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pencil

Permanent EuropeN resource Centre for Informal Learning

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Science & Society – European Science Education Initiative

Specific Support Actions

D33-34: SCIENCE TEACHERS' CONFERENCE

WP22: SCIENCE TEACHERS' CONFERENCE

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1 Executive summary

The three-day Pencil Science Teachers Conference was held at Technopolis, Mechelen, June 14-16 2007. 110 European science teachers and science centre/museum professionals had the chance to participate in workshops and debates on how schools and science centres can come together at the forefront of science education.

The emphasis of the conference was on collaboration, encouraging debate around the recommendations drawn from the Pencil pilot projects.

This Conference gave concrete examples of best practice from the 14 pilot projects, with pragmatic guidelines for teachers on the following key areas:

- The introduction of new topics in science;
- New approaches to teaching and learning traditional subjects; and
- Building relationships between schools and science centres and museums.

The outcomes and materials of the Pilot Projects, Xplora portal, motivation and gender studies and teacher training courses were demonstrated at the Conference and validated by gathering the participants' feedback.

The feedback validated the success of the event, with 94% of respondents stating that the event was "successful" or "very successful" in achieving its aims.

Please note that the decision was taken by the workpackage leader to merge D33 and D34 for comprehensiveness and coherence. This deliverable therefore constitutes both D33, the contribution of each Pilot Project workpackage to the Science Teachers Conference' as well as D34, the organisation, implementation and evaluation of the Conference itself.

2 Objectives

The principal goals of the Science Teachers Conference were as follows:

2.1 To bring together science teachers and science centre/museum professionals

This involved thorough dissemination about the event among Europe's schools. This was done through Ecsite and the network of schools associated with its members, through EUN's teachers' newsletter, through the Nucleus-supported publication Science in School and through the consortium's networks of educational contacts.

2.2 To evaluate and validate the material and results of each Pilot Project

The sessions were designed to present the work of each Pilot Project in an accessible and useful way. An evaluation form was designed to record the participants' feedback.

2.3 To give teachers pragmatic guidelines on collaborating with science centres and working with new teaching methods

The presentation of the Pilot Project materials and outcomes aimed to focus on a user-friendly approach, with the emphasis on concrete implementation of the guidelines. A leaflet was designed summarising the criteria of innovation from an educational perspective, and teachers received materials and practical advice in the sessions.

3 Methodology

3.1 Dissemination

3.1.1 Ecsite e-News and announcements

Messages were sent out regularly in the run-up to the Conference announcing it and linking to the registration page on Xplora, with the following text:

Dear colleague,

I am pleased to inform you that the online registration for the 2007 PENCIL Science Teachers Conference is now open, at <http://www.xplora.org/xplora/pencilconference07/>.

The Conference will take place from the 14th to the 16th June 2007 at Technopolis®, in Mechelen, Belgium. This is a unique opportunity to participate in workshops and debates on how schools and science centres can come together at the forefront of science education. There is no registration fee for this event.

The Conference will give concrete examples of best practice from 14 European pilot projects, covering a wide range of topics and student age groups. These projects have been tested and evaluated in schools, as well as in science centres and museums. Using these results, the Conference offers teachers pragmatic guidelines on the following key areas:

- The introduction of new topics in science;
- New approaches to teaching and learning traditional subjects; and
- Building relationships between schools and science centres and museums.

Teachers will have the chance to network and exchange their experiences with colleagues from all over Europe.

This Science Teachers Conference is organised within the [PENCIL](#) project (Permanent European resource Centre for Informal Learning), a large scale European project, funded by the European Commission's Directorate General for Research as part of Science and Society, to develop and test innovative methods for science teaching via a number of pilot projects.

For more information, to download the full programme in PDF format and to register online, please consult <http://www.xplora.org/xplora/pencilconference07/>.

I look forward to meeting you at the Conference. For any further information, please do not hesitate to contact me.

3.1.2 EUN e-Newsletter

This announcement was also circulated on the e-Newsletter created by EUN (see D15) to the following mailing lists:

- Xplora-news-en@listserv.eun.org – this mailing list is used to disseminate the English version of the newsletter. There are 1,671 members on the list from a variety of countries including the UK, Greece, Italy, Poland, Hungary, Slovenia and more.

- Xplora-news-de@listserv.eun.org – this list is used to disseminate the German version of the newsletter. There are 90 members based in Germany, Switzerland and Austria.
- Xplora-news-fr@listserv.eun.org – this list disseminates the French version. There are 80 members, mainly from France and Romania (where many teachers speak, read and write French).

3.1.3 Science in School

The journal Science in School (circulated to 30 000 science teachers across Europe) included the following listing promoting the Conference in their Winter 2006 and Spring 2007 issues:

*14 June 2007: Technopolis, Mechelen, Belgium
Conference: PENCIL Final Science Teachers' Conference*

Science teachers are invited to participate in workshops and debates on how schools and science centres can come together at the forefront of science education. The conference will give concrete examples of best practice from the 14 European PENCIL pilot projects, covering a wide range of topics and student age groups. These projects have been tested and evaluated in schools, as well as in science centres and museums. Using these results, the conference offers teachers pragmatic guidelines on the following key areas:

- *The introduction of new topics in science*
- *New approaches to teaching and learning traditional subjects*
- *Building relationships between schools and science centres and museums.*

Teachers will have the chance to network and exchange their experiences with colleagues from all over Europe. The working language is English and participation in the conference is free.

More information: www.xplora.org/xplora/pencilconference07

Contact: Michael Creek: mccreek@ecsite.net

3.1.4 Invited teachers

3.1.4.1 P2 National Marine Aquarium

A total of four teachers were invited to the teachers conference – each teacher representing one of the four schools that participated throughout in the “Marine Issues with Climate Change” pilot project.

3.1.4.2 P3 IMSS

The IMSS informed the teachers who had been involved in the Pencil Pilot Project, by e-mail and telephone calls, about the Pencil Science Teachers Conference 2007. One of

them came to the Conference: Paola Falsini from the Liceo Scientifico Agnoletti, Sesto Fiorentino, Firenze.

She took part with her class to different activities within the IMSS Pencil Pilot Project: the “Galileo and experimental science” and the evaluation of the multimedia tools. Moreover, she contributed to the Training Course designed by Indire.

3.1.4.3 P5 Heureka

Heureka invited 3 teachers: combination of classroom teachers having experience in science centres, ict, and curriculum development.

3.1.4.4 P6 Nemo

Nemo invited 3 teachers to the conference. They were all taking part in the pilot project of Science Center at School.

3.1.4.5 P7 Deutsches Museum

Irmgard Veress, Hauptschule an der Ichostraße was involved in all steps of the project, took part in all evaluation events and was very helpful and co-operative. Frau Veres accompanied the pencil project with her class and visualized the progress in her classroom. She produced a video on the group role playing and presented that in Mechelen.

Anke Eberlein and Susanne Vörtl, of Hauptschule an der Reichenaustraße were interested in the workshop on museum activities, but could not take part. They were more engaged in setting up the role play. Frau Vörtl even produced a video of one of the roleplays in English and presented that in Mechelen.

