PROJECTS & FORUM

SCIENCE ON STAGE FESTIVAL 2013

CROSSING BORDERS IN SCIENCE TEACHING

SŁUBICE · FRANKFURT (ODER)
25 – 28 APRIL 2013

SCIENCE ON STAGE 2013
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IN COOPERATION WITH
Adam Mieckiewicz University in Poznań
Jugend forscht
Collegium Polonicum

DEAR PARTICIPANTS,

We are very pleased to welcome you to the eighth European Science on Stage festival in Słubice – Frankfurt (Oder) from 25–28 April 2013. Science on Stage Poland, hosted by the Adam Mickiewicz University in Poznań and Science on Stage Germany, the European platform for science teachers, are honoured to be the first countries to organise this festival across borders!

In these days you will meet about 350 teachers from 24 European countries and Canada. All of them present their ideas and experiences in science teaching and are looking forward to sharing them. To get an overview about the participants, this booklet contains information about all projects and Forum stands. Take the opportunity to exchange your ideas and teaching concepts!

On behalf of Science on Stage Europe, which is the umbrella association reaching about 40.000 teachers in 26 countries, we encourage you to begin today to share good-practice examples beyond the festival. Please pass the festival ideas on to your colleagues in your national schools. The follow-up activities focus on sustaining the inspiration gained at the festival: a teacher exchange programme, excursions and teacher trainings are organised throughout Europe by the National Steering Committees. Therefore we would be very glad to welcome many of you to the Network meetings to brainstorm about further projects. (see page 76).

The Science on Stage festival would not be feasible without a group of supporters from all over Europe. We thank very much the Organising Committee, the jury and the National Steering Committees in each country as well as the board and the office of Science on Stage Europe in Berlin.

Our biggest thanks goes to you the science teachers – you are the central actors in the Science on Stage festival – without your efforts and preparations, connected with a lot of extra work, there would be no festival.

We wish all of us a very fruitful and inspiring Science on Stage festival 2013!

Prof. Wojciech Nawrocik
Chair Science on Stage Polska and
Adam Mickiewicz University in Poznań

Prof. Otto Lührs
Chair Science on Stage Deutschland

Stefanie Schlunk
Chair Science on Stage Europe

We are extremely grateful for the financial support of our partners. We would like to thank the main sponsor of the festival, the Federation of German Employers' Associations in the Metal and Electrical Engineering Industries (Gesamtmetall) with its initiative think ING.

Also thanks to our further supporters the Adam Mickiewicz University in Poznań, the Siemens Stiftung, Intel, Land Brandenburg and the Heidehof Stiftung as well as to our cooperation partners Jugend forscht and the Collegium Poloncium.

LIST OF CONTENT

5	Categories
6	Guiding themes
7	Programme Committee
8	Selection process and jury
9	Timetable Workshops
10	Timetable Master classes
11	Timetable Performances
11	Timetable talks
12	Projects
73	Additional projects
76	Follow-up activities
78	Forum
81	Outlook Science on Stage festival 2015
82	List of participants
92	Plan of Venue
94	Science on Stage Europe

CATEGORIES

Here you find an overview of the categories offered at the Science on Stage festival 2013. Detailed information about topics and timetables are provided on the following pages.

FAIR
The fair is the main element of the festival, where all participants present their projects.

FORUM
Foundations, educational networks and companies display their materials and inform about their activities at stands within the fair.

ON-STAGE PRESENTATIONS
In seven on-stage presentations teachers present scientific and technical subjects in form of a performance on stage (duration 20 or 30 minutes) in the main auditorium.

WORKSHOPS
In 25 workshops (60 minutes each) teachers introduce their teaching methods to a group of pedagogues.

MASTER CLASSES
At 18 master classes (30 minutes), the introduction of teaching ideas and concepts is to the fore. The focus lies on sharing good practice teaching concepts in small, informal presentations.

TALKS
There are five parallel talks on Friday in which pedagogues inform about their teaching methods, a scientific specialist subject or an experimental lecture (30 minutes).

NETWORK MEETINGS
Participants have the opportunity to join in five network meetings, where they discuss future collaboration topics. The target is a long-term approach to continue working together after the festival.

INVITED TALKS
Two plenary talks are held in the main auditorium on Friday and Saturday.

HIGHLIGHT SESSIONS
A selection of projects is presented on a small stage in room 12 on Friday and Saturday.

OPEN STAGE
A lecture theatre has been set aside for informal, short performance demonstrations in room 18.

GUIDING THEMES

The Science on Stage festival 2013 is structured by the following guiding themes:

INQUIRY-BASED LEARNING
Examples: experiments, science for healthy living, science in practical mathematics

INFORMATION AND COMMUNICATION TECHNOLOGIES
Examples: simulation techniques, environmental engineering, bioinformatics

SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL
Examples: practical and experimental science for pre-school children

SCHOOL COOPERATION
Examples: joint projects with industry, non-formal learning initiatives, schools working together etc.

LEARNING LANDSCAPES
Examples: participative models of learning, self-perception and the teacher´s role

PROGRAMME COMMITTEE

The Programme Committee is responsible for the programme of the Science on Stage festival. It is composed of members of the Executive Board and the experts of Science on Stage Europe and members from the German and Polish Organising Committee.

Executive Board of Science on Stage Europe		
Stefanie Schlunk	Science on Stage Deutschland e. V.	Germany
Dr Rosa Maria Ros	Ciencia en Acción	Spain
David Featonby	Institute of Physics	United Kingdom
Dr Ádám Kovach	Institute of Nuclear Research	Hungary
Michalis Hadjimarcou	Department of Educational Sciences	Cyprus

Experts of Science on Stage Europe		
Wolfgang Gollub	think ING., the initiative of the German Association of Metal and Electrical Industry Employers (Gesamtmetall)	Germany
Dr Eleanor Hayes	Science in School/EMBL	Germany

Polish Organising Committee		
Prof. Dr Wojciech Nawrocik	Faculty of Physics, Adam Mickiewicz University in Poznań	Poland
Maria Dobkowska	Polish Physical Society, Warsaw	Poland
Dr Jerzy Jarosz	Institute of Physics Silesian University	Poland
Ewa Bielewicz-Polakowska	Collegium Polonicum	Poland
Prof. Zdzisław Błaszczak	Adam Mickiewicz University in Poznań	Poland

German Organising Committee		
Prof. Otto Lührs	Science on Stage Deutschland e.V.	Germany
Dr Ulrich Scheller	Science on Stage Deutschland e.V.	Germany
Stefanie Schlunk	Science on Stage Deutschland e.V.	Germany
Johanna Schulze	Science on Stage Deutschland e.V.	Germany
Karoline Kirschner	Science on Stage Deutschland e.V.	Germany
David Spitzl	Science on Stage Deutschland e.V.	Germany
Charlotte Schroer	Science on Stage Deutschland e.V.	Germany

SELECTION PROCESS AND JURY

At the festival one project per guiding theme will get a prize sponsored by Intel (500 € and participation in the Intel Educator Academy 2014). In addition there will be one prize awarded by the public (polish art piece). The evaluation procedure is limited to the projects in the fair.

The ideal Science on Stage project

- promotes students interest in science,
- refers to everyday life,
- has a sustainable effect,
- is feasible in everyday school life and can be financed with reasonable expenses,
- promotes inquiry-based learning.

The National Steering Commitees (NSCs) selected their national delegates for the fair and recommended projects for the categories on-stage performances, workshops, master classes and talks. Based on their recommendations the Programme Committee decided which projects have been included in the programme.

The international jury is compounded by teachers, teacher trainers, scientists and people from universities and companies.

The Festival Programme Committee thanks all members of the jury for their support!

Alison Alexander	United Kingdom
Daniel Bengtsson	Sweden
Anders Blomqvist	Sweden
Prof. Ewa Dembowska	Poland
Michal Dzoga	Poland
David Featonby	United Kingdom
Dr Jörg Gutschank	Germany
Michalis Hadjimarcou	Cyprus
Dr Eleanor Hayes	Germany
Zuzana Jeskova	Slovakia
Prof. Otto Lührs	Germany
Paul Nugent	Ireland
Erik Bruun Olesen	Denmark
Ida Regl	Austria
Dr Rosa Maria Ros	Spain
Monica Zanella	Italy

TIMETABLE WORKSHOPS

FRIDAY · 26 APRIL · 11:30–12:30

TITLE	NAME	COUNTRY	ROOM	STAND
Cutting motives	Werner Reithmeier, Claudia Harpain	Germany	205	D.20
Explore-it	Maurice Cosandey	Switzerland	153	CH.3
Inquiry based learning in primary school	Christoffer Danielsson	Sweden	28 (laboratory)	S.4
Tasty meat sauce and onions	Eila Hämäläinen	Finland	Cooking room (ground floor)	FIN.3
Physics and Toys	Rafał Jakubowski, Piotr Chabecki	Poland	154	PL.28
Application of SmartPhones in Science Teaching	Jean-Luc Richter	France	156	F.4
Measurements in the electrostatics	Zdeněk Šabatka	Czech Republic	157	CZ.6
Digital teaching materials for instructors – the media portal of the Siemens Stiftung	Susanne Mühlbauer	Lokando AG, Siemens Stiftung (Partner workshop)	152	see page 74

FRIDAY · 26 APRIL · 13:30–14:30

TITLE	NAME	COUNTRY	ROOM	STAND
The sky in your hands	Isabel Borges	Portugal	18	P.1
Getting to know, discovering and learning together through science	Andreu Cardo Martinez, Carme Alemany	Spain	156	see page 73
Science education through the development of simple tools from available materials and ICT	Ivo Jokin	Bulgaria	15	BG.4
The Experiment Mats	Lara Woods	United Kingdom	152	UK.10
Bielsko-Biala protects the climate	Janina Kula, Aneta Gut-Sulima, Anna Handzlik, Katarzyna Kordas	Poland	153	PL.17
Toys and physics	Mileen Malbrain	Belgium	154	B.7
The flipped classroom	Daniel Barker	Sweden	17	S.1
Dynamic Maths with Tablet and PC – Sketchometry	Prof. Dr Peter Baptist, Carsten Miller, Matthias Ehmann	University of Bayreuth (Partner workshop)	16	see page 73

SATURDAY · 27 APRIL · 16:00–17:00

TITLE	NAME	COUNTRY	ROOM	STAND
Sunrise Eratosthenes	Sakari Ekko	Finland	156	FIN.2
My Microcontroller does what I want	Ulrich Jucknischke, Karsten Bolte	Germany	152	D.13
Hot Science	Dr Maeve Liston	Ireland	153	see page 74
PocketLab	Jeanjacquot Philippe	France	15	F.2
Matebilandia, Experiencing Mathematical Modelling in an Amusement Park	Lorenza Resta, Giovanni Pezzi	Italy	16	I.8
Berta the dragon and her wonderful world of Chemistry	Anna Gunnarsson	Sweden	154	S.3
Do two pints of beer make me a criminal?	Maria Tsierkezou-Georgiou	Cyprus	25 (computer lab)	CY.3
What happens next?	David Featonby, Zuzana Jescova	United Kingdom, Slovakia	17	see page 73
Teachers' TryScience	Peter Kusterer, Anna Jawor	IBM Germany, Poland (Partner workshop)	18	see page 74

