innovation.

9. Local action opens new spaces for thoughts

Think global – act local. LECs are most successful when tackling local needs and challenges and therefore contribute to the transformation of the educational system in their neighbourhood. The emphasis on local circumstances enables all stakeholders to share their individual experience and ideas for tackling regional challenges.

A global perspective may help to understand local challenges and bring new ideas to solve problems. LECs may learn from each other, when they ask themselves questions like: Which measures have proven to be successful in similar cases? Which measures are transferable?

10. Critical mass gives weight

How big does a LEC need to be to be successful? The sheer amount of partners is no indication of its likelihood of success. Our LECs had between 2 and 32 partners! Your success is more likely to be judged by your outputs.

In physics, critical mass is defined as the minimum amount of fissile material needed to maintain a nuclear chain reaction.

A LEC is not about nuclear, but about sustainable chain reactions. If the LEC idea is passed on from mouth to mouth and reaches groups that previously had nothing to do with each other, the significance of LECs becomes ever deeper and the sphere of influence ever wider!

11. Innovation, common understanding and enthusiasm are the engine

Tired of "more of the same"? LECs and the open schooling approach give the opportunity to try out new ideas and to change perspectives in a new way of cooperation with institutions who have never worked together before. They have faced new challenges and tackled innovative topics, where everyone can contribute with his or her individual perspective and expertise.

The recipe: Mix fun with innovation, celebrate failures, bring together a community of committed people and transform your learning supported enthusiastically by numerous institutions. The mixture stands for an exciting and ever evolving project!

12. Knowledge on implementation and advocacy supports sustainability and growing

LEC activities are not only based on intuition, a bundle of activities or the use of the momentum of bringing people together; LECs are clusters of different stakeholders, who organise new learning with planned activities, a shared vision and a commitment to build a stronger network.

Therefore, sustained reflection about how to design and implement a cluster is needed. Concepts of implementation research are important to reflect the organisational development in the beginning of implementating a LEC, but also in the phase of running a LEC. Knowledge about advisory support is helpful for the development of sustainable strategies and tackling challenges en-route. Access to advocacy documents, can be a framework around which to build your ship and with recourse to this knowledge, LECs will not only grow and develop, but also become established and implemented sustainably as learning hubs for all.

3.2. A VIEW FROM THE CROW'S NEST

3.2.1 Setting sail! Developing the educational system via Open Schooling

Karoline Iber, Chris Gary, Mirela Paraschiv and Laura Cristea

PHERECLOS illustrated a scenario whereby following their successful implementation the Open Schooling approach has been realised. As for the schools, which are in the centre of the LECs, it implies that they are operating in a way that reflects external ideas, topics and challenges and incorporates them in their teaching approaches and everyday school life. In return, their pupils and teachers provide creativity and are potential assets to the community around them.

Thinking education ahead – why collaboration in education at a local level?

The Whitebook is outlining requirements and opportunities for innovative and successful collaboration among various education and knowledge providers on a local level for the enhancement and diversification of formal education under the perspective of a collaborative approach to "Open Schooling".

Piloting of model collaboration within the six Local Education Clusters (LEC) as part of the PHERECLOS approach have revealed the potential when actors from different societal sectors, from different educational levels or different professional backgrounds combine their skills and ideas to the field of local education. What has also become apparent is that this pilot implementation has contributed to initiating a change in the institutions involved.

But how do these models resonate with the global trends in education and how the future of schooling is perceived?

In 2020, after PHERECLOS had started its endeavor in innovating educational collaboration across six model regions, the OECD published its report (OECD, 2020) on a possible future of education and it outlined four possible scenarios and described them in the context of the role of institutions and educationalists, the pervasion of technology into everyday life, potential social and political developments as well as grand challenges – either predicted or totally unexpected – which may have an impact on likely or unlikely these scenarios are. This takes into consideration e.g. the recent Covid19 Pandemic, natural disasters and climate

change, economic crises, war and cybercrime or the dependency or risks associated with online connectedness, artificial intelligence or machine learning.