3.1.4.6 P8 Experimentarium

Bente Kold Christensen was invited by Experimentarium to participate in the Pencil Teachers Conference. Bente took part in the Xciters course with two more teachers from her school and with pupils. Bente has also used and worked with the Xciters’ method in her school, in between courses and also after the course ended. Bente has implemented the Xciters’ method in the school as an on-going method for teaching science in the older classes.

3.1.4.7 P10 Fondazione IDIS

Fondazione IDIS-Città della Scienza invited to the conference one primary school teacher because she has been involved a lot of times in educational activities in collaboration with the Science Centre of Città della Scienza, so that now she is really a good expert about joining formal and non formal activities in science education. She is one of the school

teachers of the pupils involved in the “So...Science!” Pilot Project, and she has created a little “Città della Scienza” in her school.

3.1.4.8 P12 Cité de l’Espace

1 teacher involved in the Pilot Project of la Cité de l’Espace participated in the Science Teacher Conference in Mechelen. This teacher from primary school was also in CERN, Geneva, in 2006. Her connections with the project were:

- to participate with her pupils to the comparative evaluation of three ways of learning the topic of seasons in la Cité de l’espace.
- to disseminate the outcomes of the PP during workshops with other teachers of primary schools (3 sessions in a year)
- to disseminate the outcomes of the PP and the Science Teachers Conference in the local academic network
- to help in designing tools for pupils.

3.1.4.9 P13 Technopolis

An invitation was sent to:

- Klasse Lerarenkaart (electronic newsletter for teachers in Flanders)
- TOP nieuws (a newsletter for teachers technological education)
- Educational networks:
 - Community education
 - Educational Secretariat of the Association of Flemish Cities and Municipalities
 - Provincial Education Flanders
 - Flemish Secretariat for Catholic Education
- TOS21
- Lerarendirect (electronic newsletter for teachers in Flanders)
- Schooldirect (electronic newsletter for headmasters in Flanders)
- President VELEWE (association for science teachers in Flanders)

3.1.4.10 P19 Indire

Palmira Ronchi, mathematics and physics teacher at the technical commercial school “Vivante” of Bari (ITALY), as well as consultant of Indire for science subjects, attended the Conference. In addition to the participation in the work group linked to the Xplora portal, coordinated by EUN, last year Mrs. Ronchi was hired by Indire as consultant for planning the WP25 educational model (teacher training). Together with the editorial staff of Indire and with other experts, she revised the materials coming from PPs, by writing some training activities based on each single pilot project. In the training platform, Mrs. Ronchi will be Indire’s referring tutor for those teachers who will join.

3.2 Conference programme sessions



Justin Dillon (KCL), Erik Jacquemyn (Technopolis) and Steven Parker at the opening of the Conference

The structure of the Conference was defined by the Pencil Steering Committee composed of the project coordinator P1, the academic partners P17 and P18, P16 for Xplora, and P5 for the motivation survey. It was decided that these partners would convene the sessions, to ensure a coherent vision of the Conference.

The committee grouped the Pilot Projects into sessions which had a common thread. Three sessions focused on new topics being introduced into science teaching. Another three looked at new approaches to teaching and learning. Other Pilot Projects featured in a session on building relationships with science centres, and others in the plenary session on the motivation survey.

3.2.1 Poster session

Posters produced by the Pencil projects for both Ecsite 2006 and 2007 were on display during the conference. The 2006 posters provided a description to the activities and techniques developed by the partners, whilst the 2007 posters (co-authored by two or more projects) presented some of key findings and cross cutting themes from the Pencil experience.

The posters were on display throughout the conference to offer the attendees an opportunity to learn more about the individual projects and to provide some additional background context to the issues presented in the workshops.

3.2.2 Plenary lecture - What science centres can do for you

In this lecture, Justin Dillon from King's College London provided a general overview of the many resources that museums and science centres can offer to schools. The session

was supported by a leaflet entitled “Make the most of your museums and science centres’ (see Annex C) and included a list of key suggestions, provided by the Pencil projects, for ways in which schools could make the best use of their local informal institutions.

3.2.3 Approaches to teaching and learning – three parallel workshops

3.2.3.1 IT Tools & Experiments

In this workshop, Karl Sarnow (Xplora – European Schoolnet) gave an introduction of how to use the Xplora-Knoppix DVD with the pilot projects’ contribution. It was important to make the participating teachers understand, that it is necessary to boot the DVD to get the full advantage of the DVD. Xplora showed that using the DVD as a simple data DVD allows access only to certain parts of the DVD. The pilot projects documentation is visible under all conditions, but then could need some plugins, which are not needed using the DVD as intended as boot medium.

In the second part of the workshop, Exploradome guided through the use of the GIMP software for image manipulation, to demonstrate how the software on the DVD could be used in manipulating images and create special effects. Manipulating images is central to documentation in science lessons or reports in order to guide the readers’ attention to the scientific relevant parts of the image and hide non-relevant elements.

While the first part of the workshop focused on the use of the DVD and browsed through the content, the second part has taken a real example as it could happen whenever scientific image material has to be prepared for reporting or documentation.

3.2.3.2 Peer-to-peer learning and roleplay

This workshop session was convened in order to share two innovative teaching techniques developed by Pencil projects, whereby the ‘teachers’ were in fact students, and the students learnt from one another. The workshop was designed in a manner to leave plenty of time for a general discussion which followed the presentation of the two techniques from Pencil project coordinators with support from partner teachers. This discussion was guided by two key questions: would a peer-to-peer teaching technique work in schools in your country? What would you need to introduce and support such a technique in your own practice?

The session also provided an opportunity to consider other approaches to teaching and learning which have been pioneered in informal contexts (where educators have more time and flexibility in their curriculum) but which could be used in formal contexts also.

Experimentarium presented this workshop together with Deutsches Museum on the first day of the conference. The aim of the session was to inform about the two approaches of working with teenagers. The presentation was followed by a structured discussion in

small groups where participants discussed whether these approaches would work in their countries and whether they could create collaborations with science centres.

The discussions were lively and all participants were greatly interested to hear about these presented methods. Many questions were posed and these also added to the discussions. All participants were offered a 'Teacher's Manual' explaining the method in detail and describing how a teacher can use this method in school. Further teaching materials on science topics and science communicating skills were also available.

One of the major discussions was how a teacher can work with the Xciters method and at the same time fill in the requirements for the science curriculum, and also whether a method such as Xciters took up too much time compared to other methods. The points discussed and raised here were partly that when and if a class had worked with the Xciters' method it would of course be time-consuming in the beginning, but once the students had mastered and were used to using this method it meant it could even save time. The point was raised that teachers often would find that their students were more able to work by themselves, find information and set up experiments without their teachers having to support as much as they were used to when their students had become 'Xciters' – so it could even end up saving time. The other point was that it was very possible to keep the chosen science topics within the science curriculum.

Irmgard Veress, Susanne Vörtl and Elisabeth Schepers presented the Deutsches Museum Pilot Project activities regarding climate change and traffic. This comprised a short introduction into the two school programs about hurricanes in Europe on the one hand and mobility and climate change on the other, finally concentrating on the role play about climate conscious shopping. The focus was on distributing the material, now also available under <http://www.deutsches-museum.de/dmznt/objects/klima/roleplay3.pdf> and via <http://www.xplora.org/ww/en/pub/xplora/>. One of the teachers, Frau Vörtl, had even produced one version of the roleplays her students had done, in English. This was presented to the audience, too.

