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Seed Cities for Science

A COMMUNITY APPROACH
FOR A SUSTAINABLE GROWTH
OF SCIENCE EDUCATION
IN EUROPE

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With the support of:

EUROPEAN COMMISSION

SIXTH FRAMEWORK PROGRAMME

Pollen is a European research and development project supported by the DG RESEARCH (FP6) of the European Commission. It has been selected as one of the reference projects to promote scientific education and culture in Europe.

What is Pollen?

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Pollen aims to stimulate and support science teaching and learning in primary schools so that children can observe, question, and understand the world that surrounds them, making experiments, developing scientific reasoning, problem solving skills and creativity through hands-on, inquiry- and innovative-based science education.

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Pollen is supported by a group of pedagogical and scientific organisations from 12 European countries. Pollen is therefore a network, not only on a community level, but also at European level, bringing science closer to society through schooling.

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The project will focus on the creation of 12 seed cities for science in 12 European countries. A seed city is an educative territory that supports primary science education through the commitment of the whole community (families, education authorities, scientific and industrial partners, municipalities, museums and cultural centres, etc.).

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The experimentation process proposed to the children is structured through questioning related to their everyday life and surrounding world. In a working session, investigations carried out by children can be supported by experiments, object or model constructions, direct and indirect observations, documents, surveys and visits. During their investigations, the children argue and reason, pooling and discussing their ideas and results, and building on their knowledge.

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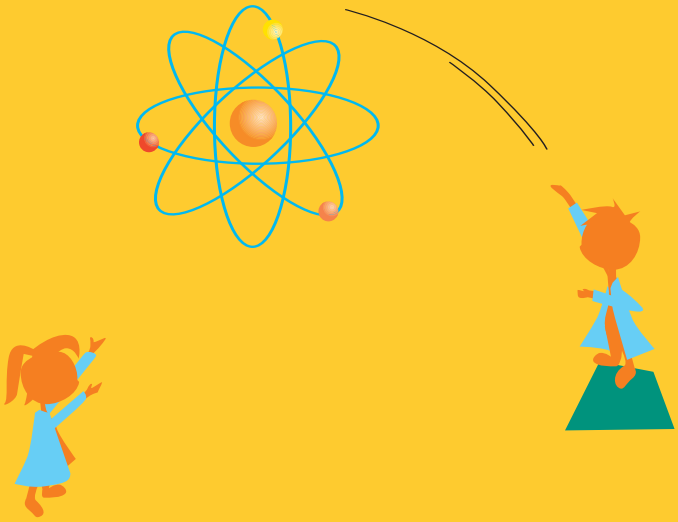
Pollen will offer teachers and trainers material, methodological and pedagogical resources and tools that have already been tested, as well as support for the daily work at school, compatible with the framework of the local curriculum.

Science education:
Where will Pollen innovate?

The fundamental premise of Pollen is to develop a model for the sustainable development of science education in primary school based on an inquiry-based learning and teaching approach.



Child participation

Children will feel that they are directly involved in science education, thus creating positive attitudes towards science and technology.

Children will develop a positive and personal attitude towards science and technology, through the progressive discovery and appropriation of natural phenomena and the practice of observation and experimentation. Our aim is not only to increase the number of future scientists, but also to develop values such as understanding and respect for knowledge and active citizenship.

To achieve this objective, pupils and adults implement activities that will take place at **school** and in the surrounding **community**.

Hands-on and inquiry learning

It has been demonstrated that the approach based on investigation and hands-on activities contributes strongly to language learning which is fundamental in science at every level of study.

- Inquiry processes allow pupils to use intelligence skills, ask questions, make hypotheses, conduct experiments, develop creativity, design skills and develop critical thinking. While working in teams, children learn to respect each other's views. The process is intended to be of particular value for children with disabilities or special needs.

The community participation: "The seed city"

A seed city is an educative territory that establishes science education as a priority.

An educative territory is not limited to schools. All cultural, scientific, economic, political, leisure and other resources are mobilised to improve the community's development. This will, in terms of a feed-back effect, nurture the city and improve its resources.