The four scenarios range from a model where schooling is more or less extended from the current status, where schools continue a classroom-centered approach with some more flexibility in the curriculum (despite other trends towards uniformity and standards) and greater diversification of professional profiles and roles of the educators in schools, also in face of digitalisation which allows more emphasis on supporting emotional learning and motivation to learn – but all in all, the "formal certificates" continue to be the main passports to economic and social success.

On the other side of the spectrum the OECD drafts a scenario where traditional schooling totally dissolves in an environment where education takes place anywhere and anytime, driven by the rapid advancement of artificial intelligence and augmented reality. In this setting, schools do no longer have the role of being a sole provider of certification and the remaining infrastructure is used more flexibly and open, but limited to alternative childcare arrangements where virtual learning is enabled and monitored in a smart environment. Professional educators are no longer needed and distinctions between education, work and leisure become blurred.

So where is the PHERECLOS approach located within this spectrum of scenarios?

The OECD has drafted a model where schools – different from the latter, rather utopian scenario – retain their basic traditional functions but become learning hubs as authority in education becomes more decentralized and local actors come up with distinct initiatives which are relevant in a local setting. Schools are perceived as relevant and successful, if they have strong connections within the community around them. This brings about less uniformity in the school system and allows for more flexible schooling arrangements with more personalisation and more community involvement. However, as different regions and different communities are characterized by different resources with respect to social, cultural, economic and scientific infrastructure and capacity, a strong regulatory and strategic framework is required on all levels (local, regional, national, international) – including targeted funding and investment – in order to compensate this.

What makes this scenario so unique compared to others is that schools as institutions get an even stronger role than nowadays and become *"the centerpiece of wider, dynamically evolving local education ecosystems, mapping learning opportunities across an interconnected network of educational spaces. This way, diverse individual and institutional players offer a variety of skills and expertise that can be brought in to support student learning."* (ibid.)

In this scenario, the role of both professional and non-professional educators is highlighted, with a strong focus on local values, local decisions and diverse partnerships – more than on standardized curricula. Similar as for the role of institutions, this future scenario – different to the other ones described by the OECD – also assumes increased importance and trust in the role and competencies of educators as enablers of learning experiences and educational pathways. Obviously, this calls for an enhancement of in-service and pre-service teacher training in order to prepare them for various forms of collaboration with non-professional knowledge providers when *"[…] strong partnerships are also welcomed as schools seek to leverage the resources of external institutions, such as museums, libraries, residential centers, technological hubs and others. […] Teachers with strong pedagogical knowledge and close connections to multiple networks are crucial."* (ibid.)

PHERECLOS is happy and proud that many of these aspects were already anticipated from the start of the project in 2019, with the aim of piloting and showcasing such innovative forms of collaboration in education and of implementing them in a systematic, concerted and sustainable way. The 12 criteria for successful implementation which are outlined herein, encapsulate the learning which derived from our piloting and together with the

models we describe should help others implement their own journeys into Open Schooling in the future in a more enlightened way.

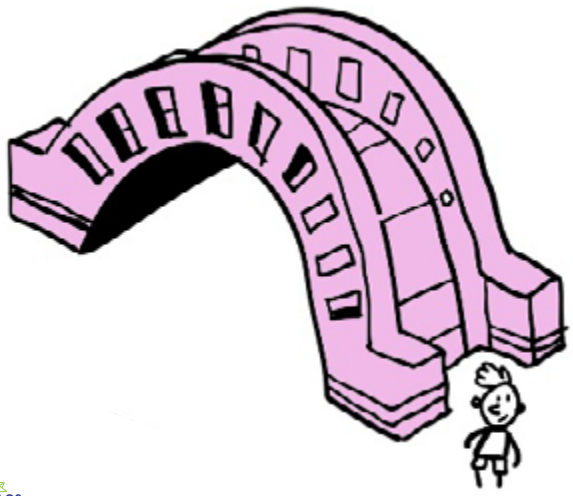
So what else is needed for scaling up collaboration in education at local level in the future?

In the scenario outlined above, some fundamental questions remain in order to estimate how realistic it is for the future and which signals from the present are available which point in this direction.