TIMETABLE MASTER CLASSES

SATURDAY · 27 APRIL · 12.00–12.30

TITLE	NAME	COUNTRY	ROOM	STAND
How does the color of light affect photosynthesis activity and why are LED lights interesting for hoticultures	Anne Appe	Denmark	152	DK.4
HOBOS – students learn from the bee	Christoph Bauer, Nobert Baur, Holger Seefried	Germany	153	D.1
Levitation and other disillusions	Ambrož Demšar	Slovenia	154	SLO.4
Science and technology a working tool in a school for all	Manuel Hernández	Spain	156	E.4
Problem-based woodworking	Louis Laroche	Canada	17	CDN.1
Gustav-Conserve-Energy	Volker Smit, Zeljko Malinovic	Germany	16	D.23
Modeling The Hero Scientist	Johanne Patry	Canada	15	see page 75
Playground physics	Anette Barr	Sweden	157	S.7
How to benefit from International network of Science Fairs	Michał Dzoga	Intel Poland (Partner workshop)	18	see page 75

SATURDAY · 27 APRIL · 13.30–14.00

TITLE	NAME	COUNTRY	ROOM	STAND
Freediving and Life in Water	Jesper Terp Jørgensen	Denmark	152	DK.3
Talent Search	Anna Kaczorowska, Dr Agnieszka Korgull, Marzena Saladra, Konstancja Nowakowska	Poland	15	PL.6
Mathland, teaching geometry with OpenSim	Michelina Occhioni	Italy	16	I.4
Flexibilities of light	Antonis Margaritis	Greece	17	GR.5
Supergravity and Antigravity: Effect of Gravity on Simple Pendulum	Nikos Skoulidis	Greece	153	GR.7
Magnetism Inquiry Corner to encourage inquiry-based Learning	Saskia Wüst	Germany	154	D.26
The World is my classroom: Using Social media to promote International Scientific Collaboration in Middle school	Fiona Luna	Sweden	18	S.2
The impact of technology on education	Andrzej Grzybowski	Intel Poland (Partner workshop)	156	see page 75

TIMETABLE PERFORMANCES

FRIDAY · 26 APRIL · 9.00–10.15

TITLE	NAME	COUNTRY	ROOM	STAND
The Science Show SG	Sebastian Funk, Dr Elmar Winkel	Germany	Auditorium	D.6
Berta the dragon and her wonderful world of Chemistry	Anna Gunnarsson	Sweden	Auditorium	S.3

SATURDAY · 27 APRIL · 9.00–10.15

TITLE	NAME	COUNTRY	ROOM	STAND
Hocus-pocus, one must focus	Ryszard Pieluchowski, Jacek Włodarski	Poland	Auditorium	PL.3
The story of a light bulb	Barbora Mikulecká, Vojtech Hanak, Jan Pavelka	Czech Republic	Auditorium	CZ.8
Physics in primary schools	Marc Govaert	Belgium	Auditorium	B.5

SUNDAY · 28 APRIL · 9.00–10.15

TITLE	NAME	COUNTRY	ROOM	STAND
About a bit romantic meeting of Electricity and Magnetism and what happened next	Ewa Wegner, Piotr Wegner, Urszula Grabowska, Hanna Korpik	Poland	Auditorium	PL.8
Brilliant Chemistry	Philippe Delsate, Pierre Hautier	Belgium	Auditorium	B.1

TIMETABLE TALKS

FRIDAY · 26 APRIL · 11.30–12.00

TITLE	NAME	COUNTRY	ROOM	STAND
Electrical Energy out of a carbon sandwich – the first experiments on the topic of 'lithium-ion-battery'	Martin Hasselmann, Prof. Dr Marco Oetken	Germany	18	D.8
We live on Earth – the rotating planet	Jerzy Jarosz, Aneta Szczygielska	Poland	12	PL.25
Google, Facebook or Big Brother – Who knows more about you?	Dr Steffen Ortmann	IHP Institute (Partner workshop)	17	see page 75

FRIDAY · 26 APRIL · 12.00–12.30

TITLE	NAME	COUNTRY	ROOM	STAND
Physics experiments with electric household appliances	Hugo Pérez	Spain	16	E.1
Young Science Journalism – learning to write science	Dr Uwe Simon	Austria	15	A.5

Projects

Please note that the following project descriptions have been edited by the participants themselves.

AUSTRIA

A.1 INQUIRY-BASED LEARNING

Understanding Dementia – Youth and Alzheimer's

Bernhard Stehrer
HLFS Ursprung, Salzburg
Biology, Chemistry, ICT

The aim of this project was to give young people an insight into Alzheimer's disease (AD). We started our own research to contribute to the world-wide efforts to understand the molecular mechanisms behind AD and we were also interested in the clinical, psychological and social aspects of the disease. Therefore, we invited physicians to give lectures and we organized a workshop with a health psychologist. We visited an old people's home and the geriatrics of Salzburg's main hospital. We could learn a lot about AD at the molecular level and about the right and respectful way to deal with people who suffer from dementia.

A.2 INQUIRY-BASED LEARNING

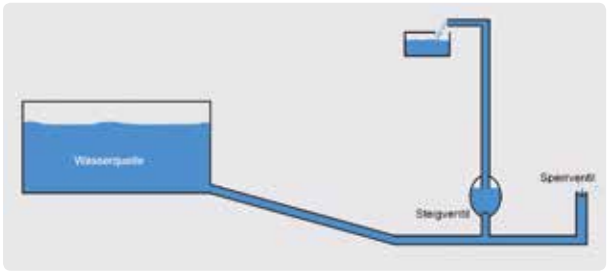
Running Water Uphill

Ludwig Eidenberger, Harald Gollner
BG/BRG Rohrbach
Physics, Others

The hydraulic hammer is an amazing machine. It pumps up water to surprising heights just by using the energy of the flowing water without requiring any additional power source. Even more fascinating is the fact, that the machine uses only two moving parts.

A pipe with low drop height provides the necessary operation power in order to push up the dropping valve and thus closing it. This leads to a massive shock pressure, which opens the rising valve. Water rushes into a chamber. The increasing pressure in the chamber pushes the water up the rising pipe.

The rising valve closes, the dropping valve opens – the cycle starts again.This way, the water head rises until water pours out at the top.



A.3 · A.4 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Cooperation "Kids into technology"

Andrea Scheinig, Burkhard Grabner
HTL Mössingerstraße
Natural Sciences

The project is a cooperation between the higher technical school Mössingerstraße, the secondary school Mössingerstraße and the Kindergarten Sonnenschein in Klagenfurt, Austria. All institutions created this project together. All participants are a self-responsible part of the project, who create and realize the purposes of the project. Young people and little children should be interested in technics. The competences of all pupils should be promoted. New methods of teaching are used, like learning by doing, a system of tutor-teaching. All pupils gather theoretical knowledge, which they can apply at the practical workshops. Older pupils act as teachers and are responsible for younger ones.

A.5 INFORMATION AND COMMUNICATION TECHNOLOGIES

Young Science Journalism – learning to write science

Talk
Dr Uwe Simon
Karl-Franzens-University Graz, Centre for Didactics of Biology
Biology, Chemistry, Physics

Writing articles in natural science classes that are fun to read and yet truly scientific? Students can do this! In our project "Young Science Journalism" we developed an interdisciplinary workshop-based approach in which biology and German classes were fused to help teenage students compose texts about

scientific topics of their choice. The students had to hand in several versions during the course of the project, which were discussed and commented on by the project team and classmates. Students' writing competence increased, in average, enormously, as did the overall interest in reading science texts and in the natural sciences in general.

A.6 INQUIRY-BASED LEARNING

Individualised lessons across different disciplines in professional preparation for carpenters

Oskar Redhammer, Norbert Spindler
Berufsschule 2 Linz (Vocational school for carpenters)
Mathematics, Others

The project starts with an analysis of Neurobiological bases for individualized teaching, goes through the evolutionary boost of brain and the milestones of the brain research. The project shows the latest findings in brain research and extrapolates didactical approaches for the teaching in the vocational school. Finally it shows the implementation in typical study sessions in the vocational school for carpenters "Berufsschule Linz 2".

BELGIUM

B.1 SCHOOL COOPERATION

Brilliant Chemistry

Performance
Philippe Delsate, Pierre Hautier
Chimie-Passion, Bastogne
Chemistry

This unusual one-hour-and-a-half show presents chemical reactions which were originally aimed at illustrating various chemistry concepts and making them mote understandable in a classroom. Oxidation-reduction reactions will of course be shown, as well as acid-base reactions and indicators, plastic materials and how to recycle them …

Some of those reactions are impressive, others are rather pretty, some again are amazing and others look magical … Anyway, all of them are explained in a way that is suitable for the audience. Most of these reactions are linked with their use in everyday life, namely the stent, revealing bloodstains (think of The Experts), among many others.

There will smoke, explosions and flashing lights but no danger. This show is intended for all: the young will discover a funny aspect of a science that they don't particularly like; adults will rediscover and remember some good or bad memories; the teachers might pick up one idea or another …

B.2 INQUIRY-BASED LEARNING

Electromagnetism

Francis Moreau
Duferco Belgium, Charleroi
Physics

Come and discover the World of Electromagnetism. You will make a trip from Maxwell to Siemens. You jump in the train of

electromagnetic waves at a frequency of 134 kHz; your friend, Electron, turning round and round in a magnetic field escapes from it, he crosses the Bridge of Graetz and joins you at Transistor Station.

Together, you reach the end of the journey at Loudspeaker's Station, where you listen to radio Słubice.

The project is a set of experiments to explain electromagnetism.

B.3 INQUIRY-BASED LEARNING

Slime

Tina Michetti, Joséphine Giambusso
Institut Don Bosco, Brussels
Physics, Chemistry, Mathematics

Slime is a non-Newtonian fluid (easily made from polyvinyl alcohol and borax) that flows under low stresses but breaks under higher stresses and pressures.

B.4 INQUIRY-BASED LEARNING

Become an alchemist

Tina Michetti, Joséphine Giambusso
Institut Don Bosco, Brussels
Physics, Chemistry, Mathematics

All you need are a couple of common chemicals to turn your normal copper-colored pennies (or other mainly-copper object) from copper to silver and then to gold. No, the coins won't really be silver or gold. The actual metal involved is zinc. This project is easy to do.