For the theoretical background, a hint was made to the «Science in School » article about the Deutsches Museum Pencil Project. A list with relevant links was distributed.

The teachers in the session were very much interested in the material they could use in their environment – not so much in learning about the co-operation or the theoretical background of the project. So the discussion concentrated on the role play, which many teachers said, would be applicable in their teaching, too, but could e.g. be presented in a less structured way, probably with more pictures. They liked the general idea of discussing global challenges like climate change, using a common, easy to understand topic like shopping.

The three science teachers were eager to learn about science teaching in other countries and were amazed that many European teachers experience the same problems and

challenges as they do. The positive feedback they received and the conversations with other teachers were seen as a major plus – more than the theoretical contributions to the conference, which, they felt, were not always applicable to their teaching routine. A closer connection as far as topics and methods are concerned across the different pilot projects would have facilitated conversations between teachers.

As a consequence of the teachers' meeting, a co-operation between the Munich school authority and Deutsches Museum was agreed on. In a meeting with representatives of the school authority, science teachers from Grund- and Hauptschulen, and Traudel Weber and Elisabeth Schepers from Deutsches Museum on July 19th, a teacher training day was projected for October. This shall be the starting point for further co-operation projects – the next one probably on optics.

3.2.3.3 Learning by making

Modern cognitive theories describe learning as a life-long, continuous process that is both conscious and unconscious. People learn according to different styles, and the same individual may adopt different styles when confronted with different learning contexts. In the so called constructionist approach, learning occurs through making something, for example building an artefact, writing computer programs or painting. Students who create their own solutions to problems experience the thrill of genuine achievement - an experience altogether different from simply memorising the achievements of others. The more empowered students feel, the more they enjoy their classes, and the more they begin to take charge of their own learning process. Learning is fostered when students get the opportunity to explore the world on their own, but in a guided environment. When students actively construct things in the physical world it helps them greatly build knowledge in their minds. This new knowledge enables them to create ever more sophisticated solutions, yielding more skills, more knowledge, and more solved challenges in a self-reinforcing cycle. The constructivist approach was one of the many different ones used and evaluated by PENCIL Pilot Projects. In particular, the Nemo science centre has designed a programme in which primary school pupils build their own interactive exhibits with poor materials after having seen a professional version in the science centre. In this session, University of Napoli gave a theoretical introduction and contextualization of the Pilot Project developed at Nemo, before giving the stage to the Pilot Project itself to present its programme in detail through an interactive workshop.

This was a hands-on workshop on the project Science Center at School. The project challenges pupils aged 11/12 years to design and create their own exhibits. An employee at a real science centre was the principal for the construction of the exhibits. To round off the project the pupils set up a science centre at their own school. They present the results of their research into the science behind the exhibit.

The title of the workshop was 'Learning by making', and the aim was for the participants to experience it. After a short introduction the participants (40 in total) built their own

exhibit in pairs. By building the exhibits the participants encounter the problems that also pupils encounter. By this experience the teachers are better able to guide the pupils while building exhibits. After this hands-on activity there was a discussion as to whether the project could be applied to other countries.

Teachers from many different countries saw possibilities to apply the project to their own country. The possibilities are mostly defined by how fixed the national curriculum is. By the nature of the project it can be easily applied to other countries, though. Science centres from Italy, Belgium (Technopolis, Mechelen), Israel (The Bloomfield Science Museum, Jerusalem) and Great Britain (Museum for Children Eureka, West Yorkshire) have shown interest in the project. The Bloomfield Science Museum wants to translate the project in Hebrew. The science centre Ciência Viva in Lisbon, Portugal, wants to adopt and translate the project.

3.2.4 Making the most of students' motivations

The motivation survey's design of the study was presented for the teachers. The main theme was to underline the motivational aspects, and how they are related to cognitive learning. It turned out that the pupils who are performing at school – according to the teachers grades – below the average level, did get strong motivational input while working in the science centre laboratory with hands-on activities.

Besides the science centre hands-on experiments - it is essential to have well planned and easy going pre- and post- activities for the teacher in the classroom. Only this guarantees the cognitive learning results.

The project was receiving valuable feedback about the relation of the chemistry topics in five laboratory programmes and how they fit into the curriculum in other countries.

The National Marine Aquarium was one of four pilot projects participating in the motivation study (WP19). The Pilot Project conducted by the National Marine Aquarium concerned the delivery of topics surrounding climate change within the school curriculum and the production of a website resource – Climate Lab – to facilitate teaching and learning of climate issues. Additionally, the Aquarium has developed a programme for school groups visiting the institution that complements the web resource. Climate Change is considered to be an excellent stepping off point for students studying science, geography and citizenship as it is a topic that is contemporary and often controversial. The National Marine Aquarium is ideally placed to deliver climate change topics as they have exhibitions and expertise in house that can stimulate interest and approach science from a different angle. The preliminary results from the motivation study were presented showing that increases in pupil knowledge were evident through use of the website and through the visit but that the combination of website and visit showed by far the greatest

improvement – this is potentially a powerful argument for enhancing visits with pre-visit resources.

The topics introduced by the speakers sparked a lively discussion amongst teachers and particularly the concept of cross curricular teaching and the introduction of complex systems was received with enthusiasm. Teachers discussed the barriers that were in place to prevent such an approach and how they, within their national structure, could overcome the barriers.

La Cité de l'espace participated in the "Motivation survey" by giving data from over 100 pupils. These data deal with the impact of the Planetarium. During the session, this "Motivation survey" was compared with the work of evaluation run by la Cité de l'espace in its own workpackage, dealing with the evaluation of the learning process used in the science centre to measure the efficiency of informal learning with pupils.

Technopolis contributed a presentation on how science centres could make the most of students' motivations in collaborations with schools.

Several findings were drawn thanks to the discussions during (and after) the session:

- it is difficult to evaluate the real benefits of a school visit in terms of contents;
- measuring how the visit influences the pupils' motivation towards science is one of the ways to determine the impact of informal learning;
- evaluating the learning process used in the science centre is another way to assess this impact. The role of future technologies in the ways of learning in science centres is one of the issues of this evaluation;
- to run this kind of evaluation, partnerships with schools and universities must be developed. Thus, one way to bridge the gap between formal and informal learning could be to bridge the gap between formal knowledge in science learning from research and informal knowledge in science learning from science centres. This could provide useful guidelines to develop more activities in science centres (exhibits, animations, shows..) using the last results of research in cognitive sciences;
- Schools and science centres must also work mutually, especially to share the conception of products, as NEMO tries to do with its pilot project, for instance.

