

## **Public-private partnerships for maths, science and technology education: the examples of Xperimania & Futurenergia**

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European Schoolnet convened a workshop for educators at the School of Tomorrow conference in Athens, Greece. It focused on two key projects aimed at schools in Europe for maths, science and technology (MST) education: Xperimania and Futurenergia. These two projects are examples of multi-stakeholder partnerships offering inquiry-based learning opportunities and awareness-raising activities, based on the use of ICT.

In this paper, we will first describe European Schoolnet, followed by an overview of the main pedagogical rationale, and then go on to give details on the two project examples. We conclude with some points raised during discussions held with attendees of the workshop.

### **What is European Schoolnet?**

European Schoolnet<sup>1</sup> (EUN) is a unique not-for-profit consortium of 28 Ministries of Education in Europe created in 1997. EUN provides major European education portals for teaching, learning and collaboration (including Xplora<sup>2</sup> for science education) and leads the way in bringing about change in schooling through the use of new technology. Since its establishment, European Schoolnet (EUN) has been at the forefront in supporting the European dimension in schools. This goal is achieved through projects, competitions, activities, communication and information exchange at all levels of school education using innovative technologies.

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<sup>1</sup> European Schoolnet website – [www.eun.org](http://www.eun.org)

<sup>2</sup> Xplora website – [www.xplora.org](http://www.xplora.org)



Figure 1: Screenshot of Xplora portal

EUN's work is organised in three strands corresponding to its core objective of supporting the efficient use of ICT in education and the European dimension in education: School networking and services; knowledge building and exchange on ICT policy and practice and Interoperability and content exchange.

As part of this work, one of the key areas of activity is in maths, science and technology (MST) education. European Schoolnet has been involved in numerous projects related to MST including:

- Green Week competitions to raise awareness of environmental issues;<sup>3</sup>
- Zoom campaign to raise awareness of climate change and mobility;<sup>4</sup>
- PENCIL project to investigate and disseminate new teaching methods for science;
- Discovery Days<sup>5</sup> – organising innovative science education events;
- La Main a la Pate – European Schoolnet provided the website for one of the project's key activities, European Discoveries;

<sup>3</sup> Green Week website – [www.greenweek2006.eun.org](http://www.greenweek2006.eun.org)

<sup>4</sup> Zoom website – <http://zoom-europe.eun.org>

<sup>5</sup> Discovery Days project information - [http://www.xplora.org/ww/en/pub/xplora/eu\\_projects\\_new/eu\\_projects/discovery\\_days.htm](http://www.xplora.org/ww/en/pub/xplora/eu_projects_new/eu_projects/discovery_days.htm)

- WONDERS<sup>6</sup> – organising science education events;
- Hands On Brains On – investigating teaching methods for primary science education;
- Web experiment tool – an R&D activity to implement a remote-controlled laboratory tool;
- Xperimania – a school campaign to raise awareness and interest in chemistry;
- Futurenergia – a school campaign on energy efficiency;
- eTwinning – more than 230 MST partnerships on a variety of topics;
- INSPIRE – an R&D project to investigate the use of Learning Objects in MST education.

Xperimania and Futurenergia are both examples of multistakeholder partnerships for education. Industry interest in maths, science and technology (MST) is high due to the negative effects they are already suffering in terms of recruiting staff with skills in MST, while public education systems are lagging in implementing innovative methods for teaching and learning MST. In this respect, public private partnerships are therefore beneficial in supporting public services establish new programmes while ensuring the private sector can help stimulate interest in MST in a pedagogically and ethically appropriate manner.

### **Futurenergia**

Futurenergia - Energy is our Future is a school programme that is jointly managed by European Schoolnet and PlasticsEurope, the association of plastics manufacturers. The programme is intended to help students learn to make a difference in using energy and find out more about the role of advanced materials, such as plastics, in saving energy and therefore contributing to a sustainable future.

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<sup>6</sup> WONDERS project information - <http://www.xplora.org/ww/en/pub/xplora/wonders2007.htm>



**Figure 2: Futurenergia website**

In its second year, the “Energy is our Future” school programme continues to focus on enhancing and supporting energy education across the curriculum in schools. The programme is intended to raise awareness on how energy consumption might affect climate change and how advanced materials such as plastics can help save energy and create a sustainable future.

Through a set of online activities and competitions, the programme aims to encourage students to influence behaviour in their nearest environment, such as among families and local communities.