B.5 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Physics in primary schools

Performance
Marc Govaert, Katrijn Govaert
WiNaDoe, Oosterzele
Physics

This presentation is a playful walk through physics.

The purpose of this interactive show is to give teachers the self-confidence to guide pupils in their efforts to understand a number of phenomena in the world that surrounds them.

Laws of physics are demonstrated using simple experiments that involve everyday materials and common objects.

This gives teachers a good starting point to acquire the skills and background to breach scientific subjects and tap in to the spontaneous curiosity of the pupils and use this for exploratory learning.

B.6 INQUIRY-BASED LEARNING

Combustion!

Patrik Claes
Spelenderwijzer vzw, Antwerp
Physics, Chemistry

In "combustion" we show a series of experiments that are all linked to combustion. Each individual experiment is directly usable in the classroom. And that's exactly what we want: our intention is to only use materials that are cheap and easy to find. This way, not only the teachers but also the students will be much more provoked to do the experiments themselves. The experiments (dust explosion, fire tornado, Ohmic heating, burning metals, …) all have a degree of "unexpectedness" and a certain "wow-factor". Not that all experiments should be spectacular, but the students should start wondering why what they see is possible against their common sense … and that's when science comes in!

B.7 INQUIRY-BASED LEARNING

Toys and physics

Workshop
Mileen Malbrain
Sancta Maria Leuven, Leuven
Physics

Objectives of the project: To encourage teachers to use other things than lab stuff such as toys for introducing new themes or concepts or for small research tasks. This playful learning will enhance the enthusiasm and motivation of the students.

BULGARIA

BG.1 INQUIRY-BASED LEARNING

Simplified construction of a transverse excitation atmospheric pressure laser and its application in the classroom

Rositsa Konova, Nikola Dyulgyarov
Vasil Levski High School, Sevlievo
Physics

The project outlines the construction of a TEA (Transverse Excitation at Atmospheric pressure) laser system capable of delivering nanosecond pulses of coherent ultraviolet light at a wavelength of 337.1 nm. The lasing medium employed is nitrogen in unfiltered atmospheric air. The gain medium is pumped by a glow discharge delivered by a high voltage, low capacitance, low-inductance capacitor constructed from easily acquired materials. The driving circuit of the laser is also made from surplus materials obtained from various household appliances. We plan on using the laser to explore UV fluorescence in chemicals and minerals and to pump a dye laser made from available materials.

BG.2 INQUIRY-BASED LEARNING

An unusual journey

Rositsa Hristova, Lyubka Misheva
Hristo Botev High School, Kubrat
Chemistry, Physics, Biology

An Unusual Journey is a story about a drop of distilled water that gets into a lab's drain. There it meets another drop which knows a lot about solutions. The drain drop takes the distilled drop to a back-in-time journey and while travelling she explains what solution is and she demonstrates diffusion. During the journey they drop in at Fick's & Van't Hoff's laboratories. The drops also witness two meetings; one between Van't Hoff & Hansen-a famous man of letters, who makes connection between the osmotic pressure and the pyramids construction, and the other meeting between Van't Hoff & Arrhenius. The already educated distilled drop wishes to start another journey and learn more about the world.

BG.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

The future in our hands

Tsanka Nencheva, Marianka Georgieva Hristova
"Radost" Kindergarten, Sevlievo
Physics, Chemistry, ICT, Others

The purpose of this project is based on scientific knowledge and using appropriate methods and tools to develop the imagination and creativity of the children in pre-school. As a result, children make sense of the laws of nature and scientific ideas through simple experiments, development activities and games. In the process of implementation of the project, we make sure that the kids have certain knowledge about the four elements: air, water, fire and earth as well as the natural phenomenon – rainbow. In this case, the children's reactions to natural disasters improve as well as skills for environmental conservation.

The project activities include the following: theater show "Light" and booths: "Dexter's Laboratory"; "Eco Workshop"; "As you play, you will know everything."

BG.4 LEARNING LANDSCAPES

Science education through the development of simple tools from available m aterials and ICT

- Workshop
- Ivo Jokin
- Municipal center for extracurricular activities, Baykal village
- Physics, Chemistry, Biology, ICT

In description of the work I presented my experience in organizing and conducting of school and extracurricular activities with students, used forms and work methods, results and some good practices in sciences education. Organizing and conducting scientific festivals, participation in common projects with scientific organizations. We make a great part of the visual aids and materials together with the pupils from available and waste materials and I adapt them in conformity with the age and individual particularities of the pupils. We use astronomy software for making 3D images of cells and astronomical objects and determine their size.

BG.5 INQUIRY-BASED LEARNING

Heavy metals – nature and role inside and outside the human organism

- Ivelina Hristova, Simona Dimitrova Stoyanova, Lyuba Dimitrova Dimitrova, Desislava Lordanova Doseva
- Foreign Language School "Ekzarh Iossiff", Razgrad
- Chemistry, Physics, Biology, ICT

The majority of chemical elements which are included in the periodic table are metals. Those of them which have density higher than five grams per cubic meter are called more specifically heavy metals. Copper, silver, gold, zinc, iron, platinum and lead are just some of the representatives signed as "important for our everyday life" heavy metals. One part of them is of a high importance for all the biochemical reactions, happening in human's body. This part contains the metals, known as biogenic elements.

BG.6 INQUIRY-BASED LEARNING

The future in our hands

- Milena Gosheva, Pavel Hristov Venev, Borislav Vencislavov Cvetanov
- Sofia Vocational High School of Electronics "John Atanasoff", Sofia
- Physics, Chemistry, ICT, Others

We have made models of working generators of Brown gas and a miniature of a residential, which has solar panels and describes the future from our point of view. The generator is also equipped with an innovative "Brown gas vacuum pump". Those three models are presenting some solutions for our environmental problems.

BG.7 INQUIRY-BASED LEARNING

Science in my life

- Magdalena Beluhova
- HSET "Aleko Konstantinov", Velingrad
- Chemistry, Biology

As a managing tutor of the current project I would like to say that the research and experimental work demonstrated in the films will be diversified with some lab physical and chemical experiments that we are going to make in our labs with easiness. We can successfully demonstrate also: calories analyses while garbage is burned, monitoring of the water, blood pres-

sure, blood sugar and cholesterol measured with pendulum, some experiments from our projects – physics for fun, and medical physics.

BG.8 LEARNING LANDSCAPES

Science from a Grandma's Drower Chest

Tsvetelina Nikolova, Krasinela Georgieva
Aprilov National High School, Gabrovo
Physics, Chemistry, Biology

The project's goal is to build a bridge between the present filled with science and technology and the history of Bulgarian crafts from the middle and end of the 19th century. In an attractive and untraditional way physical and chemical processes and technologies used in the production and dyeing of "gaytans" (woolen braiding) are being explained from the point of view of modern science. An authentic cog wheel mechanism for gaytan weaving from 19th century called "chark" is being used in the project. The chark is renovated and usable. The dyeing of the produced gaytan is made with natural dyes extracted from traditional Bulgarian flowers and herbs which were gathered by the participants in the project. The working model demonstrates water power capabilities by setting the chark in motion.

CANADA

CDN.1 INQUIRY-BASED LEARNING

Problem-Based Woodworking

Master class
Louis Laroche
Lanaudière, Montréal
Mathematics

I have created a special project in which students solve math problems and hone mathematical skills through woodworking projects. For example, each pupil creates an abacus of his own design which we later use to learn arithmetic. Another entry-level project is the spinning wheel in which symmetry and the laws of probability are explored by creating a balanced needle as well as generating and analyzing large sample spinning results. Angle measurements need to be applied with precision when it comes to designing and building a clock – a very popular project!

In short, problem-based woodworking gives students a rock solid reason to become interested in technology while using math skills to apply their knowledge in real life situations.

CDN.2 LEARNING LANDSCAPES

Western and Indigenous Science: merging approaches, practices, philosophies

Dr Tim Molnar
University of Saskatchewan, Saskatoon
Physics, Others

School science as a Western way of knowing is an encultured activity. Other cultures also possess ways of knowing and being in the world they consider science. Difficulty in overcoming this difference often discourages k-12 students and particularly those of First Nation, Métis and Inuit heritage from achieving in school science and from pursuing science-related activities later. This project outlines initiatives in a teacher education college to help transform teachers' understandings of Indigenous ways of knowing nature that will ultimately help k-12 students in experiencing more meaningful science learning.

CDN.3 INQUIRY-BASED LEARNING

Science Club Activities with Scientists at the Canadian Light Source

Dr Anjuli Ahooja
Appleby College, Oakville (Ontario)
Physics, Chemistry, Biology

This is an “Integrated Science” activity in the true sense. Not many teachers have the opportunity to have their students work with “real” scientists in the “real” research facility.

This innovative project gives the students and myself go out of our classes and perform an experiment that relates to the real world, analyze its results and present the findings to the scientists. I would like other teachers to learn about this amazing opportunity.

CDN.4 INQUIRY-BASED LEARNING

Three hands-on projects in science

Robin St-Pierre
É.S. des Patriotes de Beauharnois, Beauharnois
Physics, Others

First project: design a rocket car build-it, test-it, predict and measure its performances.

Second project: create and build a hydraulic toy with syringes and wood.

Third project: design, build, calibrate and test an optic range-finder.

CDN.5 INQUIRY-BASED LEARNING

Design of a Micro internship in a research center: from pedagogical intention to action in pre-university

Thibeault Huguette
Cégep de Saint-Hyacinthe, Saint-Hyacinthe (Québec)
Biology, Others

The design of the Micro internship in a research center for students in Science is at the heart of my presentation. It is intended for teachers who wish to offer their students an opportunity to discover and share the passion of researchers, graduate students and research assistants. It is an opportunity for the student to join a research team and actively participate in the experimental method. Following a ten hour micro internship in a research center, either at university, in government or in industry, students are encouraged to make connections between science and society. This immersion in a research milieu helps to significantly consolidate the choice of scientific career for students.

CYPRUS

CY.1 INQUIRY-BASED LEARNING

Macromolecule Modelling

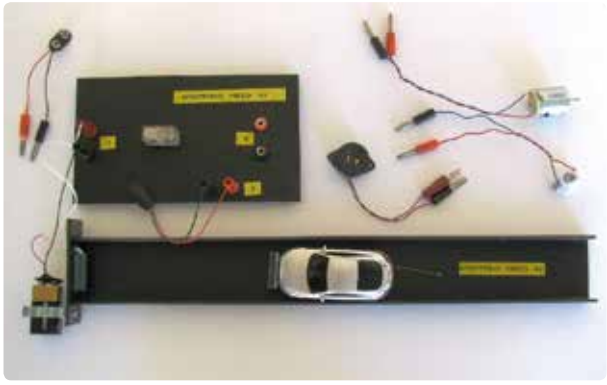
Aegli Balkwill
Kykkos A Lyceum, Nicosia
Biology

This project presents a low-cost, yet effective, method for introducing and teaching the structures and functions of organic molecules, enzymes and membranes in Biology at 3rd Lyceum (Key Stage 5/pre-University) level. Students are encouraged to learn actively and to collaborate by manipulating readily available resources, such as beads and other craft items. A number of desirable outcomes are achieved, including the utilization of different learning styles; the promotion of team-work; the production of illustrative models which can be used in a variety of ways; a better understanding of the concepts taught.