- Will strategic collaboration between formal and non-formal sectors in education lead to an erosion of formal credentials from primary to tertiary education?

Even though PHERECLOS has focused on building bridges between various knowledge and education providers in a region, it did not really tackle the matter of traditional certification. However, PHERECLOS was tested an badge ecosystem for issues virtual credentials of particular knowledge and skills that were obtained during the implementation (see chapter. 2.7. The Open Badges – From Sailors to Ship Builders). The results are promising and elements of such an credential ecosystem could be transferred to the school sectors and be used within certain scopes, however national legislation is still hindering the further uptake of such alternative means of assessment (see 2.5 Sustainability – Policy Practice)

If skills are more separated from formal certification, will this allow for more flexible learning choices or less predetermined learning paths towards either general of vocational learning tracks?



Again, PHERECLOS has presented and laid down principles for how to successfully launch and accomplish implementation processes, which lead to more systematic and more strategic collaboration between knowledge and education providers of various kinds. These would basically allow for serval forms of educational pathways and their accreditation, as long as they are in alignment with national legislation. PHERECLOS has developed a set of policy briefs, which may help to create a deeper understanding and awareness for more flexibility and less standardization and uniformity in the assessment of learning outcomes and achievements (see 2.5. Sustainability – Policy Practice)

- If schools are to become learning hubs in their communities, can this also counteract social segregation and polarization in a neighborhood and strengthen a feeling of belonging, including intergenerational learning and volunteer work as a means of social cohesion and acquisition of social capital?

PHERECLOS has not explicitly pursued an intergenerational approach. However, there is profound knowledge available from the model of Children's Universities, where some lighthouse initiatives have made intergenerational learning a central component in their approach and mission. As Children's Universities have taken the role of incubators of change within PHERECLOS, this aspect can still be added to the systematic formation of a learning community. Mentoring turned out to be a suitable and effective vehicle within the overall PHERECLOS concept, where 44 institutions have engaged in then transnational mentoring partnerships (TEMP) in 15 different countries, which definitely helped to inspire new and diverse institutionalized relationships in these countries, including several forms of collaboration between schools and the communities around them (see chapter 2.4. TEMPs).

- The outlined scenario of schools as learning hubs assumes that traditional governance mechanisms in schooling becomes less pertinent and *"more purpose oriented,*

horizontal, collaborative and iterative ways of teaching and learning" will emerge, including models of service-learning and citizen science. What would this scenario imply for the role of professional educators and could they be the "game changers" for innovation in education?

PHERECLOS as a pilot initiative may not have the potential to immediately create a chance in national education systems and policies, also taking into to consideration the limitation due to legislative requirements, which are in place. However, PHERECLOS has eminently uncovered the central role which teachers have in changing the education systems towards more flexible and collaborative forms: Teachers are key and the role of teachers comprises both leaders of learning as well as capacity building for children. As experts regarding the every-day school life, they are the engines of adjustments, and therefore crucial for the development of a Open Schooling Projects. PHERECLOS has encapsulated these requirements and recommendations for pre-service and in-service teacher training in the *"Teacher Training Innovation Toolkit on Open Schooling"* (see chapter 2.6. Teacher Training Toolkit).

3.2.2. Children's Universities re-thought?

Karoline Iber, Chris Gary

The main idea of PHERECLOS is based on the experiences of Children's Universities. After three years of close cooperation with schools and the development of pilot regions through models of Local Education Clusters (LECs) and collaboration in Transnational Mentoring Partnerships, we are left to consider the relationships between Open Schooling and the concept, the idea and the aims of Children's Universities, more broadly, the non-formal sector in education.

The international community of Children's Universities (European Children's Universities Network – www.eucu.net) agreed on this definition of a "Children's University' in 2010.