The project aims to build a sustainable framework for science education through a child-centred approach, starting at school and involving the whole city.

Pollen's Key topics

Each seed city will focus on a key issue creating and animating centres of excellence.

Bruxelles
BELGIUM

Science education in low income areas. Disadvantaged children living in low-income areas suffer from a lack of language abilities and insufficient recognition of curricular skills, which condemns them to a high risk of academic failure. Our goal is to promote and better understand the impact of the hands-on approach on socially disadvantaged children, specifically with regards to science performance and language skills.

Saint-Etienne
FRANCE

Scientific community involvement at primary school. Partnerships between local scientists (retired scientists, researchers or students) and teachers help to take the drama out of science learning, make science more amenable and provide help for handling experiments at school. Saint-Etienne's aims are to involve active scientists in primary school education and produce guides, resources and other types of materials to help teachers.

Amsterdam
NETHERLANDS

Enhancing inquiry-based science and technology education in primary schools with ICT. It has been demonstrated that significant gains can be expected when students use ICT to learn through the exploration of real situations with probe-ware. In our seed city, we will ensure that even under-resourced schools can implement effective ICT use in the framework of their science and technology programmes.

Tartu
ESTONIA

Science education and children with special needs. Tartu's objectives are focused on children with special learning needs: better understand the impact of the hands-on approach, especially on language and thinking skills, implement new specific activities for the children, and create guidelines and materials to support their teachers.

Berlin
GERMANY

Gender issues and science education. The number of students, especially women, choosing a scientific career, is decreasing. This may stem from the fact that students refrain from choosing a particular subject if the image associated with this subject does not match the self-image they wish to acquire. The process begins at primary school, thus it is necessary to find out whether self-image affects attitudes towards science at these ages. This question will be answered at the local level to be shared with the whole seed cities network.

Sacavém
PORTUGAL

Family involvement in science education. We want to assess community participation in science education. For this reason, we will try to ensure that families in low-income communities get involved with their children in school activities, to change their own perception of science.

Vác
HUNGARY

Ljubijana
SLOVENIA

Science education in new member states. Hungary and Slovenia are implementing, at the seed city level, the basic framework for a community approach to science education. Special emphasis will be placed on training facilities in order to empower local communities. Pollen's goal is to promote and establish local good practices based on hands-on methods in primary schools.

Girona
SPAIN

Science education and immigrants: challenges and opportunities. All our European seed cities are facing new challenges and opportunities derived from immigration flows. We will try to understand the specific relation to science among immigrant families and work to overcome prejudices by addressing issues such as the Arabian or Chinese contributions to science in order to bring science closer to all citizens.

Perugia
ITALY

Child participation in science education and active citizenship. How can children's participation in science education promote their citizenship values? What kind of participation activities can help to promote child citizenship? In this order, Pollen will focus on:

- Local events related to science set in the city, such as "Science week".
- Youth science clubs; these will be encouraged to undertake investigation, invention and encourage certain attitudes among the community.
- A community development project, in which children are involved together with adults.

Stockholm
SWEDEN

Science education and the transition from primary to secondary school. At secondary school, the hands-on approach is far less developed, whilst teachers have better scientific knowledge. Stockholm will focus primarily on exploring how the investigation procedure can be applied in relation to scientific and technological education at secondary schools.

Leicester
UNITED KINGDOM

Science education and the cross-disciplinary approach. Positive attitudes towards science are important to optimise learning and encourage pupils' interest in science throughout their schooling. Primary school is the ideal place in which to support teachers in the development of effective cross-disciplinary work, which is a very suitable vehicle for showing the social relevance of science. Links between universities, schools and school teachers, science-based organisations, industry and commerce will be reinforced.

The role of schools...

Schools and their teachers have the key role of introducing and guiding pupils through science and technology, following hands-on and inquiry approach methods, and collaborating with the local community partners.

Schools are seen as an individual setting, but are also part of a broader setting, in which interaction with the rest of the local stakeholders is crucial to enhance pupils' competences. Pollen will rely on the work carried out in the classroom, and will emphasise the collaboration between the school and the local community.