CY.2 LEARNING LANDSCAPES

Educational Module for Learning the Operation of a Relay in Design & Technology class

Anna Maria Pavlou Grzeczinski
Agios Georgios Lyceum, Lakatamia, Nicosia
Physics, Others



A relay is an electronic component to operate as a switching mechanism for many devices used in daily life. Although students of Design & Technology classes use relays in their projects, teachers often notice that students are not able to fully grasp the operation of a relay. This is perhaps because most educational materials for teaching the operation of the relay use abstract and passive teaching methods and do not allow students to experiment with the operation of a relay. To address this common problem in Design & Technology classes, I have created a hands-on educational module for illustrating the operation of a relay that allows students to visualize, touch, and operate a real-life relay. The proposed educational module with step-by-step educational aids and worksheets follow an active learning approach that encourage students to infer the operation of a relay on their own.

CY.3 INQUIRY-BASED LEARNING

Do two pints of beer make me a criminal?

Workshop
Maria Tsierkezou- Georgiou
Lyceum of Apostolos Loukas (Kolossi), Limassol
Chemistry

In many countries secondary school students lack motivation when it comes to learn science. This project focused on the development of a web-based inquiry module to increase students'

interest to learn chemistry. The module, titled "Do two pints of beer make me a criminal?" presents students with an authentic scenario (drunken teenagers involved in accidents), engages them in inquiry-based science and asks students to take an evidence-based stance regarding the guilt or innocence of the young driver. Data from student assessments indicated that students were motivated to learn chemistry. The module was designed by 9 chemistry teachers participating in the PROFILES FP7 European project.

CY.4 INQUIRY-BASED LEARNING

Natural and synthetic soaps

Maria Tsierkezou-Georgiou
Lyceum of Apostolos Loukas (Kolossi), Limassol
Chemistry

We designed and applied a study to investigate structured, guided and open inquiry-based learning on the topic of "Natural and Synthetic Soaps" of our secondary school Chemistry curriculum. The students worked individually and in groups on a variety of activities designed to enable them develop skills required in each level of inquiry-based learning.

Our findings indicate a preference of the teachers and students in this form of learning as opposed to traditional teaching methods, the students achieving better understanding of the topic studied and its association with everyday life. However, more practice is required, the process is time consuming and cannot be applied on every topic of our current Chemistry curriculum. The module was designed by 3 chemistry teachers participating in the ESTABLISH European Project.

CY.5 INQUIRY-BASED LEARNING

Natural Gas: A curse or a blessing?

Maria Tsierkezou-Georgiou
Lyceum of Apostolos Loukas (Kolossi), Limassol
Chemistry

In many countries secondary school students lack motivation to learn science. This project focused on the development of a web-based inquiry module to increase students' interest to learn chemistry. The module, titled "Natural Gas: A curse or a blessing?" presents a scenario of local interest (the discovery of natural gas), engages students in the process of scientific inquiry, and asks them to take an evidence-based stance on the impact of the extraction of natural gas on the environment and everyday lives. Student assessments indicated that students were motivated to learn chemistry. The module was designed by 9 chemistry teachers participating in the PROFILES FP7 European project.

CZECH REPUBLIC

CZ.1 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

What's floating around us?

Renata Rydvalová
Preschool: Mateřská škola U Potůčku, Liberec
Physics

The presentation focuses to explain the topic "air" to the pre school children.

Also small children are faced with the air every day without to realize this element and without information about it.

The presentation is aimed at providing of intelligible information to their age, and this way to encourage their interest for feeling of air as an integral part of world around us.

CZ.2 INQUIRY-BASED LEARNING

Physics in a library

Zdeněk Rakušan
Research Library Liberec – The Music Library, Liberec
Physics, Mathematics

Children's department of Regional Scientific Library in Liberec offer many educational programmes for basic school classes. These programmes are focused to inspire school-age children to borrowing library books. A programme „Playing and Thinking" relates to many books full of funny scientific experiments, toys and brain teasers. It is arranged as a workshop based on self-service children's work with several tens of hand-made exhibits. Most of them are made from wood or household rubbish. Ideas of all exhibits are well-known, not original. Our contribution is only the way of using that ideas for library programme.

CZ.3 INQUIRY-BASED LEARNING

Playing with plastic

Václava Kopecká
Elementary school: ZŠ Nebušice, Praha
Physics, Chemistry

The contribution presents some experiments that show what will happen with plastic containers when they are inserted into hot liquids. The experiments highlight problems with safe use some plastic when heated.

CZ.4 INQUIRY-BASED LEARNING

Heat Engine Olympic Games

Pavel Konecny
Amazing Theatre of Physics ÚDiF
Physics

It is easy to turn work into heat (just rub your hands and you will feel it). To turn heat into work we need a little more sophisticated devices (engines or rockets) and with a little more work we can force the heat to cool things down (heat pumps). This workshop is competition of heat engines: flying around, lifting heavy weight (30kg) endurance running and other disciplines.

CZ.5 INQUIRY-BASED LEARNING

Leonardo's bridge

Kateřina Lipertová
Secondary school: Církevní gymnázium Plzeň
Physics, Mathematics

What about building a bridge over a river! You mustn't use any nails, any ropes, any glue! There are only wooden sticks needed to realize it. Impossible?

Sometime around 1485–1487, Leonardo da Vinci devised a method for building a self-supporting arched bridge that doesn't require any ropes or other fasteners. The bridge's own weight keeps it together. It was originally meant to be a quick bridge for military usage – just bring along the pre-cut pieces and slot them together.

Try to build Leonardo's bridge according to the instructions and stand up on it. Don't worry! It's stable enough! You can even transport the bridge without dismounting it.

CZ.6 INQUIRY-BASED LEARNING

Measurements in the electrostatics

Workshop
Zdeněk Šabatka
Secondary school: New PORG – Gymnasium, Praha
Physics

The contribution presents experiments which could be used on both basic and high school level. One part of the experiments demonstrates the electrical interaction between electrically

charged bodies and veryfies the Coulomb's in an easy way. Other experiments are focused on capacity and capacitors.

CZ.7 INQUIRY-BASED LEARNING

By magic to the basis of information theory

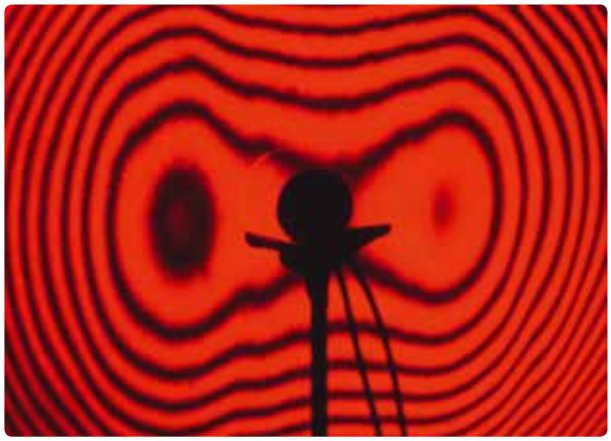
Daniel Lessner
Secondary school: Gymnázium Litoměřická, Praha
Mathematics, ICT

The aim of the presented activity is to review and strenghten students mastery of information theory, binary numeral system and problem solving. The teacher presents a seemingly magic trick: using cards with curiously organized numbers, he will identify a number which a student has secretly chosen. Students shall reveal the magic. They sort their observations according to their relevance, test the system, search regularities, formulate and test hypotheses, until they understand the trick. Those who solve the problem can change roles and use their understanding to assist their peers.

CZ.8 INQUIRY-BASED LEARNING

The Story of Light bulb

Performance
Barbora Mikulecka, Vojtech Hanak, Jan Pavelka
Amazing Theatre of Physics ÚDiF
Physics



The invention of light bulb changed the world and it is often incorrectly attributed to T.A. Edison. In this stage performance we show full story of the light bulb: its inventors, the technical challenges.

DENMARK

DK.1 INFORMATION AND COMMUNICATION TECHNOLOGIES

Global School

Deia Vejby, Jesper Vejby
Ingrid Jespersens Gymnasieskole, Copenhagen
ICT, Physics, Chemistry, Biology, Others

Schoolwork on a global level a new media tool directed at pupils worldwide. This new web portal will connect your pupils with pupils from around the world. In essence the web portal allows you as a teacher to choose your subject year language and topic of discussion. Hereafter teachers with a similar interest can bit in on the web meeting and the dialogue is set of. Initially the concept is that the meetings will take place between two classes where each pupil will be assigned a partner from the other class. The themes discussed at the meetings are determined by discipline specific goals set by the teacher and it is expected that the pupils have worked with the theme in their respective classes before the interactive meeting.

DK.2 INFORMATION AND COMMUNICATION TECHNOLOGIES

Explore the sunlight

Martin Søgaard, Bjarne Johansen
Toftegårdsskolen, Faaborg
Physics, Biology

The basic idea is for the pupils to get more active and involved in science classes e. g. physics. A normal lesson is very often filled with a lot of talk and some experiments, where the pupils have to follow a baking recipe and they aren't really forced to think about what they are doing. We want the pupils to think for themselves and use as much of their knowledge and curiosity as possibly. We have built a website with experiments, problems, hints, building projects and theory. The pupils are faced with an open task, which requires the common knowledge of the group to solve. If they can't solve the problem, the website will provide them with several hints to help them solve the problem.

DK.3 LEARNING LANDSCAPES

Freediving and Life in Water

- Master class
- Jesper Terp Jørgensen
- Odense Katedralskole, Odense
- Biology, Physics

The project is an interdisciplinary project including physics and biology, and some music and mathematics. The project spans over 30 lessons devided equally between physics and biology, with some joint lessons at the Marine Center "Fjord & Bælt" in Kerteminde (www.fjord-baelt.dk) and in a swimmingpool. The project is based on investigating the differences between humans (the students) and harbor porpoises to examin the mammalian adaptions to a life in water. The main subjects in the project is sound and echolocation, buoyancy, the mammalian diving reflex, respiration and the respiratory system. Ideas for further investigations could include photosynthesis of aquatic plants, refraction and absorbance of light.