A Children's University means:

- Encouraging children to be curious and to think critically – the mainsprings of research and science
- Communicating to them the idea of universities and providing insights into academic culture as well as their role in the society at large
- Working with young people in such a way as to help universities to be more responsive and open
- Making encounters between children and "the university" (as a community of academic staff and students) possible
- Enthralling them with diverse scientific fields (from humanities to social sciences and natural sciences) and with diverse scientific methods unbiased by commercial interest
- Giving young people an understanding of their future educational choice and options

A Children's University is based on the aims of:

- Providing access for all children without boundaries and on a voluntary basis
- Involving and providing benefit for children from disadvantaged groups (including barriers caused by social or economic, impairment, language or gender)
- Providing an atmosphere of respect without pressure to perform
- Contributing to the enhancement of universities as concerning organisational, didactical and research development

All 70 partner organisations from 33 countries across the world agreed on this definition published in the EUCU.NET charter.

Schools are not mentioned in the Charter and this is mainly based on the fact, that most Children's Universities are traditionally out-of-school activities or summer programmes connected with STE(A)M outreach and community engagement.

The Open Schooling idea was new for this movement – an interesting, but also challenging way to reflect the role of Children's Universities within the educational system, to learn and to exploit the potential of these types of activities.

After three years of Children's Universities expanding their activities with schools and developing Open Schooling hubs (our Local Education Clusters), we have drawn three conclusions:

1. Children's Universities play a role as an integrative part of the educational landscape
2. Children's Universities learn from the school system and benefit from strengthening the collaboration.
3. Children's Universities are informal learning settings and should keep this role!

Children's Universities play a role as an integrative part of the educational landscape

School is the most relevant societal actor in the life of a child, the place where they spend most of their time outside of their family. It is not only a place for learning, but also the place for friendship, for developing social relations, for the first steps towards independence and individual well-being. Those teachers who are able listen, can hear the voices of children. They know a lot about the topics which adolescents are interested in, that they are struggling with or which they have more questions. All these topics are relevant for curating CU projects.

Open Schooling helps Children's Universities build upon this social sphere in order to develop their content and forms of engagement further: Through collaboration with schools, Children's Universities can better connect to real-world experiences for children linked to STE(A)M engagement.

Open Schooling allows Children's Universities to learn more about the reality of life and the practical relevance of social inclusion. Educational pathways are predetermined in many aspects (social, cultural, political, economic) and Open Schooling can help to address First Generation students in a well-balanced approach between social justice and student recruitment.

Children's Universities need to understand both the life of a child and the school system as a whole

If we take the EUCU.NET charter seriously, we need to understand the dynamics and the characteristics of educational pathways, of the barriers to education and of the fundamental mechanisms that give young people an understanding of their future educational choices and options.

The school system is of massive significance and this became obvious in the time of the pandemic. Schools were suddenly recognised as vital to maintaining social structures, going far beyond questions of quality of teaching and future labour markets. The pandemic also raised questions about the fundamental role of education in our societies, including the autonomy and the determination of the educators. Children's Universities have years of experience as innovators and agents of change within university structures, but are new in building collaboration with schools as relevant societal actors.

In addition to the EUCU.NET charter, we should not only make encounters between children and the universities, but also between schools and universities, public libraries, museums, companies, NGOs and other stakeholders.

"It takes a village to raise a child" – an African proverb reminds us not to forget that activities for children and with children can and should not be limited on one organisation – for example a university.

Open Schooling contributes to this ethos too, by engaging 'the entire community' in the education process. If Children's Universities are able to learn more about the world in which children live, they can better allocate their contribution and their capacity to create a more colourful, innovative and stimulating educational landscape.

Children's Universities learn from the school system and benefit from strengthening the collaboration

Open Schooling allows systematic and strategic links with pre-university education and serve as bridge builders between society and the academic sector.

Children's Universities are ideally placed to help universities achieve their Third Mission: the social, enterprise and innovative activities that universities perform in addition to teaching and research. This contribution can be optimised through collaboration with schools and focused on real societal needs. Children's Universities may act as bridges between schools and universities and may be the translators of the different languages used in the two organisational regimes.

For their organisational development, Universities can benefit from a better understanding of how to be attractive to future cohorts of students. Universities can learn from a close and ongoing collaboration with schools about how to provide information and support about the university in such a way that children, parents and the general public can understand, boosting inclusivity (and potentially recruitment).