3.2.5 Topics in science – choice of three parallel workshops

3.2.5.1 Environmental Issues

One of the key factors for success in developing educational programmes on environmental issues is the construction of cross curricular activities involving both scientific and non-scientific disciplines. On the one hand, building such programmes is a challenge against the resistance of teachers in following a multidisciplinary approach. On the other hand, it represents a unique chance to raise pupils' interest and awareness in linking scientific knowledge to societal issues such as the effect of every-day human behaviours on the earth's ecosystem and the ways in which science and technology could

help us in preserving it, stimulating them towards becoming scientifically literate and critical citizens.

In order to enhance teachers' and pupils' motivation, informal learning contexts can offer schools a chance to complement formal learning with: exploration of natural environments, workshops involving scientists, innovative educational resources based on hands-on exhibits, information and communication technologies, lab activities. Science centres are also a "neutral" and stimulating territory to bridge the gap between real scientific research (and researchers!) and schools.

Pilot Projects presented their programmes in terms of educational methodology, strengths and weaknesses of their approach, emerging elements of innovation. Then small discussion groups addressed the questions:

- How could we create a strong link between exploration of environments and learning about the way they are modelled by science?
- How could we complement cross-curricular classroom activities with science centre visits?
- How could we raise students' awareness about the social implication of topical science?
- How could we bridge the gap between topical scientific research and school teaching?

The study of contemporary environmental issues offers teachers the opportunity to engage pupils and to develop learning in broader scientific principles. The study of climate change does not fit neatly into any particular curriculum area but cuts across, most notably, science, geography and citizenship. Teaching a topic across curriculum areas is not an easy thing to do but enables discussion of unifying principles. Complex systems theory is gaining ground in scientific circles and offers more realistic explanations of the world that our pupils will inhabit than more classical reductionist approaches. Introducing complexity to pupils is key to aiding their understanding of the world, the way real systems function and the ways that scientists model and predict the world. The Pilot project asks teachers to consider with their pupils:

- How do science, politics and economics interact with respect to climate change?
- Where do the predictions about the future come from?
- What tools do scientists have to model the future and what are their limitations?
- How do "Climate Change Sceptics" exploit these limitations?
- How reliable is information from different sources?
- What changes can individuals make to affect the global situation?
- Can individuals have a non-linear impact upon the "System"?

Five teachers that had worked with their class in the Swedish project participated in the conference. In addition, a researcher from Gothenburg University that has been part of the project network participated.

A short description of the pilot project was given:

- SC worked with several schools over a long time period
- Support and inspire teachers and pupils in their schoolwork
- Tailor made repeated visits

Seven areas (Forest, Recycling, Water, Energy, Space, Food, Communication) that are suited to work on across the curriculum and thematically were presented. Examples on how the teachers worked with these areas both at the science centre and the classroom were given.

What were seen as strengths and challenges in the project:

Strengths

- Many pupils get interested in the area
- Can be a way to get students interested in science and technology
- It is a way to attract all teachers not only science teachers

Challenges

- Big area
- Expensive for schools
- Complex systems hard to understand and predict

Environmental Issues

Following the presentation the audience was divided into four groups and it was focused on the following questions :

How could we create a strong link between exploration of environments and learning about the way they are modelled by science?

How could we complement cross-curricular classroom activities with science centre visits?

How could we raise students' awareness about the social implication of topical science?

How could we bridge the gap between topical scientific research and school teaching?

3.2.5.2 Maths and History of Science

This workshop was convened to explore the way in which museums and science centres may address and promote learning in two subject areas considered difficult to teach and not applicable to science centre visits: maths and the history of science. In the first half of the workshop, audience members heard about the practical workshop and on-line activities developed by IMSS to explore aspects of Galilean science in the context in which Galileo worked (ie without our modern understandings of physics). The audience members were intrigued by the idea of replicating the context and conditions of scientific developments and were very impressed at the way in which the relatively 'dry' collections of scientific objects held by the museum were made interesting and relevant by the workshop and the website.

In the second part of the session, Sofia Lucas from the Pavilion of Knowledge encouraged audience members to consider mathematical principles in both the paintings of Old

Masters and images of contemporary culture. She noted that many children do not realize that they are doing 'maths' when engaged in such activities. In this way, she hoped to share a technique of incorporating maths into visits to museums, science centres and galleries.

The IMSS presentation focused on an explanation of the features of the project "Galileo and Experimental Science" (basic idea, aims, implementation, feedbacks received from students and teachers) and the illustration of the educational web application "Galileo's microscope."

The whole presentation aimed at communicating the means the IMSS identified for conveying students and teachers a perspective of science that takes into account its history, not from a "positivist" point of view (i.e. by representing science as a sum of "good" results), instead, by focusing on the dynamic processes that lead to scientific discoveries and the building of new knowledge.

Referring to the birth of modern science and in particular to the scientific work of Galileo the activity "Galileo and experimental science" was oriented to offer students an experience for exploring the way scientist, by creating material and intellectual instruments, develops new knowledge on nature often overcoming current and strongly established traditions.

Light was also cast on the relevance of the material history of science and scientific instruments, and how multimedia educational tools can be implemented to explain the functioning of hold instruments preserved in the museum's collection.

Pictures from the activities and the website of the Galileo's Compass and Galileo's Microscope (<http://brunelleschi.imss.fi.it/esplora/microscopio/index.html>) were shown. At the end of the workshop a leaflet was distributed to participants (see the attached file: Handout IMSS D33-34.doc).

From the questions and comments made by teachers during the workshop, the impression of a significant interest in the history of science and in the informal learning activities realized within the IMSS PP was received. Many questions were asked to get more information about the multimedia educational tools. This fact seemed to offer a confirmation of the usefulness for educational purposes of the series "The Instruments of Science", whose use is not limited to people that can visit the museum, being, instead and e-learning resource.

3.2.5.3 Chemistry and laboratories

Laboratorial activities are central to learning chemistry. Experimenting in first person helps the student understand the nature of scientific enquiry and develop skills such as observation, data collection, construction and analysis of explanations and cooperation

and communication in team, work with peers. Opposite to be informed about the findings of scientific research as it has developed historically, the student is exposed to the very processes that produced those findings. Enquiry based learning encourages students to think critically and to take independent decisions supported by observation and inference. Research in science education shows that students' interest and motivation to learning chemistry is improved when students are involved in laboratorial activities. Nevertheless, European schools often lack in laboratories and equipment necessary to carry out such activities. The problem is even greater in primary school, where teachers mostly lack the necessary time, structures and sometimes preparation. Science centres can represent an alternative space where all the necessary tools, equipment and safety conditions are provided in order to allow students to carry out chemistry laboratories in an informal and engaging way. The Heureka science centre in Helsinki has been offering chemistry laboratorial activities for fifteen years. In the framework of PENCIL, five laboratorial programmes for primary school pupils have been revised and new teacher and explainers scripts have been designed, which describe the activities in detail. In this session, University of Napoli gave a theoretical introduction and contextualization of the Pilot Project developed at Heureka, before giving the stage to the Pilot Project itself to present its programme in detail through an interactive workshop.

Representatives of Heureka presented all the five programmes to the audience who had the opportunity to do the programmes themselves. The audience found the programmes very interesting and effective. One of the most interesting parts of the discussion was about whether there is any difference in doing lab programmes at school or in a science centre.