DK.4 INQUIRY-BASED LEARNING

How colors of visible light affect the activity of photosynthesis, and why LED lights are interesting for production in greenhouses

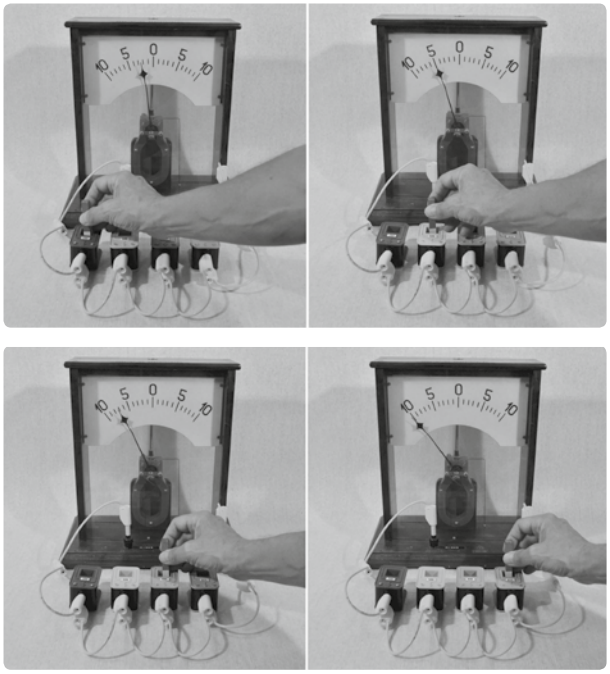
- Master class
- Anne Appe
- Midtfyns Gymnasium, Ringe
- Biology, Chemistry, Physics

The project aims to investigate the dependence of photosynthesis on light quality/light color. This should be done by measuring CO_2-consumption and O_2-development over time in a 2L's Vernier bio-chamber, wherein a plant is illuminated with white light, with blue light (450 nm) and red light (625 nm) and green light (520 nm). Photosynthesis activity is measured both as CO_2 consumption and O_2 production. It is measured by different light sources (LED) that emits light at the right wavelengths.

DK.5 LEARNING LANDSCAPES

Faraday's Law of Induction – a new teaching concept

- Poul Hedegaard
- Odense Katedralskole, Odense
- Physics



FINLAND

Traditionally, the laws of induction are shown by qualitative experiments, e.g. by moving magnets in or out of coils. Using instrumental amplifiers it is now possible to make quantitative measurements, and thereby verify Faraday's Law of Induction. The same equipment also gives us the opportunity to measure the magnetic flux of magnets passing through coils.

Using video cameras we can measure the time needed for magnets to fall through conducting pipes, to find the parameters determining the size of the braking eddy currents.

The relatively low costs of the experimental equipment makes it possible to divide the class into small groups, thereby enhancing the students learning process.

FIN.1 INQUIRY-BASED LEARNING

Arcturus – astronomy teaching environment

Irma Hannula
University of Helsinki, EAAE Finland
Physics, Mathematics

Arcturus – astronomy resource center is an educational environment for astronomy teaching in all school levels. On the webpages there are a lot of teaching materials and instructions for teachers. The set of astronomical topics follows the chronological structural order of the universe, starting the near familiar environment, expanding to the larger units in the universe. Every topic in the structural units represents the entity of two lesson work in teaching. For helping teachers to get more information about the teaching content, a lot of keywords have listed at the end of each entity. Also there are some important advises and questions given to solve problems together with pupils in the classroom.

FIN.2 INQUIRY-BASED LEARNING

Sunrise Eratosthenes Experiment

Workshop
Sakari Ekko
EAAE Finland, Turku
Physics

I will present the idea, cameras and results of the Sunrise Eratosthenes Experiment that I have run for three years now (eaae-astronomy.org/sunrise-project/): photographing the sunrise or sunset at equinox with self-made pinhole cameras, the students find their latitude by measuring the rising or setting angle of the Sun. By comparing the photos taken by other groups at different latitudes, they will get an idea of the differences in the path of the Sun in different locations. With a set of several pinhole cameras, it is possible to photograph the path of the Sun during a whole day, even during a whole year.

FIN.3 INQUIRY-BASED LEARNING

Tasty meat sauce and heated onion studies with FTIR spectrometer

Workshop
Eila Hämäläinen
Hollolan lukio, Hollola
Chemistry

Tasty meat sauce can be prepared, when the fat and the water-soluble flavors are extracted into the sauce. When the cooking temperature is right as well, hundreds of products are generated as a result of Maillard-reaction. When heating onion, large carbohydrates decompose smaller sweet ones. The concentration of sugar increased as a function of heating time. That can be verified with FTIR- spectrometer in an aqueous extract of onion.

FIN.4 INQUIRY-BASED LEARNING

Nanoschool

Anssi Lindell
University of Jväskylä, Department of Teacher Education
Physics, Chemistry, Biology, Technology

Nanoschool project aims to motivate pupils, teachers, and policy makers in science education by developing scientific inquiries to promote cutting edge scientific research in the school curricula. For Science on Stage, we will prepare inquiries in visualizing human observations and their counterparts in scanning probe microscopy. Vision, smell and touch are used to create different images and can be compared with artificial sensors.

FIN.5 INQUIRY-BASED LEARNING

Model of Solar System

Asko Aikkila
Kuusamon lukio, Kuusamo
Physics, Mathematics, Others

Co-operative project in astronomy, maths and arts in order to create a concrete model of Solar System. When the scale is 1:150,000,000, it is possible to build the Sun and the planets so that you can distinguish details even on the small planets. The planets and the distances must be built in different scales using suitable scale transformation. In order to explain the real diameters and distances in the model is necessary to make a table, where both the distances and the diameters are in the same scale. To concretise these distances in the same scale, you can name the locations of the planets by the place names nearby.

The product of this project can be used in physics, astronomy, maths and other natural sciences.

FIN.6 LEARNING LANDSCAPES

The Co-Designing Learning Environments

Kirsti Koski
Teacher Training School/University of Jyväskylä
Physics, Chemistry, Biology, Others

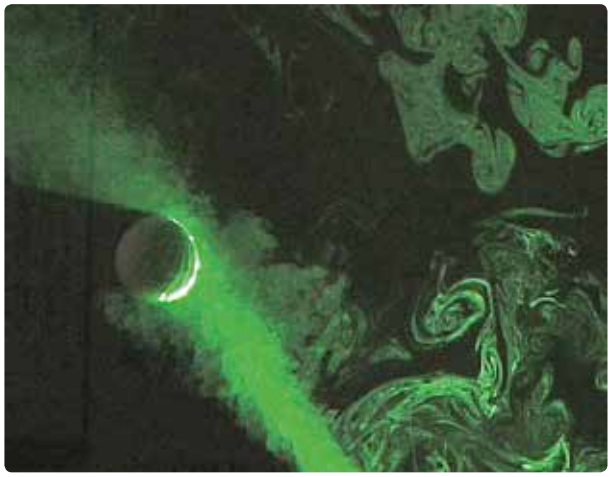
The project aims at adapting physical learning environments to support better the teaching and learning of key competences that are important for the 21st century. The project is a part of national Indoor Environments Program, Work package 4: Environments for Learning and Creation of New Knowledge. The main project partners are the University of Jyväskylä (Research area Innovative Learning Environments lead by Professor Marja Kankaanranta / Agora Center),The University Properties of Finland Ltd. and The Jyväskylä Teacher Training School. The University of Jyväskylä coordinates the project. The University Properties of Finland provides guidelines of the project and is responsible for the construction of facilities. The Jyväskylä Teacher Training School is the end-user of the new learning space, in specific, a Natural Science learning environment.

FRANCE

F.1 INQUIRY-BASED LEARNING

The world of turbulence

Vincent Devaux, Beya Ouadi
Collège Stéphane Mallarme, Sens
Physics, Mathematics, Others



A kite can't possibly fly in the blow of a fan but a balloon can stay on balance in the air for a long time. How to explain that?

The core of this project is to initiate pupils to a scientific reasoning, using various experiences and observations.

Equipped with hairdryers and filled with curiosity, the pupils carried out several experiences to discover the basic principles of the fluid mechanics, and to tackle such a complex world that is the one of "turbulences".

The pupils looked for possible applications to their work. They tried to better understand the world surrounding them and to create new flying objects such as jellyfish, spiders, cats, superheroes and many other things born from their imaginations.

F.2 INFORMATION AND COMMUNICATION TECHNOLOGIES

PocketLab

Workshop
Jeanjacquot Philippe
Lycée Charlie Chaplin, Décines
Physic, ICT, Biology, Others

Why don't we use the sensors of our smartphones for data acquisitions? It is the aim of the PocketLab project. The project was built during a scientific workshop in a high school in Décines (near Lyon, France). Now, the PocketLab smartphone is the tool for most of our practical work where we need to measure the acceleration: in physic for the study of motion and the mechanical waves; in music and acoustic to measure the characteristic of the sound, in geology for the seismology, for the study of the physiology and gesture in sport. We can use it in every kind of experiments, the only limit is our imagination.

F.3 INQUIRY-BASED LEARNING

The "Objectif Tourne-Sol project" or How to shorten the flight of a solar balloon safely?

Emmanuel Thibault
Lycee Jacques de Vaucanson, Tours
Physics, Others

A solar balloon is a hot air balloon made of black plastic sheeting which absorbs almost the entire solar beam. It is an exciting and interesting project for students to make a solar balloon, but it has a major problem: it descends only at sun set. I am happy to report that my students have solved this problem, creating a way to bring the balloon back to earth during the day. In every experiments and released, they met various problems. But each time, they found a solution which allowed their project to improve. The solar balloon can be used thus now for studies of the atmosphere or the ground in Middle school and in College during the day!

GERMANY

F.4 INFORMATION AND COMMUNICATION TECHNOLOGIES

iStage and Application of SmartPhones in Science Teaching

- **Workshop**
- **Jean-Luc Richter**
- **Collège J.J.Waltz, Marckolsheim**
- **Physics, Chemistry, Mathematics, ICT**

I attended the presentation of the iStage Project, on November 9 and 10 in Berlin, in which I was co-coordinator. In this meeting we set the bases of our new project "Application of Smartphones in Science Teaching" with the support of the SAP computing company. With Stefanie Schlunk, for Science on Stage Germany, we planned to have our next coordinator meeting at the festival in Słubice. With my colleague, we will also present a more elaborated draft of teaching units ideas for this project.

D.1 SCHOOL COOPERATION

HOBOS – students learn from the bee

- **Master class**
- **Christoph Bauer, Norbert Baur, Holger Seefried**
- **Deutschhaus Gymnasium Würzburg**
- **Biology, Mathematics**

HOBOS, the interdisciplinary bee project at the University of Wurzburg, is already put into practice successfully at Deutschhaus Gymnasium.