Teaching and learning is the fundamental mission of schools and universities, but didactics and pedagogy are often different – in particular with respect to teaching innovation. Mutual insight and sharing of best practice across the two communities can significantly boost teaching and learning of adolescents before they enter the university system enabling mutual benefit from innovative practises in both worlds, not leaving aside the potential, the knowledge and the commitment of non-professional educators inside and outside educational establishments.

Many universities are also teacher training institutions. In an Open Schooling approach, these links are another potentially synergistic set of links between the two communities and whilst Open Schooling is a relatively new approach that is not yet fully recognised in teacher training, the Phereclos Teacher Training Innovation Toolkit could be one vehicle to help combine the ways of teaching and learning in Children's Universities, academic environments and schools, benefiting future education.

A valuable contribution to research development is the enhancement of Citizen Science in collaboration with schools. PHERECLOS LECs showed that co-creation is an innovative and meaningful way to create new ideas together with children, including new questions for scientific research! Collaboration between researchers and schools – linked through Children's Universities activities and other places of learning outside schools – allow universities to use these formats to generate new ideas and data.

As a common principle, Children's Universities are also based on the aims of inclusion and accessibility without boundaries.

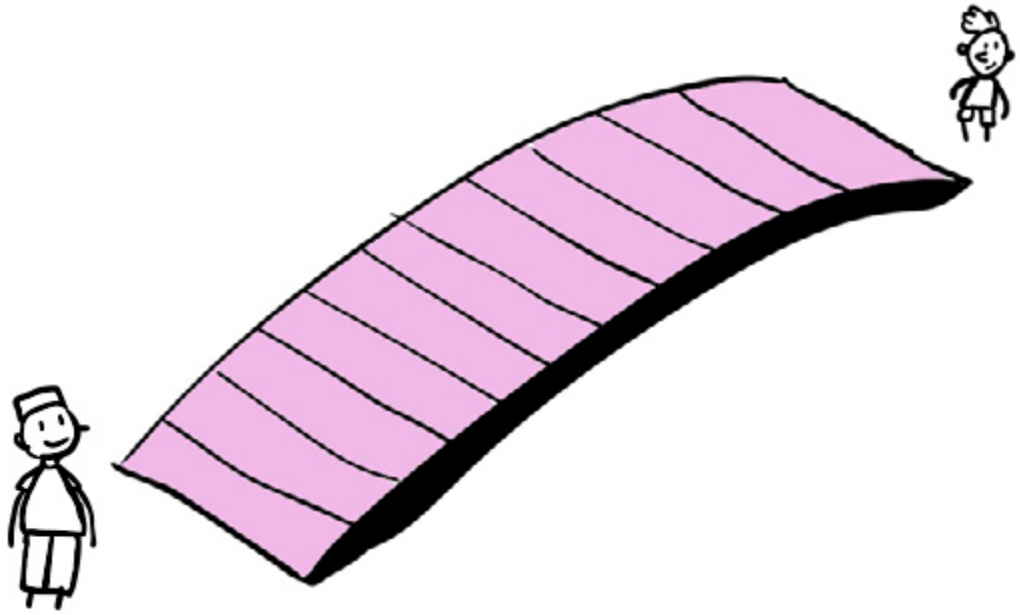
Collaboration with schools may help Children's Universities to lower barriers and address children who have less support from their parents and family than other children.

Children's Universities are very often short-term interventions, single events or a short series of activities. The concept and the understanding of Science Capital as a continuous accumulation of knowledge, interest, competence, literacy and the ability to take a critical stance towards science has proven a suitable model for the expansion of an

Open Schooling approach: the more a person knows and understands about science and the more actors a person has got to know as reliable and authentic role models, the higher this person's Science Capital, and therefore the more likely they are to "see science for them".

Open Schooling can provide a perfect basis for such an approach and for Children's Universities, this includes the chance to attract more experts to engage in their (CU) activities, potentially diversifying the engagement formats that can be offered.