Depending on the national school curriculum, the “Energy is our Future” school programme is suitable for the following school subjects: sciences, languages, art, geography, history and computer science. Teachers are encouraged to approach the online activities and competitions in a cross-curricular manner, involving more than one of the above-mentioned school subjects.

The programme covers three main areas:

- Energy efficiency: the impact of design and material selection on energy consumption

- Climate protection: how our day-to-day behaviour can contribute to reducing greenhouse gas emissions
- Resource efficiency: how each of us can do something to save natural resources.

The programme is open to students from 7 to 20 years of age that are based in the European Union Member States, Candidate and EFTA countries.

To achieve its objectives, the school programme makes available a set of activities and competitions that aim to:

- Familiarise students with the main thematic areas of the programme: energy efficiency, climate protection and resource efficiency
- Enable classes to transpose energy-related topics into a drawing, a related written and media composition
- Provide students with positive examples of what saving energy looks like
- Evaluate and analyse how design and materials contribute to energy saving
- Evaluate and discuss the advantages and disadvantages of using natural and renewable energy resources
- Convey knowledge about basic concepts in the field of energy and materials
- Help modify and/or improve habits in terms of energy use.

The school programme consists of four online activities and competitions that are accompanied by specific guidelines. They are:

#### 1. Profile the FuturEnergia Hero

Groups of three students (7-14 years old) define and present the main features of the FuturEnergia Hero, a comic strip character, by drawing and writing about his/her habits, life-style etc.

#### 2. The Adventures of FuturEnergia Hero

Five 'subjects', composed of a title and a short description, are proposed on the website. These subjects set the scene of an episode for a comic strip to be created by students, in teams of three (7-14 years old). They are invited to either: 1) write a script narrating a story based on the subject chosen, or; 2) draw a comic strip composed of maximum of ten tables and upload a digital picture to the website.

#### 3. Wanna be a Hero?

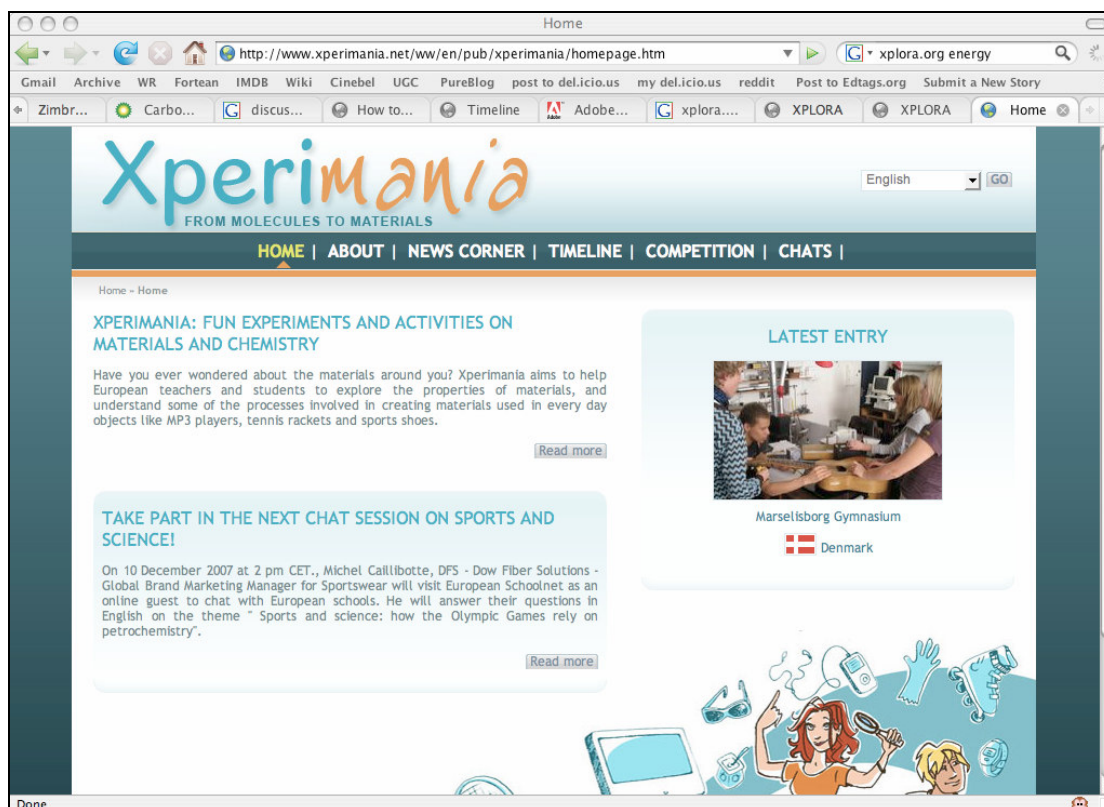
Five brain challenges and related background content are offered on the website. Students, in groups of three (14-20 years old), select one of the challenges and make online research about it. They are then invited to suggest solutions on how to avoid the given situations by providing an alternate way of living (changing habits, behaviour, materials etc.) presented through either: 1) a video clip, or; 2) a multimedia presentation (composed of a group of photographs and/or drawings). The entry (in English, French or German) may contain an experimental element to prove the students' findings.