A lesson based on HOBOS is divided into three parts:
1. Instruction by the teacher.
2. Independent student work.
3. Summary and comparison of results.

HOBOS offers students of all types of schools and years the opportunity to be introduced to scientific work. Team spirit is promoted, dealing with large amounts of data is practiced – in short, key competences are acquired.

HOBOS does not only establish a closer connection between university and school, moreover it promotes to intercultural exchange through cooperative projects between schools.

D.2 INQUIRY-BASED LEARNING

SocialGenius – Game Enthusiasm with Seniors – Developing senior-friendly Games

- **Kirsten Biedermann, Shabarz Starke, Fabian Hilpert**
- **Ravensberger Schule, Bielefeld**
- **Physics, Mathematics, Biology, Others**

"All they play in the nursing home is ludo!" was the initial finding of this project in which students with speech disabilities find, among other things, new access to the natural sciences. The desire to increase the enthusiasm of the elderly (OAPs, older people) prompted the students to investigate and learn about the biology of age, like seeing, hearing and motor skills as well as the physics of gravity and friction forces or mathematical considerations for optimizing the playing time (random, expected value) and pleasure (luck versus strategy) or technical design/woodwork for example to construct playing tiles and boards which are accessible for older people. The project was awarded the "Jugend Forscht" and" Social Ingenious Lighthouse Project 2012".

D.3 INQUIRY-BASED LEARNING

Students Discover the Dynamics of the Big Bang with an 11-Inch-Telescope

Hans-Otto Carmesin
Gymnasium Athenaeum, Stade
Physics, Mathematics

The great achievements of Nicolaus Copernicus and Galileo Galilei illustrate that humans want to understand their whole world. In this project the pupils reach this goal by themselves:

They observe redshifts and distances of remote galaxies with an 11-inch-telescope. Therefrom they determine the distances and radial velocities of galaxies. By analyzing their results, the pupils infer the recession of galaxies, the Hubble Law, the Big Bang and the age of the universe. I present the effective equipment of our observatory, the pupil's observation data with a signal-to-noise ratio of 3.2 and field-tested lessons for Mathematics, Physics and Astronomy using the Big Bang.

D.4 SCHOOL COOPERATION

Magic of the mountains

Ute Eckhof, Dr Frank Walter
Christian-von-Dohm-Gymnasium, Goslar
Chemistry

The mountain of the city of Goslar is called "Rammelsberg". In cooperation with the Rammelsberg mine museum educational service a school workshop presents a show to demonstrate the fascination of the chemistry of metal extraction. Making gold – maybe this would solve a lot of today's problems. In the tradition of former alchemists our students perform magical tricks until they get uncovered by modern "scientists". The chemistry regarding mining can be visualised and sensually experienced by the audience and the students themselves. Chemical principles will be presented from a different point of view and with a local perspective being amusing and entertaining.

D.5 SCHOOL COOPERATION

Border-crossing research and discovery – a German-Dutch school project

Dorotheé Brauner, Christian Karus, André Steffans
Andreas-Vesalius-Gymnasium, Wesel
Biology, Chemistry, Physics, ICT

Mixed teams of German and Dutch students deal with research assignments of companies or universities and develop creative solutions, which are presented to a jury that honours the most creative teams. Students, teachers and company staff communicate in English. The aim of our project is to inspire students for MINT-subjects and to support and challenge them in this field. They get insights into future professions and information about professional possibilities and standards. Because of the challenging character and realistic reference of the assignments the students are motivated to deal with strategies to solve scientific problems and organize their work on their own.

D.6 INQUIRY-BASED LEARNING

The Science Show SG

- **Performance**
- **Sebastian Funk, Dr Elmar Winkel**
- **Gymnasium Stift Keppel, Hilchenbach**
- **Physics, Chemistry, Biology**

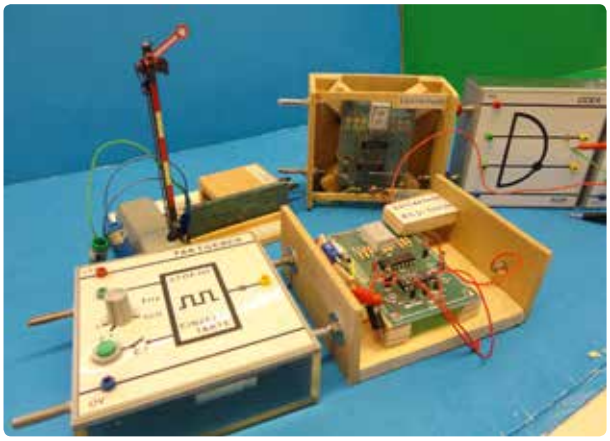
Spectacular trials and experiments are shown by the "Science Show SG" of the high school Stift Keppel in Hilchenbach, Germany. The 10 to 18 years old students work together and construct their own show experiments. The goal is a fascinating scientific stage show that takes the audience quickly under her spell. They do not only perform the individual experiments and explain it in their own words, but involve the audience into the performance with one. It's a real show with humor, suspense, and great insight into the world of physics, chemistry and biology. Look forward to the "Science Show SG".

D.7 LEARNING LANDSCAPES

Physical handicrafts and physical toys

- **Günter Grudnio**
- **Elly-Heuss-Schule Wiesbaden**
- **Physics**

I produce pretty coloured physical toys, buy complete toys or I combine self-made toys with our school-equipment and use it for demonstration in my lessons. Toys in physics are one of the possibilities of introducing a new lesson or new theme. So the pupils will be remembered at their childhood and their instinct of playing. I say it like Goethe: "Who brings much, will bring everybody something." Thereby the pupils feel amused and entertained and feel a little bit my love and care for them. I demonstrate creativity and modesty. It's a real refreshment in a cyberworld. I profit, too, because my own doing makes me free and in a world of school-administration it helps to prevent from burning out.



D.8 INQUIRY-BASED LEARNING

Electrical Energy out of a carbon sandwich – the first experiments on the topic of 'lithium-ion-battery'

- **Talk**
- **Martin Hasselmann, Prof. Dr Marco Oetken**
- **University of Education, Freiburg**
- **Chemistry, Physics**

In this project completely new experiments on the topic of 'lithium-ion-battery' are presented in theory and practice. It will be shown how a lithium-ion-battery can be realized in a very simple way. For example, conventional graphite leads and a non-poisonous, and thus harmless organic electrolyte dissolution are being used. These batteries can be constructed by the students themselves. Apart from the construction of this lithium-ion-cell it will be demonstrated how the performance of the secondary battery can be raised by using larger electrode surfaces and also how the chemical reactions on the poles can be proven in a simple way.

D.9 INQUIRY-BASED LEARNING

Zebra Effect

Matthias Hauck
Hohenstaufen-Gymnasium, Eberbach
Physics, Biology, Others

The submitted project presents a scientific research, done in the field of thermodynamics. It was focused on heat radiation and the resulting convective air currents by investigating the so-called “zebra effect”. This assumed effect describes the opportunity that zebras exhibit their own cooling system which is based on their black and white stripe pattern. Scientists suppose that due to temperature differences between the differently coloured stripes air currents occur to cool down the animals. To our knowledge, there is no published work that approves this assumption. A group of students from the HSG Eberbach investigated this effect and was able to disprove it in large parts.

D.10 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Astronomy in primary school, Section: Solar system/earth and moon

Heidrun Boll, Christa Müller
Student Research Centre South Wuerttemberg SFZ®, Bad Saulgau
Physics, Others

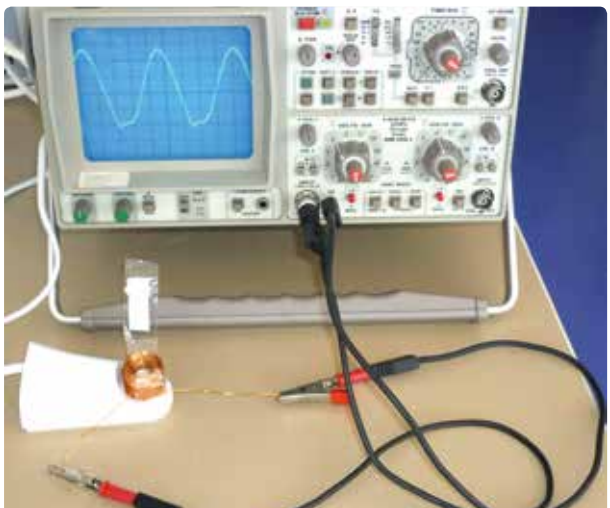
Astronomy, fascinating and incredible! We will show and explain how you can teach complex connections in astronomy with the simplest materials.

Example: the solar system (the sun and the planets), the earth and the moon. We think it is important that the children comprehend the features of the planets in a variety of experiments. Similarly, the children can discover for themselves the phenomena of the development of the seasons, lunar and solar eclipses, the phases of the moon, day and night by constructing a tellurium. Even the necessary conditions for the ocean tides can be demonstrated and explained.

D.11 INQUIRY-BASED LEARNING

Learning at stations: Experiments on electromagnetic induction with the base station of an electric toothbrush

Ludwig Huber
Gymnasium Pfarrkirchen
Physics



At four stations groups of three students make experiments with self-wound coils and the base station of an electric toothbrush. The students discovered themselves in this learning environment the different aspects of electromagnetic induction and its application to the toothbrush. At the stations they work out the proportionality between the number of turns and the induced voltage, the efficiency of the arrangement, the frequency of the alternating magnetic field, and they are looking for the link to the technical realization.

D.12 INQUIRY-BASED LEARNING

BiPhy – Experience sciences

Tobias Jagsch, Astrid Gärtner, Ines Engelhardt, Karen Wilkening
Marie-Curie-Gymnasium, Berlin
Physics, Biology

Where are the contact points of biology and physics? Actually everywhere! Teaching BiPhy is still as fascinating and joyful as we experienced it in developing the first topic "motion in air". BiPhy was designed for the 9th and 10th grade. First, just with an interdisciplinary concept it turned out to be a subject with no boundaries between biology and physics.

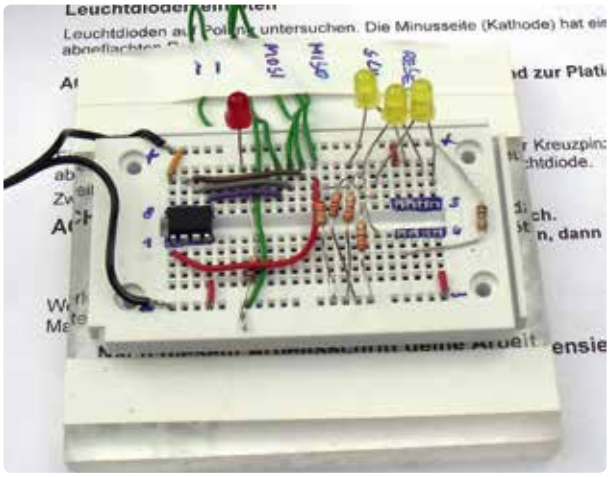
Our goal is to let the students experience how scientific methods help to answer daily questions. Therefore every semester has a new topic and we work with different studying techniques.