3.2.6 Workshops

3.2.6.1 E-Courses

The workshop, held in collaboration between Indire-EUN, was about the training activities addressed to European science teachers, which will be in short available in the www.xplora.org portal. For the part concerning Indire, the workshop was held by Elena Mosa and Serena Goracci (Researchers of Indire) and by Palmira Ronchi (teacher in science subjects and consultant of Indire).

The agenda of the activities was as follows:

- very short presentation of Indire and the main themes concerning the content of the Pencil project, one of the WP of the project, in short available in the Xplora platform.
- definition of the training targets: the attention was directed more on the idea of experimenting the proposed activities in class than on the “theoretical” training.
- training modules have been shown like something which can stimulate the teachers to think about the museum as one of the available resources for their teaching planning
- presentation of the structure of the Moodle platform on pen MOUSE USB: the 4 macro-areas and the active modules concerning IMSS and Universeum-Tekniken Hus.

- demonstration of an activity (case study and web quest of IMSS) with special reference to the activities required to the teacher attending the course.
- explanation of the training phases:
 1. analysis of the modules with the help of a tutor;
 2. planning of an educational activity to do in class concerning the chosen module;
 3. discussion and sharing of the planning with the tutor and other teachers within the forum;
 4. documentation of anything which can happen from September on in class through the scheme called “Teacher’s diary”.
- attending teachers have tried to surf the platform and they have tested its functionalities;
- final discussion.

Xplora has explained the principle of the MOUSE and the eCourse on it. After the explanation, a classroom simulation started, where one computer booted from the MOUSE and the other computers with 3 different operating systems (Windows, MacOS, Linux) booted to access the eCourse on the MOUSE.

eCourses are a local variant of global Moodle courses, where the teacher does not need to install a Moodle server or have Internet access to profit from a Moodle server. The local installation type of the MOUSE prevents obstacles from pre-occupation of parents, teachers, system operators or headmasters. After demonstrating the working principle, INDIRE gave an explanation of their teacher training sessions, which will be published on Xplora and made available as course within Xplora's Moodle server and downloadable as Moodle course backup and eCourse ready to burn on a USB stick. The original intention of giving ready to run MOUSEs to the participants could not be hold due to the failure of the supplier. Those participants who had a 2GB USB memory stick, where given a copy of the MOUSE used for demonstration in this workshop.

3.2.6.2 Building relationships

From the very beginning of Pencil, discussion among partners often revolved around the theme of building relationships between science centres, school teachers and learners. Making these relationships become long-term ones was recognized as a key factor in order to:

- offer the schools innovative learning environments
- stimulate teachers in the content of the activities and work with them closely to understand their needs
- profit from teachers’ expertise to better link informal activities to the school curriculum and to better understand pupils’ needs
- promote a positive perception of a culture of innovation in educational policy making.

Now, after three years in which the huge variety of educational activities carried out by the Pilot Projects have been run, the King’s College and the University of Naples are performing a cross-comparative study of their experiences and results in order to address,

among others, the following research question: Can we build a model for partnerships between schools and museums?

Before the conference some teachers involved in the Pilot Projects represented in this session were asked to answer a short questionnaire in order to give hints to address this question. The session tried to identify what the critical steps in the process of building this partnership could be. University of Napoli started off the discussion presenting teachers' answers to the pre-conference questionnaire. PP's representatives were then invited to present their model of partnership together with teachers who took part in their activities.

Esthy Bresner, Head of Educational Programs at BSMJ, made a presentation entitled "Museum as Mediator" alongside representatives from Fondazione IDIS - Città della Scienza, Naples and Universeum, Sweden as part of the Building Relationships workshop.

Esthy Bresner's presentation outlined the role played by BSMJ as the mediator between teachers and researchers of science both during the PENCIL pilot project as well as at the museum in general. Particular focus was placed upon establishing and strengthening the Museum's relationships with teachers. The role of the personal relationship in fostering the professional relationship was examined through a number of strategies. These included Teacher-training Courses, Seminars for Professional Development and the establishment of a Teachers' Club to provide a setting for planned activities. Unexpected new channels of professional relationships which have grown out of the PENCIL pilot project at BSMJ were presented, such as a seminar for Teachers coordinating student project work.

Fondazione IDIS participated to the "Building relationships" session with a speech about good practices in contacting and communicating with schools. The formalities of involvement of the school are particularly important in order to secure the link between teachers and science centre staff and to satisfy the needs of a correct communicative process. This is for the obvious reason that such a link has to assure the sharing and the transmission of information and, therefore, especially when people are engaged in actions of a certain temporary extension or that involve a great number of participants. But we know that the exchange of information is not the only function that communication can and must perform. There can be communication activities directed to maintaining active the channel between, for example, the science centre and the school. In this case it is about the phatic function of communication. Another function that, surely, will be (and must be) exercised in the connection with the schools, is the so-called metalinguistics function, that is the one directed to communicate on communication itself. The agreements that are made on when and how to exchange information are an example of this.

Each of the three museums represented at the Building Relationships Workshop Session, BSMJ, Città della Scienza and Universeum undertook very different pilot projects on behalf of PENCIL. The Building Relationship Workshop itself gave the representatives of each of the three museums an opportunity to share selected findings from their individual

pilot projects both with each other and with the participating teachers at the Teachers Conference.

Although, each of the three pilot projects were all very different from each other, the three museums represented at the session all recognized the importance of the Museum-Teacher relationship and its central role in the success of their projects. This suggests that the Museum-Teacher relationship may be of particular significance and should be considered an essential part of project planning at the Museum.

It was valuable to hear feedback from both Museum representatives and Teachers on the individual findings presented from the BSMJ Pilot Project in general and the museum's role as a mediator in particular.

Universeum's area of interest in this project was the cooperation between Science Centre and schools. The objective was to develop and test a new method to cooperate between science centres, schools and society.

Universeum worked together with teachers during a period from 6 to 12 months. The area sustainable society is a multidisciplinary concept. Teachers are supposed to work on the subject and many have expressed the need for support to meet the aims in the curriculum. Together with the teachers a working model was defined.

The results imply that teachers have used the science centre according to their own needs. The teacher's circumstances are very different; distance to science centre, knowledge of the area, age of the pupils etc.

Difference from usual practice

- Repeated visits
- Time for evaluation – interviews, discussion with researcher
- Working with a small number of teachers including social science teachers
- Meeting with teachers before, during and after program

The following strengths and challenges were identified:

Strengths :

- The teachers been part of the process
- Tailor-made visits
- Working with few teachers
- Repeated visits

Challenges :

- Sustainability
- Teachers “drown” in offers from different institutions, museums
- Understanding the different realities, school and Science centres
- Worked with “friendly teachers”

3.2.7 Xplora portal

Xplora gave a presentation of the integrated support for science teachers. The triangle of download from the server, offline usage of software and educational material from Xplora-Knoppix at home and in the classroom and download and offline use of Moodle courses on the MOUSE (eCourses) has been explained. In addition the advantages of web experiments in the support of science teachers has been demonstrated. It has been shown, that Xplora is the place where offers for science teachers should go in and how they can go in. It has been explained, that everybody, whether from the formal as well as the informal learning environment, can use Xplora to share resources of any type. Xplora showed the relevance of the offline version of such resources on the DVD, as the DVD does not need any requirements but a computer with a bootable DVD drive. The editorial team of Xplora is then able to manage the integration of the supplied resource onto the DVD, where many of the pilot projects contributed their work. Xplora has also shown the interdependency of Xplora-Knoppix and eCourses, as the content of the eCourses bases on software available for free on the Xplora-Knoppix DVD. Therefore partners would have the unique opportunity to publish courses with a parallel support form the DVD's resources.