Pollen starts at school, with the responsible authorities, and fosters community participation, including families, the scientific community, universities, public services, industries, and other entities dealing with education, interacting on a local scale.

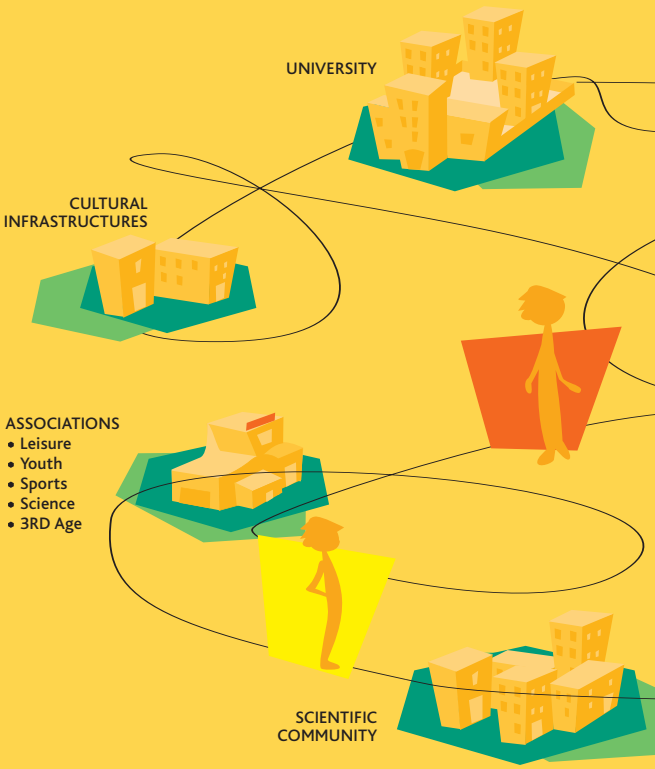
What does Pollen contribute to schools?

- Pollen will provide educative benefits to the whole school.
- Dozens of hours of teacher training per year.
- Educational materials: designed activities, experimental materials for the classroom, etc.
- Permanent advisory services for carrying out the different activities.
- A European network to intensify cooperation and twinning activities.
- A unique web platform in order to access tools, contact coordinators and be informed of the project development.

The local trainer

This will be somebody who is familiar with school culture and in-service training, as well as with school development processes. He/she will:

- Ensure and facilitate links between the Pollen community and general school development.
- Carry out the in-service training and enhance collaboration inside the local community.



Evaluation of the project

Three partners will work as a team to define the frameworks for the entire project assessment, focusing on the following three topics: **students' attitudes towards science, teachers' attitudes, and community participation**. In addition, a continuous evaluation will be made by the local staff, with the participation of the community board and occasionally with representatives of the different stakeholders.

...in the seed city

A seed city is a city where synergies are created and forces are joined to foster science education. Municipality support is essential to develop a partnership between schools and actors, scientists, universities, industry representatives, health workers, cultural institutions, entities, etc.

The local coordinator

The local coordinator will be familiar with the organisation and the dynamics of the local community and its processes. He/she will:

- Coordinate Pollen local community board actions.
- Manage local budgetary and administrative issues related to the project.
- Ensure and facilitate daily contact between schools and the local institutions inside the local community, and coordinate joint events and activities.
- Ensure internal and external communication.

The local community board

This board will be set up to coordinate local Pollen activities, and it willl:

- Be headed by the local coordinator:
  - Training, instructions and suggestions for seed city community board management will be provided through the general coordination.
- Help define and implement the action plan:
  - This includes analysis of the community's scientific needs and suggestions of activities.
- Be a participatory framework for all stakeholders:
  - Coordinating school and other actors' common initiatives, stimulating partnerships, sharing resources and assessing the whole project.
- Maintain high visibility of the project.

Step by step
Work Plan

1. Initial evaluation of the science education in each seed city to define main objectives.
2. Creation of a sense of partnership and ownership of the project.
3. Elaboration and implementation of a strategic plan.
4. Development of all activities and actions in the school and community.