D.13 INFORMATION AND COMMUNICATION TECHNOLOGIES

My Microcontroller does what I want

Workshop
Ulrich Jucknischke, Karsten Bolte
Overbergschule, Ahlen/ Evangelische Gesamtschule Gelsenkirchen
ICT

A Microcontroller (µC) is practically a one-chip-computer system. You find it in everyday devices (cars, toys, greeting cards etc.). µC are adapted in their equipment to the intended purpose. It's interesting for schools to work with these electronic components in MINT-subjects (Mathematics, Informatics, Natural sciences and Technology), because they are so wide spread in daily life and students should learn to use them. The work with the µC-project offers the students an experience to help decide about future studies or work experience.



The possible project areas are:
- ⋆ Control with the µC
- ⋆ Measure with the µC
- ⋆ Create a program sequence/program the µC
- ⋆ Production of hardware and testing

D.14 INFORMATION AND COMMUNICATION TECHNOLOGIES

Teaching physics with a smartphone

Stephen Kimbrough, Julia Brimer, Wolfgang Sobtzick
Helene-Lange-Gymnasium, Dürer-Gymnasium Nürnberg
Physics, ICT

Smartphones being present in our everyday life, and also in the life of our students, lead to the idea of including this gadget in class. Nowadays a lot of smartphones having fancy hi-tech sensors, i. e. an accelerometer and a rate sensor, make it a low-cost experimentation device. As part of this project the use of smartphones in a 10th grade physics class has been tested to teach classical mechanics.

D.15 INQUIRY-BASED LEARNING

Jeans – from raw materials to the final consumer product

Heike Magg, Hannelore Scheid
Geschwister-Scholl-Gymnasium
Biology, Chemistry, Others

Jeans and denim jackets are garments that are very common especially for young people. But did they ever think about how such a garment is produced, what basic materials are needed, where do they derive from and how are they processed?

Starting with a general discussion about denim, we take a closer look on the basic materials, such as cotton. What problems are connected with the cultivation of cotton, how is cotton processed? In the next phase the ways of production of natural and synthetic Indigo are investigated and colouring is executed. The students learn about weaving methods, build their own weaving frames, make a piece of denim material and produce a consumer product.

D.16 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Paper-Automata: Moving, mechanical Toy

Wilfried Meyer, Uta Çelik, Kirsten Yüzüncü
Grundschule am Halmerweg
Mathematics, Others

Paper-Automata for the classroom

This educational project is an innovative project that is using mechanical moving toys (Automata) as a tool to enhance primary student's learning across a range of transversal key competences.

Mechanical moving toys (Automata) are a great way to introduce engineering, arts, sculpture, mechanics and science, by combining play and technology. If we want children to understand the importance of technology and engineering then mechanical toys are an ideal way to introduce the concepts. But mechanical toys go further as they have always fascinated children as they combine the elements of creative play with the unexplained magic of their move.

D.17 LEARNING LANDSCAPES

Experiments and tricks – a combination of physics and music on stage

Jürgen Miericke, Martin Fischer
Didaktik der Physik – Universität Erlangen
Physics, Others

An entertaining stage performance introduces children, teenagers (and the young at heart) to science, especially physics. Phenomena from the world of physics and our everyday lives are presented in an exciting and often surprising way. The method of teaching physics through an interactive performance on stage is still very rarely used at schools, even though this project could be carried out with any stage a school possesses. This kind of performance both conveys knowledge and inspires a scientific way of thinking. Some presentations will seem magic, most will be explained by a physicist so they can be understood. Music will support the experiments.

D.18 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Nobody is too young to be a scientist – How to enable primary school pupils of the second to the fourth grade to transfer own ideas into project theses taking part in the science competition "Jugend forscht"

Benita Otto, Eirik Otto, Gesine Schönheid
Caspar-Aquila-Grundschule
Biology, Chemistry, Mathematics

"Do trees adhere to deadlines?", "Why does Saalfeld has a playbench" – These and many more questions answered primary school pupils of the "Caspar-Aquila" Grundschule in Saalfeld together with their teachers in eleven interesting project theses within the last five years. Thereby they worked the same way

the older pupils do: science-based, with theoretically and practically analyses. They presented to and discussed their theses with a competent jury and the public during the competition "Jugend forscht".

D.19 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Once upon a time … Fairy tale science

Christine Prem-Vogt, Manja Erb, Detlef Knebel, Sabine Streller, Claudia Frühinsfeld, Nadine Chasté
ProNaWi-Berlin
Mathematics, Physics, Biology, Chemistry, Others

Fairy tales are used as a starting point for inquiry-based learning in the project "Once upon a time…" Many fairy tales include interesting aspects that are useful for elementary science education. For example, density as a property of substances can be put in a new context with the fairy tale "The Frog Prince". All lesson building blocks that were developed in the project provide differentiated learning opportunities. Based on fairy tales, they all focus on discussing children's research questions in forms of cooperative learning. This way, scientific methods are learned and improved.

D.20 INQUIRY-BASED LEARNING

Cutting motives

Workshop
Werner Reithmeier, Claudia Harpain
Gymnasium Soltau
Mathematics, ICT

Motivation: the presentation of milling plates

Preparation: a choice of suitable subjects as well as the reduction of problems due to the size of the diameter of the milling tool

Construction: on paper draw straight lines or arcs/circles with the help of a ruler and a pair of compasses. Precision work is most important, i. e. all points have to be chosen with an accuracy of 0,01 mm.

Programming: learning how to operate the RMS programme sphere and to use simple commands. Achieving the optimum of the programme by trial and error.

Finally the metal plates are milled.

D.21 INQUIRY-BASED LEARNING

Burt Sampson's problems – a bilingual project

Silvia Savelsberg, Tim Kreckel
Werner-Heisenberg-Gymnasium Leverkusen
Biology, Chemistry, Others

This short sequence motivates the students because the scientific problems are presented by Burt Sampson (films), who is home alone. The problems evolve around washing and enzymes. From there the students plan and carry their own investigations, which includes all essential parts of a scientific investigation. Using help! – and more! – cards students of different abilities can actively participate in the lessons. The lessons, the materials and all student products are in English, which is supported by material called 'language support' to help students communicate during group work phases.

D.22 SCHOOL COOPERATION

Virtual Science Fair

Birgit Krämer, Dr Gabriela Jonas Ahrend
Werner-Heisenberg-Gymnasium Leverkusen
Biology, Chemistry, ICT

Pupils get organised for Virtual Science Fair and work independently on their individual science projects over a time period of 6 weeks. They are introduced to a communication platform (moodle) and team up online with "their" cyber-mentor who offers virtual guidance, support and encouragement in the process. In their investigations they carry out all stages of the scientific method. On the day of the REAL fair, all teams present their displays to a jury and guests in English. This combination of VIRTUAL fair and real fair, involving the use of modern communication technology and the presentation of results in a for-

eign language, offers a very challenging occasion for the 14–16-olds.

D.23 INQUIRY-BASED LEARNING

Gustav-Conserve-Energy

- Master class
- Volker Smit, Zeljko Malinovic
- Gustav-Heinemann-Schule
- Physics, Chemistry, Others

„Gustav-Conserve-Energy“ is a curricular project about energy production and energy saving, using animation as a means of visualization. After preparing a storyboard, which was then divided into different sequences, each sequence was animated by one of the groups of 4/5 students. Finally, all sequences were put together in one short film. In the end, the film received an audio track with music and was presented to the community within the school and as a Youtube video on the internet. One student designed a website to present the results.

D.24 LEARNING LANDSCAPES

Junior-Pilot-License – hands-on-learning and physics

- Klaus Strienz, Tobias Schüttler
- Gymnasium Höchstadt
- Physics, Mathematics, Others

Students who are interested in aviation and model airplanes visit a new department of their school: it is the “junior pilot school”. They are offered flight training to pass several qualifications, similar to professional flight schools. A radio-control-system with computer is used for educational support. At the end of the course the students will have an insight into the technical development of aviation, in some aspects of physics and in social behaviors.

D.25 INQUIRY-BASED LEARNING

Chips are not equally chips!

- Jens Viehweg, Marian Scheibe
- Landesgymnasium Sankt Afra
- Chemistry, Biology

We would like to make suggestions for a practical example to the analysis of food constituents. The qualitative analysis of proteins, carbohydrates and fats into chips is possible to use in biology and chemistry classes.

The tests can be carried out in individual lessons of various grade levels or as a project-oriented and multi-disciplinary approach.

The qualitative as well as quantitative results differ evidently for potato, tortilla, crab and apple chips. They can help to think about the consumption of chips a little bit more.

That it’s possible to be surprises by Lugol’s solution, shows itself under the microscope. If you prepare a slides with crushed crab chips, are not stained grains of starch blue, but parts of the exoskeleton of chitin.

GREECE

D.26 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Magnetism Inquiry Corner to encourage inquiry-based learning

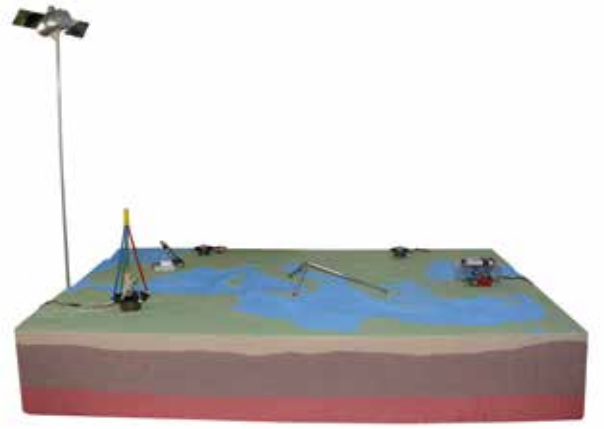
- Master class
- Saskia Wüst
- Grundschule Oettingen
- Physics

In this project inquiry-based learning is encouraged by allowing pupils to work at a so called "magnetism inquiry table". Inspired by their own questions, they invent experiments, keep record of their results in their magnetism researcher book and finally publish them at a pinboard or during regularly held meetings in the classroom.

GR.1 LEARNING LANDSCAPES

Simple and functional seismograph – A relief of the Mediterranean area for the visualization of some aspects about earthquakes

- Panteleimon Bazanos
- General Lyceum of Filiatra
- Physics, ICT, Others



A. Simple and functional seismograph is an implementation of seismograph. The geophone (seismic waves sensor) is made of a woofer (low pitch speaker) in conjunction with a spring and mass system and the processor unit is a computer equipped with sound card and sound processing software.