3.2.8 Resource centre

Researchers from the University of Napoli presented the draft version of the online Resource Centre for Informal Learning they developed during the last two years. This website is an European repository for science educators with a special focus on informal learning environments and methodologies. It is linked to the European gateway to science education, Xplora, but represents a different experiment, addressing different needs. It is more a proposal than a finished website, because its philosophy is not sustainable in the framework of the PENCIL project. While Xplora is a very large repository based on the philosophy of open source, where registered users may upload whatever materials they like, this website has a scientific committee made up of researchers in science education who select the materials after having reviewed them. Accounting for practitioners lack of time for searching through large lists of resources or going through long readings, the website is based on a strong selection of the materials and on the publication of summaries of selected resources. Its focus with regards to target audience is more on science centre or museum practitioners and informal science educators, but it might be of interest for school teachers as well.

3.2.9 Professional development

The presentation was structured as follows:

- presentation of Indire: the story and the organization in 5 sectors, all linked to the school world (training, documentation, communication, educational research, European projects);
- focus on the activities of the training area since its birth in 2002 till today with special reference to the educational model of blended e-learning, which took shape in a clearer way throughout these years for the training of school staff, and to the number of people who attended Indire's training course;
- aims and features of Indire's training (customisation, learning by doing, community);
- description of the instructional design of the model (sections and functions of the environment);
- the e-tutor and his role within the environment and the training path;
- social aspects of the training environment;
- types of contents (activities, teaching aids, interactions, etc.)
- role of Indire within the Pencil project;
- aims and features of the Pencil Teacher Training;
- relation between pilot projects, university and Pencil training;
- phases of the Pencil training;
- general themes of the Pencil training and transversal nodes;
- pilot projects and their added value;
- review of the pilot projects results: case study and web quest;
- teaching planning as a training product;
- the importance of online discussion and sharing;
- the expert tutor.

Teachers who participated in the plenary meeting voiced the following requirements:

- the materials showing the experiences of informal education in collaboration with museums must be translated into each single partner's language;
- allow comparison of curricula relating to science subjects at least on European scale.

During the workshop, 41 European teachers interested in training and sharing further experiences and materials related to the aims of the Pencil project, were collected. This allows an increase in the network of contacts and the level of sharing, as well as having the teachers themselves as both players and makers of the training.

3.2.10 Boys Learning, Girls Learning

Gender difference in science learning was a transversal theme in the PENCIL project. In Europe, women are largely underrepresented in science and technology careers. Graduate students in S&T are for approximately two thirds men. Already as school pupils, girls are less attracted to S&T than their male mates. On the other hand, research claims that the problem is not a lack of interest in the girls, suggesting that the way S&T is presented at school and portrayed by the media is somehow gender biased. As they are able to foster different learning styles and bridge the gap among real science and the wider public,

informal learning institutions such as science centres and musea can play an important role in addressing the gender issue. Working at the interface between formal and informal learning environments PENCIL's Pilot Projects have explored a variety of educational approaches that can challenge girls resistance and lack of self-confidence towards S&T. Pilot activities have focussed on relationship, communication and group interaction, have highlighted connections of S&T topics with social benefit and pupils' everyday life. They have had pupils' learn about or even meet female scientists. All Pilot Projects have been asked to evaluate their actions keeping track of pupils' gender and looking for differences in learning, motivation, perceptions. In this session, University of Napoli presented some of the outcomes of the project such as identifying barriers, preconceptions, success factors, changes in girls' and boys' perception of and motivation towards S&T.

Fondazione IDIS participated to the "Boys learning, Girls learning" session with a speech where the IDIS Pilot Project – the "So...Science!" project – and the European GAPP project were presented.

So...Science! involves 11 schools, 70 teachers and 600 students - from kindergartens to high schools - in experimental activities of Physics, Life Sciences, Earth Sciences and Astronomy. Some informal teaching strategies have been explored, such as the use of inquiry, exhibits, discourse, argumentation and collaborative learning designs. The aim is to influence science teaching in schools by offering both to students and teachers the experience of joyfully exploring and discovering science.

The Pencil Science Teachers Conference was also a suitable opportunity to present GAPP: Gender Awareness Participation Process, an EU-funded European project which will act by establishing an integrated process of qualitative research and developing new practices in science communication and education, to reach three well-defined objectives:

1. to understand the loss of interest from young people, particularly girls, in science and technology studies and careers;
2. to implement social dialogue between the research community, teachers, students, parents and other social actors in order to identify main issues and expectations from these groups;
3. to develop and test a range of practical activities that go in the direction of overcoming gender differences and creating a connection between high school students and the professional worlds of science and technology.

4 Evaluation

An evaluation form was designed in order to assess the impact of the Conference in terms of its initial objectives.

4.1 Aims and methodology

The evaluation focussed on the following points:

- How well the Conference fulfilled its aims in terms of teachers;
- The quality of the content and materials presented by the Pilot Projects;
- Xplora;
- The Teacher Training e-Learning courses;
- The methods demonstrated;
- The usefulness of the Conference.

A copy of the form used is attached.

Participants were assured that the confidentiality and anonymity of their feedback. Quantitative data was requested using a scale of 1-4, where 1 was the lowest possible score and 4 the highest. This ipsative scale was used to discourage central tendency bias. Qualitative data was also requested in the form of comments on the quantitative grades participants gave.

The forms were sent out a week after the Conference to the 74 participants who were not members of the Pencil consortium in order to collect their feedback.

4.2 Results and analysis

Out of 74 forms, 32 were returned. The results can therefore be said to represent 43% of eligible participants.

4.2.1 Professional Status

Teacher (primary school): 25%
Teacher (secondary school): 53%
Science centre/museum professional: 22%
Other (please indicate): 0%

4.2.2 Fulfilling its aim

The PENCIL Science Teachers Conference aimed to give teachers pragmatic guidelines on collaborating with science centres and working with new teaching methods, and an opportunity

to network and exchange experiences. How successful do you think the conference was in achieving this aim?

Please give a rating between 1 and 4, where 1 is very unsuccessful and 4 is very successful:

32 respondents gave an average grade of **3.34**. This shows a very positive reaction to the Conference as a whole, with only 6% of participants giving a grade less than 3.

4.2.3 Pilot Project results and material

Please rate the following Pilot Projects for the theoretical content of the project's results and the quality of the materials shown on a scale of 1 to 4 where 1 is "poor" and 4 is "excellent."

Grades presented are an average score.

Ciência Viva, Portugal: Ludo-mathematics

Content 1.83; materials 2.00.

Participants commented that they found the presentation “unclear”.

Cité de l'Espace, Toulouse, France: Future technologies

Content 2.89 ; materials 2.67.