Pollen resources

www.pollen-europa.net

An interactive web portal (E-centre) will be developed in order to stimulate the mutual exchange of experiences and support and disseminate processes during the entire duration of the project, at local, national and European levels.

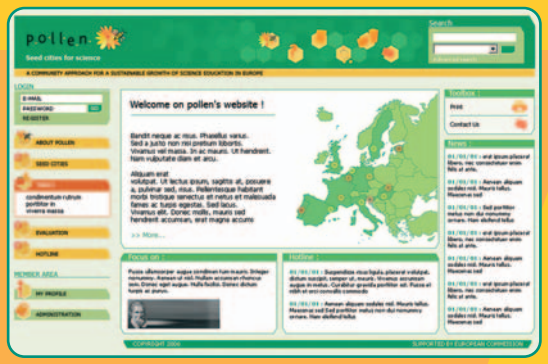
The E-centre will provide:

- A space for each Pollen seed city.
- Cooperative workspaces for all Pollen participants to develop joint projects.
- A set of resources, tools and documents relating to good practices and activities.
- An agenda of events taking place in all participating cities.

Pollen tools

The following documents will be available online, and some will be printed:

- **Guide for Coordinators.** The guide will be a tool for the seed city coordinator to initiate and implement a school science development programme, including guidelines for designing a strategic plan.
- **Guide for Trainers.** A complete guide on how to organise training sessions, how to coach and support teachers implementing school activities.
- **Guide for Teachers.** Teachers will have a practical guide with main inquiry approach principles, as well as many examples of activities for all primary school levels and other resources.



Images of various sections of the website.

www.
pollen-europa.net

- **Learning Units.** Plenty of tried-and-tested activities will be available at the E-centre and which can be used by any teacher or trainer for free.
- **Resources Database.** A downloadable list of complementary material and pedagogical resources collected worldwide will also be available to all participants at the E-centre.

An example of a step-by-step activity for teachers

What do we know about air?

- The teacher arranges a collective discussion of the pupils' ideas about air, including questions about where it can be found, what its purpose is, etc.
- **Pupils' ideas about air.** Awareness of the fact that not everyone in the class agrees on the existence of air, where it is to be found, its role, etc.
- **Debate with fellow pupils.** Give expression to spontaneous notions built up from everyday experiences. Draw up a collective written record, maintaining a distance from the spontaneous notions.

Can you catch air?

- Think of a way of filling a bag with air: open the bag with the class, blow into it; run in the playground with the bag, etc.
- Know how to perform a simple experiment: open the bag, fill it with air, and seal it.
- Air exists and is matter because one can catch it and fill a container with it.
- Describe an experimental procedure orally.
- How can one prove that the bag contains something?
- **Think of an experiment to answer the initial question.** By analogy with situations in everyday life, the pupils suggest emptying the bag by piercing it. They think they feel the air coming out. The perceived failure of this experiment leads the teacher to organise a debate to enable the pupils to overcome this setback by thinking up new experiments.
- **Perform an experiment according to an established procedure.** Know how to extract information from it. Realise that an experiment is not working: air is not a palpable substance like a solid or a liquid. Initial distinction between gaseous and liquid states. Challenge the experimental procedure in order to work out a new one.
- **Write down an experimental procedure in small groups.** Present it to the whole class and argue through it. The pupils, guided by the teacher, summarise what has been learned and noted in the collective part of the science notebook.

Pollen as a network

Pollen involves 12 science education competence centres in 12 European cities throughout Europe.

This European network will enable the exchange of best practices, peer-to-peer cooperation or twinning agreements based on specific activities. The cooperative spirit will go beyond the project itself, as strong links will be built between all participants.