The potential which schools bring into such collaboration is the long lasting relationship between teachers and students. Open Schooling in such a way, that teachers are integrated in academic outreach activities and supported by researchers, may lead to a more sustainable connection of children with scientific issues and should be explored further.



Children's Universities are informal learning settings and should keep this role!

In the EUCU.NET charter, the international community agreed on the fact that children participating in Children's Universities shall have no pressure to perform and that their participation is on a voluntary basis. Children's Universities activities are traditionally held in informal learning settings and are not part of curricular learning in schools.

PHERECLOS has developed models and recommendations of how education providers can establish a structural approach in a well-concerted mutual approach across formal and non-formal settings of learning and teaching and the clear conclusion of all parties was: enrichment for all!

Open Schooling enables Children's Universities to position themselves as "school-free zones" and to highlight that recognition of the value of children's knowledge is possible outside of traditional learning outcomes and assessment – and several recommendations for this can be found in our Teacher Training Innovation Toolkit.

In this regard, how Children's Universities organise learning can be of added value for schools as an experimental testbed for didactical innovation. Children have the chance to learn in a different way, teachers are supported to integrate new didactical elements in their daily work and Children's Universities have the chance to reach new target groups.

Children's Universities may contribute to innovation in formal educational, but shall not be part of it and will never replace schools!

Paul, one teenager involved in Open Schooling discussions, summarized:

> *What I expect from Open Schooling with Universities is: Knowledge which is so new, that it is not written in school books. School is responsible for today and shall give us as students an understanding about the knowledge which is already here. But I want to discuss questions from tomorrow and the things, where research is searching for answers – and Children's Universities open this door to Universities!"*

And now?

After three years of learning in PHERECLOS, it is time to revisit the eucu.net charter and widen the perspective and the self-understanding of Children's Universities:

- Children's University can also mean: collaboration with schools, teachers and parents and mutual learning of schools and universities supporting the idea of Open Schooling
- Children's Universities are also based on the aim of being an active part in the "local" educational landscape, bringing together different stakeholders, and contributing to the "openness of schools", potentially enhancing the offer of the basic educational system, giving support for schools especially in raising awareness of future careers and educational choice for children to be a part of solutions for future challenges.

With such an ambition in mind, the outcomes of the PHERECLOS project suggest that the idea of collaborative, cross-sectoral structures in education which are more responsive and more targeted towards current and future challenges in our societies, require all of the following: a change of mindsets, both on the side of deciders and practitioners, a change of structures in which teaching and learning takes place and a change of the conditions under which learning can be effective, with clear consideration of real-life experience.

3.3. ABSTRACT

PHERECLOS: Partnerships for Pathways to Higher Education and Science Engagement in REgional CLusters of Open Schooling

Philip H. Smith

PHERECLOS set sail in October 2019 on an ambitious educational journey to establish Local Education Clusters (LECs) in 6 different locations, with diverse challenges and contexts all seeking to embrace, develop and enhance Open Schooling opportunities. Impetus for our 6 LECs came from a collection of Inspiring Practices gathered at the start of the journey by the project consortium and the prior experiences of Children's Universities (as LEC coordinators). The formation and expansion of the LECs took guidance from Implementation Science, the support of advocacy partners and a collection of Policy Briefs which sought to calm the seas on which the good ship PHERECLOS woul sail.

Three year later, PHERECLOS is heading back to shore having withstood the Herculaneum demands presented by the global pandemic of Coronavirus (COVID-19) which has challenged societal structures and education systems the world-over the likes of which we have never seen before. Still, our talented group of mariners have brought the ship home safely and are rightly proud and delighted to share our learning with you - through case studies, models, stories and anecdotes. Our learning has been truly international, through the establishment of 10 TEMPs (Trans-National Education Mentoring Partnerships) and we seek to empower the next generation of teachers and their trainers via our Teacher Training Toolkit. We have celebrated success and participation with Open Badges, learnt from mistakes and the unexpected, demonstrated adaptability and drawn conclusions about the impact of our findings upon Open Schooling and the future of Children's Universities.