Participants found the session "interesting".

Deutsches Museum, Germany: Mobility issues with climate change

Content 3.00; materials 2.25.

Participants found the session "interesting".

Experimentarium, Denmark: Future science education within existing curricula

Content 3.20; materials 3.10

Participants “enjoyed the session” and would have liked to have heard “more from the teachers involved.”

Exploradôme, Paris, France: Middle school student's use of ICT

Content 2.75; materials 3.25

Participants found the session “inspiring.”

Fondazione IDIS / Città della Scienza, Naples, Italy: Social dimension of science, diversity and gender issues

Content 2.30; materials 2.17

Participants described the project as “interesting.” Several commented that the presentation was unclear.

Heureka, Finland: Chemistry for primary schools

Content 3.09; materials 3.09

Participants described the session as “truly hands-on, brains-on”; “very interesting.”

IMSS, Florence, Italy: Online access to history of science museum objects

Content 2.80; materials 2.86

Participants found the session gave “very good concrete examples.”

Nemo, Netherlands: Teaching R&D in schools thanks to hands-on activities

Content 3.40; materials 3.60

Several participants praised this “excellent” project. One found that there was too much emphasis on the practical and not enough on the theoretical. Two commented that they were already using material from the project in the classroom.

Technopolis, Belgium: Interactive forensic science: Whodunit

Content 3.08; materials 3.42

Comments were positive, several focusing on the usability of the material.

The Bloomfield Science Museum, Israel: Health Matters

Content 2.00; materials 2.00

Participants found the presentation “interesting.” One commented “too academic.”

The National Marine Aquarium, UK: Marine issues with climate change

Content 3.23; materials 3.06

Participants commented on the “fantastic focus, really up-to-date” and the “excellent and understandable” presentation.

Universeum / Teknikens Hus, Sweden: Learning for a sustainable society

Content 3.20; materials 2.80

Participants praised the “nice network with social studies” and described the session as “very informative.”

The feedback generally shows a positive validation of the results and material produced by the Pilot Projects. Overall, the mean scores of the theoretical content of all the Pilot Projects was 2.92, and the material produced was rated 2.87. Both these scores are well above the midpoint of 2.5, showing strong support for the projects overall.

Out of the 13 projects presented, 10 scored over 2.5 for theoretical content. The 3 that scored under 2.5 were also the sessions where several participants commented that the presentation itself was “unclear” or “complex”, suggesting that this may have affected the results. The fact that the Conference was held in English, a non-native language for the majority of participants, posed some difficulties.

4.2.4 Xplora and the Teacher Training eCourses

Please rate the following elements of the Pencil project that you saw presented at the Conference on a scale of 1 to 4 where 1 is "poor" and 4 is "excellent":

Xplora portal: 32 respondents with an average grade of **3.10**

Participants commented that they find the portal “a great resource”; that they “look forward to seeing the portal develop.” “I got a lot of ideas on how to use our computer lab more.” This is a strong validation for the portal, showing that teachers both recognise the need for such a resource and find the Xplora portal useful and effective.

The Teacher Training eCourses, under development: 31 respondents with an average grade of **2.39** Many participants commented that the courses looked “promising” or “interesting.” Some described the presentation as “hard to understand.” The feedback suggests that the participants got less out of the session as (unlike all the other sessions where participants received much material ready to use in the classroom) it did not present a complete resource, since the eCourses were still under development at the time of the Conference. However, the qualitative feedback suggests the teachers recognise the potential of such a resource.

4.2.5 Methods; usefulness

Do you agree with the following statements? Please rate each on a scale of 1 to 4 where 1 is "strongly disagree" and 4 is "strongly agree."

"I would recommend the teaching methods demonstrated at the Conference to be used in schools."

32 respondents with an average grade of 3.05

Participants commented that although the methods varied, they generally found them interesting. Several mentioned that they had already started to implement the methods, or that it had changed the way they taught or worked with science centres/museums. They praised the “real conditions” used to test these methods, and many were positive about the “new ideas” and the fact that they were up-to-date with “technological and sociological change.” Some commented that they would have liked more material ready to use in the classroom. Two also mentioned that they would find it difficult to translate the material for use.

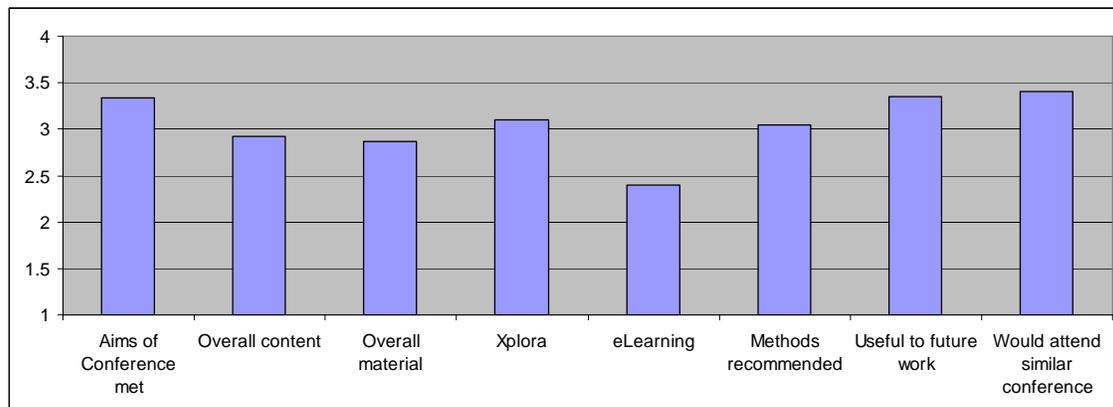
"Overall, my experience at the Pencil Science Teachers Conference was useful for my future work."

32 respondents with an average grade of 3.35

Several commented that this experience had improved the way they worked with science centres. The evaluation methods that the Pilot Projects used were also singled out for praise, with several participants stating that they would use them in future work.

"I would participate in another event about schools' relationships with science centres/museums."