#### 4. Online chats

An expert and a group of selected schools gather in an online chat to discuss certain topics related to the school programme. The chats are open to 12-20 years old students and are based on a set of related online resources that enable classes to discuss the topic in the classroom and decide what questions they wish to ask during the chat session. The main outcome of this activity is a chat transcript that is published on the website. The transcript allows website visitors to find out more about the topic and the online discussion.

### **Xperimania**

Xperimania meets the needs for inquiry-based science education. The aim of this project is to help students in lower and upper secondary school classes (covering pupils aged 10-20 years old) and their teachers to understand the wide variety of applications of petrochemistry and how this relatively new and fascinating science has contributed to the evolution of many day-to-day items. The project also illustrates the properties of a variety of materials, and lab activities help students understand how these properties can be used in beneficial ways. Participating in the Xperimania activities is an opportunity for students to stimulate their scientific and analytical observation.



**Figure 3: Screenshot of Xperimania website**

Students are invited to participate in a variety of activities and a competition:

- Timeline of everyday objects: on the interactive timeline, students are invited to investigate a discovery and illustrate what they have found out about it by uploading their work as an image plus a descriptive text onto the website;
- Hands on experiments: students and teachers are given hints on how to investigate a property of materials using a lab activity. Students then set up an easy and fun experiment, and upload their resulting lab reports on the website as a multimedia file (PowerPoint, PDF, documents, video and/or audio);
- Online chats with experts: on a regular basis, students are invited to pose their questions to scientific experts in the area of chemistry, petrochemistry and materials. Chats take place principally in English.

The Xperimania project is coordinated by European Schoolnet on behalf of the Association of Petrochemicals Producers in Europe (Appe).

### **Participant discussion**

Workshop participants were educators from Greece and Russia, from local authorities and schools. The majority were teachers in primary schools. A number of them had already participated in European Schoolnet programmes, including Futurenergia. During the workshop, the convenors invited participants to comment on the situation regarding MST education in their countries.

The participants commented on the basis of their national contexts:

- Russia: MST education used to be very strong under the Communist regime, while now Russia is starting to suffer from the same problems as other Western countries in falling interest in MST. Efforts now need to be made to combat this falling interest to ensure future economic growth. Some local authorities are experimenting with highly pioneering schools of the future. These schools are lavishly equipped, with high levels of technology throughout. The design of the schools is very innovative, with many open plan areas and physical exhibits that resemble those of science museums. The physical exhibits are used as lab apparatus for exploring a variety of hands-on science topics. These schools are successful so far and may provide a good model for future development on a wider basis – however the costs are extremely high. There is interest and need for innovative MST education programmes such as Futurenergia and Xperimania in Russia.
- Greece: MST education is also problematic in Greece, with students displaying the same falling interest as elsewhere. Few schools are equipped with good laboratory facilities – although the host school of the School of Tomorrow conference, Elligermaniki Agogi (EA), is an exception as it is privately funded and thus better equipped than a typical Greek school. EA acts as a meeting place and training facility for teachers wishing to learn and share innovative pedagogical methods for MST. The Greek system needs more resources for teaching MST. Greek teachers have been involved in Futurenergia, and found it useful for teaching primary school children about energy issues.

## **Conclusions**

The problem of falling interest in MST is affecting many countries and diverse methods are needed to address this issue. Materials and approaches to support inquiry-based and innovative pedagogies for teaching and learning about MST are needed to help teachers encourage young people's interest in MST. Projects such as Xperimania and Futurenergia can contribute.