The project has truly lived up to its name in all **regions**, creating, embracing and demonstrating the real-value of **Partnerships** at every level. Highlighting **Pathways to Higher Education**, that begin in primary schools and which have children and teachers at their centre, working with multiple agencies who are all seeking to provide **science engagement** opportunities in an **Open Schooling** environment.

We are looking to the Horizon for further inspiration and challenge and hope you enjoy our exerts from our Captains log and that you enjoy sailing with us!

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ANNEXES

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Annex 2: Advocacy Glossary of Terms

Term	Definition
Advocacy	Advocacy is the process of negotiating and mediating a dialogue through which influential networks, opinion leaders, and, ultimately, decision makers take ownership of your ideas, evidence, and proposals, and subsequently act upon them.
Children's University	A Children's University is non-formal university-based science engagement program or package of programmes s for children and young people as unconventional and non-traditional recipients of the academia
Contextual Fit	"match between the strategies, procedures, or elements of an intervention and the values, needs, skills, and resources available in a setting" (Horner, Blitz, & Ross, 2014, p. 3). Aarons, Hurlburt, and Horowitz (2011) elaborate on this concept by noting "implementation of an innovation will be successful to the degree that the innovation matches the mission, values, and service provider tasks and duties of the organization." (in: Metz, Bartley & Maltry, 2017, p.6)
Continuous Quality Improvement	"process of identifying, describing, and analyzing key data indicators and challenges; identifying and carrying out potential solutions; monitoring their effectiveness; and revising solutions based on results." (Metz, Bartley & Maltry, 2017, p. 6)
Diffusion	"Diffusion is the passive, untargeted, unplanned, and uncontrolled spread of new interventions." (Rabin et al., 2008, p. 118)
Dissemination	Dissemination means sharing research and project results with potential users such as peers in the field, industry, other education players, media and policymakers. By sharing your results with the rest of the community, you are contributing to the progress of science and education in general.
Educator	An educator is a person who accepts responsibility for the educating process and educates by supporting and assisting one or more learners. Some people are educators by profession or professional educators, teachers, university lecturers, etc. At the same time parents, family members, youth organisation leaders, business owners and many others also have such a role.
Effective Implementation	"Intentional strategies to support effective practices". (Metz, Bartley & Maltry, 2017, p. 92)
Effective Practice	"Programs or approaches put into place that are feasible, supported by research, fit the needs of the target community, and are replicable." (Metz, Bartley & Maltry, 2017, p. 92)
Enabling Contexts	"Creating the conditions that are supportive of new practices and implementation supports." (Metz, Bartley & Maltry, 2017, p.92); "collaboration through teaming structures, communication and feedback loops, and ongoing use of data improvement to build an environment that supports effective practices." (Metz, Bartley & Maltry, 2017, p. 6)
Exploitation	Exploitation of project outcomes is the use of results for the purposes of multiplying implementation or for influencing public policymaking.
Fidelity of Implementation:	"the extent to which the critical components of an intended program are present when that program is enacted" (Century, 2005; p.5)
Formal education	Formal learning or formal education is education normally delivered by trained teachers in a systematic, intentional way within a school, university another higher education institution or a vocational training provider. It is one of three forms of learning as defined by the OECD, the others being informal learning and non-formal learning.