32 respondents with an average grade of 3.40



Annex.A List of participants

First name	Last name	Country	Institution	Position
Judith	Aartsen	Netherlands	Museon	
Andres	Acher	UK	King's College London	Research Associate
Maria	Adlerborn	Sweden	Teknikens Hus	
Pernille			Natural History	
Mølgaard	Andersen	Denmark	Museum, Aarhus	
Luciana	Avancini Lombardi	Italy	School	
			Institute and Museum	
			of the History of	
Silvana	Barbacci	Italy	Science	Pencil coordinator
Alessandro	Barsi	Italy	School	
			GO! Onderwijs van de	
Marc	Beddegenoodts	Belgium	Vlaamse regering	Educational adviser
			Göteborg University	
			Department of	
Inger	Björneloo	Sweden	Education	Ph D
Wim	Bourgoignie	Belgium	School	
Gert	Braeken	Belgium	T.I.S.M	Teacher
David	Breen	UK	Techniquet	
Esthy	Bresner	Israel	Bloomfield	
Claude	Brot	France	Lycée Voltaire	Professeur
Eric	Brown	Denmark	Stenggaardsskolen	Teacher
Jose Benito	Bua	Spain	IES Ramon Cabanillas	Teacher
Ingela	Bursjö	Sweden	Buråsskolan	teacher
Mario	Campanino	Italy	IDIS	
Christophe	Chaffardon	France	Cité de l'espace	Educational Manager
Florence	Chappuis	France	Exploradome	
Marie-Hélène	Chaput	France	Cite de l'espace	teacher
Luděk	Chochola	Czech Republic	Secondary school	headteacher
			Secondary school of	
			transport Martin-	
Zuzana	Christozova	Slovakia	Priekopa	teacher
Christian	Collette	Belgium	Institut Saint Laurent	teacher
			National Marine	
Paul	Cox	UK	Aquarium	Aquarium Manager
Michael	Creek	Belgium	Ecsite	
Francesco	Cuomo	Italy	University of Naples	
Leen	De Bie	Belgium		
Halinka	De Visscher	Belgium	Technopolis	
Ivan	De Winne	Belgium	Sint-Donatusinstituut	teacher
Flora	Di Martino	Italy	IDIS	
Justin	Dillon	UK	King's College London	
Isabella	Ekholtz	Sweden	Stensbo skola	teacher
Jarmo	Elomaa	Finland	Heureka	

Paola	Falsini	Italy	Liceo Scientifico "A. E. M. Agnoletti", Sesto Fiorentino	Teacher participating to IMSS pilot PENCIL project
Nick	Fletcher	UK	St Bede's Catholic High School	Teacher of Science
Catherine	Franché	Belgium	Ecsite	
Juergen	Ganzer	Germany	Christian-Gymnasium	Deputy Head
Aliki	Giannakopoulou	Belgium	Ecsite	
Linda Isabella				
Lidia	Giannini	Italy	Xplora Team / school	Teacher
Antonio	Gomes da Costa	Portugal	Ciencia Viva	
Emile	Goossens	Netherlands	o.b.s. 't Zwanenest	vice-principal
Serena	Goracci	Italy	Indire	
Amito	Haarhuis	Netherlands	Nemo Twents Techniekmuseum	
Rudo	Hamberg	Netherlands	HEIM American School of The Hague	Teacher
Linda	Hambrick	Netherlands	ESA/ESTEC	Didactics Specialist
Shamim	Hartevelt	Netherlands	Ministry of Education	
Reinhold	Hawle	Austria	Technopolis	CEO
Erik	Jacquemyn	Belgium	Zakladni skola	teacher and teacher trainer
Jana	Jilkova	Czech Republic	Kamenna stezka National Marine Aquarium	
Caroline	Johnson	UK	Heureka	Key Stage 2 leader + science leader
Matti	Jokela	Finland		
Kelly	Jones	UK	Ford Primary Instituut Onbevelekt	
Eddy	Joris	Belgium	Hart van Maria	Teacher Teacher / author study books science
Onno	Kalverda	Netherlands	Gerrit Rietveld College	
Heather	King	UK	King's College London	
Britta	Kold Christensen	Denmark	School	
Asimina	Kontogeorgiou	Greece	The University of Ioannina	Teacher
Emmanouil	Papanikolaou	Greece	School of Palekastro	Head
Nazlı	Küçet	Turkey	Tarsus American College	Physics Teacher Secondary level
Eleni	Kyriaki	Belgium	The Greek Gymnasium Lyceum of Brussels	Teacher of Physics and Informatics
Anna	Lagerlöf Nordsvahn	Sweden	Christinaskolan	Teacher
Jonas	Larsson	Sweden	Utmarksskolan	Teacher
Sheena	Laursen	Denmark	Experimentarium	
Hazel	Lethbridge	UK	Stoke Damerel Community College	Teacher of Science
Annamaria	Lisotti	Italy	Liceo Scientifico Sorbelli	secondary school teacher

andy	major	UK	Kingsbridge	assistant head of
Mileen	Malbrain	Belgium	Community College	PSHE
Bernat	Martinez	Spain	Sancta maria institute	teacher of physics
Yvette	Minassian	Belgium	XPLORA- CEFIRE	Teacher trainer
Lidia Liliana	Minza	Romania	Institut Sainte Julie	Teacher
Elena	Mosa	Italy	"Vasile Alecsandri"	
Albert	Nagel	Netherlands	National High School	chemistry teacher
Carlo	Nati	Italy	Indire	
Jurgen	Nijs	Belgium	Ontdekhoeck Nederland	Director
STAVROS	NIKOU	Greece	Ministry of Italian	
Stephen	Parker	Belgium	Education in Rome	Teacher
Cecile	Prouteau	France	T.I.S.M	Science Teacher
Maria	Ramselaar	Netherlands	4 th Lycaeum of	
Palmira	Ronchi	Italy	Stavroupouli	Teacher
Hannu	Salmi	Finland	European Commission	Teacher in middle
Karl	Sarnow	Belgium	College Pierre Semard	school
Elisabeth	Schepers	Germany	Public Primary School	
Sirli Rahel	Seloni	Turkey	OBS "De Burght"	teacher
Marco	Serpico	Italy	School	
Benjamin	Sharon	Israel	Heureka	
Ruth	Sharon	Israel	European Schoolnet	
Ivo	Šír	Belgium	Deutsches Museum	
Dominique	Soete	Belgium	Private Aci Schools	Science Teacher
Anne	Solli	Sweden	University of Naples	
Silvia	Spinoso	Belgium	Clore Garden of Science	
Nela	Stanculescu	Romania	at Weizmann Institute	
Jacopo	Tonini	Italy	of Science	exhibit designer
Kati	Tyystjärvi	Finland	Clore Garden of Science	at Weizmann Institute
Nihan	Ucar	Turkey	of Science	
Tina	Ukonsaari	Finland	European Schoolnet	webmaster
Marjatta	Väkeväinen	Finland	De Pleinschool	
Wim	Van Broeck	Belgium	Groeningekant	science teacher
Jos	Van de Velden	Belgium	Universeum	
			EUN	
			School	teacher
			Institute and Museum	
			of the History of	
			Science	Multimedia manager
			Heureka	
			Private Aci Schools	Headteacher
			School	
			Heureka	
			Vrije Universiteit	
			Brussel	Scienc Officer
			Ministerie van de	
			Vlaamse Gemeenschap,	
			Inspectie secundair	
			onderwijs	

Leo	Van den Bogaert	Netherlands	Nemo Museum of Natural Sciences	Head of Education
Hugo	Vandendries	Belgium	Instituut OHVM	science teacher
Lode	Vanhoutte	Belgium	Hauptschule Ichostraße	Teacher
Irmgard	Veress	Germany	Kirkonkylä School	Teacher
Jarmo	Virtanen	Finland	Hauptschule an der Reichenaustraße	teacher
Susanne	Voeltl	Germany	ExploHeidelberg	
Thomas	Wendt	Germany	Tourismusschule	
Maria	Wiesinger	Austria	Tarsus American College	Science teacher
Nazire	Zambak Cekic	Turkey		
Anne	Zandstra			
Irene	Zeldenrust	Netherlands	Museon	

Annex.B Conference Programme

Annex.C King's Leaflet "Make the most of your museums"