The 12 competence centres involved in the project and the contact person for each institution are:

- Université Libre de Bruxelles (BELGIUM) – **Pasquale Nardone** [Pasquale.Nardone@ulb.ac.be]
- Université of Tartu (ESTONIA) **Toomas Tenno** [tenno@chem.ut.ee]
- Ecole Normale Supérieure (FRANCE) **Raynald Belay** [raynald.belay@inrp.fr]
- Freie Universität Berlin (GERMANY) **Petra Skiebe** [skiebe@zedat.fu-berlin.de]
- Apor Vilmos Catholic College (HUNGARY) – **Zsuzsanna Gajdóczki** [gzsuzsa@enternet.hu]
- Consortium Innovation Training Educational Inquiry (ITALY) – **Gianfranco Savelli** [savelli@unipg.it]
- Universiteit van Amsterdam (NETHERLANDS) **Ed van den Berg** [eberg@science.uva.nl]
- Ciência Viva – Agencia Nacional para a Cultura Científica e Tecnológica (PORTUGAL) **Rosario Oliveira** [roliveira@cienciaviva.pt]
- University of Ljubljana – Faculty of Education (SLOVENIA) – **Ana G. Blagotinsek** [ana.gostincar@guest.arnes.si]
- P.A.U. Education (SPAIN) – **Miquel Àngel Alabart** [miquel.alabart@paueducation.com]
- Royal Swedish Academy of Sciences (SWEDEN) **Karin Bårman** [karin.barman@kva.se]
- University of Leicester (UNITED KINGDOM) **Tina Jarvis** [jar@le.ac.uk]

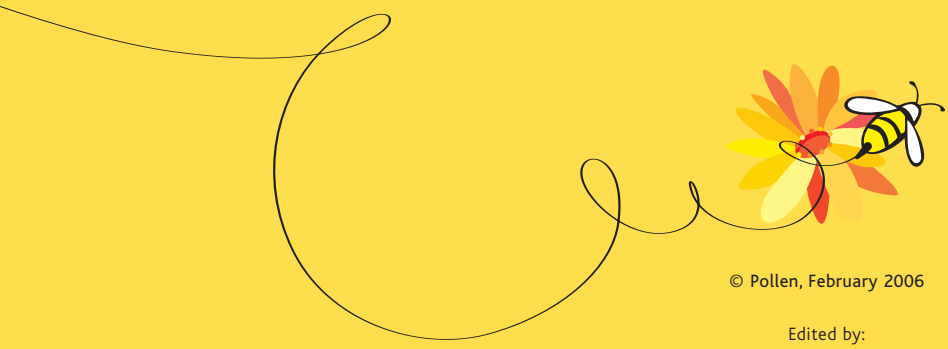
Project coordinators

- **La main à la pâte / the Ecole Normale Supérieure** promotes scientific inquiry-based education in primary schools throughout France and elsewhere. Since 1996, it has explored nearly all of the aspects dealt with in the current project: inquiry-based teaching in schools, ICT, the production of educational resources, scientific collaboration, training activities and dissemination, etc. in developed and developing countries. *La main à la pâte* has extensive experience in combining innovative actions and practical implementation within large-scale education systems.

- **P.A.U. Education** offers a unique mix of know-how, involving pedagogical thinking, editorial activity, database management and community building. Over the past five years, P.A.U. Education has acquired considerable experience in creating and running cooperative projects in Europe and developing countries in partnership with institutions such as the European Commission, UNICEF and UNESCO.

Pollen experiences and results will be widely disseminated and shared.

Science Education Charter
A Science Education Charter will be launched during the final year as a symbol of the project's main achievements.



Edited by:

P.A.U. Education
Muntaner 262, 3° - 08021 Barcelona (Spain)
Tel.: (+34) 933 670 400 - Fax: (+34) 934 146 238

www.paueducation.com

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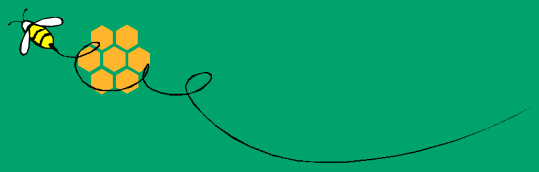
For Further information

Ecole Normale Supérieure (*La main à la pâte*)
Raynald Belay [raynald.belay@inrp.fr]

Tel.: (+33) 01.58.07.65.97
Fax: (+33) 01.58.07.65.91

P.A.U. Education
Miquel Angel Alabart [miquel.alabart@paueducation.com]

Tel.: (+34) 933 670 400
Fax: (+34) 934 146 238
www.paueducation.com



Pollen Cities

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