Implementation	Implementation is the carrying out, execution, or practice of a plan, a method, or any design, idea, model, specification, standard or policy for doing something. As such, implementation is the action that must follow any preliminary thinking in order for something to actually happen.
Implementation Drivers:	"Implementation Drivers are the key components of capacity that enable the success of innovations in practice. Implementation Drivers assure development of relevant competencies, necessary organization supports, and engaged leadership." (NIRN – Active Implementation HUB, 2005)
Implementation Science	"The study of factors that influence the full and effective use of innovations in practice. The goal of implementation science is not to answer factual questions about what is but determine what is required (mission driven)." (Blase, Van Dyke, Fixsen & Bailey, 2012)
Implementation Stages	"Implementation Stages outline the integrated, non-linear process of deciding to use an effective innovation and finally having it fully in place to realize the promised outcomes. Active implementation stages are Exploration, Installation, Initial Implementation and Full Implementation." (NIRN – Active Implementation HUB, 2005)
Implementation Team	"group of stakeholders that oversees, attends to, and is accountable for, performing key functions in the selection, implementation, and continuous improvement of an intervention." (Metz, Bartley & Maltry, 2017, p. 6)
Informal education	Informal education is the wise, respectful and spontaneous process of cultivating learning. It works through conversation, and the exploration and enlargement of experience.
Innovation	An innovation is anything new to an individual, organization, or human service system (Rogers, 1995).
LEC	A Local Educational Cluster (LEC) is a community of practice and serve as incubators of change in local education ecosystems. Different LECs may operate with different thematic focuses (ranging from class room design to active citizenship), involve diverse schools (from kindergarten to upper secondary) and explore and deploy various didactical concepts and approaches (from co-creation to problem-based learning) with a clear focus on an inclusive and gender sensitive way of teaching and learning. A LEC is composed of key stakeholders as experimental testbeds for educational cooperation.
MML-P	The PHERECLOS Mobilisation and Mutual Learning Platform will provide the basis for showcasing the progress of TEMPs and will also include tools for pairing interested mentoring parties.
Non-formal education	Education that is institutionalized, intentional and planned by an education provider. The defining characteristic of non-formal education is that it is an addition, alternative and/or a complement to formal education within the process of the lifelong learning of individuals. It is often provided to guarantee the right of access to education for all. It caters for people of all ages but does not necessarily apply a continuous pathway-structure; it may be short in duration and/or low intensity, and it is typically provided in the form of short courses, workshops or seminars. Non-formal education mostly leads to qualifications that are not recognized as formal qualifications by the relevant national educational authorities or to no qualifications at all. Non-formal education can cover programmes contributing to adult and youth literacy and education for out-of-school children, as well as programmes on life skills, work skills, and social or cultural development.
Open Schooling	Operating a school in a way that reflect on external ideas, topics and challenges and incorporates them in their teaching approaches and everyday school life, and in return, provide the creativity and potential as the assets of their pupils and teachers to the community around them
Policy Brief	A policy brief is a concise summary of a particular issue, the policy options to deal with it, and some recommendations on the best option. It is aimed at government policymakers and others who are interested in formulating or influencing policy.
Science Capital	The concept perceives individual representation of science as a bundle of commonplace habits, expectations and attitudes which are directly linked to and influenced by the everyday social sphere of individuals and all social actors herein
Stakeholder (in education)	In education, the term stakeholder typically refers to anyone – people or organisations - who is invested in the welfare and success of a school and its students, including administrators, teachers, staff members, students, parents, families, community members, local business leaders, and elected officials such as school board members, city councilors, and state representatives. In short, stakeholders have a "stake" in the school and its students, meaning that they have personal, professional, civic, or financial interest or concern.
STEAM	STEAM Education is an approach to learning that uses Science, Technology, Engineering, the Arts and Mathematics as access points for guiding student inquiry, dialogue, and critical thinking
TEMP	Transnational Education Mentoring Partnerships (TEMPs) between differently experienced parties in innovative education development are designed to create a snowball effect for the implementation and dissemination of transferable outcomes (models, recommendations and policy briefs) originating from the LECs
White Book	A white book or white paper is an authoritative report or guide that informs readers concisely about a complex issue and presents the issuing body's philosophy on the matter. It is meant to help readers understand an issue, solve a problem, or make a decision.
Whole School Approach	A whole school approach aims to raise quality and standards across the entire school. For this approach to be effective, schools need to identify and address the needs of the school community and engage in continuous, cyclical processes for improvement.

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PHERECLOS

The **PHERECLOS** (**P**ARTNERSHIPS FOR PATHWAYS TO **H**IGHER **E**DUCATION AND SCIENCE ENGAGEMENT IN **RE**GIONAL **CL**USTERS OF **O**PEN **S**CHOOLING) project aims at creating new partnerships for pathways to higher education and science engagement in regional clusters of open schooling.

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