B. The Mediterranean relief is made of a piece of Styrofoam that is accompanied by some other elements (a small tripod, computer speakers and laser pen as geophones, a can with glass mirrors as satellite and a circuit with photoresistors as seismological centre). With this assemble we can discuss carious issues about earthquakes.

GR.2 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

The science teaching in primary school with straight through and materials leading the creative and experiential learning

- Efthimios Karachalios
- 6/F elementary school Inachos Argolidas
- Physics, Others

Purpose of this paper is to highlight the remarkable position occupied by the use of teaching and visual material in teaching Science in elementary Schools. As a means to enhance it, we

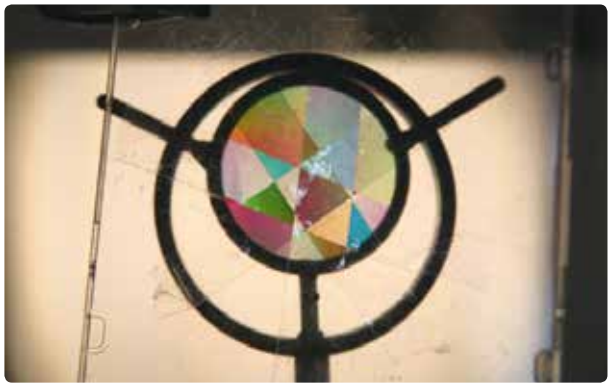
thought that it was necessary to construct visual material with simple means and materials relevant to the unit of energy, water, air, electricity and light which are included in the Science books of Physics E and F classes, for better understanding of natural phenomena.

The constructions include:
A Winged turbine, wind turbine, wind farm, Reel vehicle electrolyzer, car elevator with air, sun and moon eclipse.

GR.3 INQUIRY-BASED LEARNING

Polarization of light. Seeing the invisible

Panagiotis Lazos
26th High school of Athens
Physics



The polarization of light is a phenomenon our eyes cannot observe without help from special filters, the polarizers. By using two polarizers and putting various transparent objects between them we can observe colorfoul patterns. These patterns are a source of useful information about the structure of the objects. Besides, we can find out if there are any stresses in the object, something very useful not only for glass lenses but for machine parts or even bridges, as long as models made by plastic are examined with polarized light.

GR.4 LEARNING LANDSCAPES

Brachistochrone-tautochrone-horisontal projectile

Eleni Lebesi, Aristomenis Nikolaidis
Bougas school
Mathematics, Physics, Others

The brachistochrone problem was posed by Johann Bernoulli in 1696.

Given two points A and B in a vertical plane, what is the curve traced out by a point acted on only by gravity, which starts at A and reaches B in the shortest time.

Galileo in 1638 had studied the problem. He then made an error when he argued that the path of quickest descent from A to B would be an arc of a circle.

Five solutions were obtained, Newton, Jacob Bernoulli .Leibniz and de L' Hopital solving the problem in addition to Johann Bernoulli.

Huygens had shown in 1659 that the cycloid is the solution to the brachistochrone problem and the related tautochrone problem.

GR.5 INQUIRY-BASED LEARNING

Flexibilities of light

Master class
Antonis Margaritis
Pilot High School of Heraklion, Crete
Physics, Chemistry

The apparent elevation of celestial bodies is well known phenomenon. However, due to its large scale, the "bending" of sunlight is not possible to observe from someone on earth, only its effects. In order to observe this phenomenon in laboratory environment, we discovered that a laser beam passing via a proper optically anisotropic solution was "bent", and the length of the water bath we used (60 cm) was sufficient to observe this phenomenon. After observing the light path and making calculations, we determined the change of the refractive index of our solution as a function of depth. Finally, we used white light, and observed in a dark room the spectrum of a slightly bent light beam.

GR.6 INQUIRY-BASED LEARNING

Micro – nano – quanto: a teaching approach of Milliakan's experiment in Primary and High School in Greece

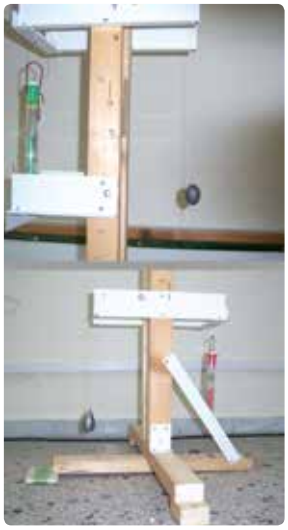
Andreas Patsis, Ioannis Gatsios
EKFE Alimou, EKFE Neas Smirnis
Physics, Chemistry, Mathematics

In 1906, Millikan began his experiments on the charge of the electron and in 1923 he was awarded the Nobel Prize. The experimental method and of some of the problems arising in the course of his experiments become the starting point for teaching students of elementary and high school in Greece, basics knowledge in math, physics and or chemistry, i.e. understand the length, area and volume at the micro- and nano- scale as well as to introduce the quantum approach of electric charge by simple means. The including construction is the model of the experimental apparatus for measuring the electric charge of the electron enhances the teaching approach the cover issues in our lessons.

GR.7 INQUIRY-BASED LEARNING

Supergravity and Antigravity: Effect of Gravity on Simple Pendulum

Master class
Nikos Skoulidis
Intercultural Jr High School of Evosmos
Physics, Others



We have constructed a completely mechanical device that simulates variable gravity, or conditions of antigravity and supergravity, in order to test the law of pendulum and the dependence of its period on gravity. It can simulate a wide area of gravity. The construction is very simple and the cost is extremely low. It can be spread within all schools and used in any school lab, even in a classroom. Initially, we conducted the mathematical analysis and then we created a computer simulation in Excel. There is an astonishing agreement between the results of the Excel simulation and the measurements taken by the device. Details about the operation/construction of the device are in main text.

GR.8 INQUIRY-BASED LEARNING

Construction and use of an interactive umbrella Planetarium

Serafeim Spanos
Iolkos High School
Physics, Others

The interactive umbrella planetarium is a relatively simple construction with several layers of complexity. It can be assigned to a student or a group of students as a project work which involves ordinary materials (black umbrella and white correcting fluid) in the construction of a sky map. The tilt of umbrella's axis relative to a plane surface represents the geographical latitude which can vary in order to reproduce the variation of night sky revolution according to latitude. The complexity of the construction is increased by substituting the white blobs (stars) on the umbrella with colored LED lights capable of shinning and by adding an electric motor on the umbrella axis.

GR.9 INQUIRY-BASED LEARNING

Learning Physics with my Body

Andreas Valadakis
Varvakios Pilot School
Physics

We have developed a complete set of large scale experiments by using a laboratory hovercraft, in which students are actual-

ly part of the experiment themselves. These experiments allow students to personally experience or feel physical phenomena and analyze why the felt what they felt.

Many active - engaged physics curricula ask students to be part of experiment, for example by walking. However because of the friction, it is easy to acquire the common "force-follows-velocity" view. A gliding hovercraft counteracts friction. So students use it to feel and study Newtonian Mechanics without the perplexity of friction.

This kind of active, collaborative learning experience makes physics more concrete and meaningful to the students, it involves them more directly in the learning process and students enjoy class more.

HUNGARY

H.1 INQUIRY-BASED LEARNING

Don't Worry be healthy!

Márta Gajdosné Szabó
Kempelen Farkas Gimnázium
Biology, Physics, Chemistry, Mathematics, ICT

Nowadays our health is one of the most important problems in the world. Today about one in three American kids and teens is overweight or obese; nearly three times the rate in 1963. Teachers have to share the responsibility to support the parents handle the problem. As science teachers we have to take part in their education too. But the teaching learning process is a real challenge, frontal teaching sometimes is not effective enough. Working in a project can be more successful especially when a computer is involved. We worked on a simple computer program where kids can check their energy consumption. The expectations from the program were to be simple and user friendly. The program's database must be open for new data. The program doesn't need connection with the internet, can be use anywhere.

H.2 INQUIRY-BASED LEARNING

"Secrets of the dough" – How can we apply the inquiry-based teaching / learning method in biology?

Tünde Kontai
Ságvári High School
Biology

According to international measurements the natural scientific education struggles serious problems nowadays in several European countries. International observations mark that improving the standard of scientific education is possible by new implementing teaching methods. Such a successfully used method is the 'inquiry-based teaching/learning' (IBL). The target of this project is to demonstrate through two concrete examples how to use this method at a class in secondary and in primary school. The example task demonstrates the most significant specialties of the IBL method and reveals how different grades of IBL tasks can be used to learn the several steps of scientific learning and thinking at a biology lesson.

H.3 INFORMATION AND COMMUNICATION TECHNOLOGIES

HiTech ripple tank for peanuts

Károly Piláth
ELTE Trefort Ágoston Gyakorlóiskola
Physics, ICT

I would like to show you how one could easily demonstrate some physical experiments using a PC and some devices developed by me.

First I would like to show a ripple tank's image which can be projected for the whole class. In my system the waves are generated by computer controlled speakers, which make possible to adjust the frequencies and phases of the wave sources independently of each other.

Have you ever seen the movement of the loudspeaker's diaphragm? You can observe this movement with my two channeled LED strobe controlled by PC's audio card.

In the end I will show my newly developed spectroscope based on a webcam which can be used to observe the spectrums of the light sources.

H.4 INQUIRY-BASED LEARNING

Redox reactions and colour changes

Endre Szórád
Bolyai Tehetséggondozó Gimnázium és Kollégium
Chemistry

Atoms, ions and molecules can only lose electrons in chemical reactions if another material is present to accept them. Thus, oxidation and reduction can only occur simultaneously. Materials connected in this way form a redox system. The definition of colour is as follows: Colour is the property of visual perception which refers to characteristics commonly described as red, yellow, green and blue, or the combinations of colours. But what hides behind colours? What particles or series of chemical reactions hide behind a certain colour? In my experiments, I will demonstrate some simple redox reactions in which colour changes occur.

H.5 SCHOOL COOPERATION

Physics therapy

Péter Baló
Tóth Árpád Gimnázium
Physics

It is easy for students to get lost in today's constant barrage of information in the media. We must compete for attention. To arouse their interest in science, we must employ tactics of the media such as catchy titles and interactive experiments.

Students will more likely have a better understanding of the laws of physics if impressed by an experiment; so in class, this is my first step. Before providing them with the 'real' scientific explanation, I offer them a far-fetched pseudo-scientific one such as physicists have a long range. I provoke them to be critical of my explanations. My approach to teaching physics has created a play entitled 'Physics Therapy.'

H.6 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Ice-cream project

Éva Wagner
Deák Diák Primary School
Physics, Mathematics

Raising and maintaining children's interest for science is a challenging task. Substantiating the interest for science is to be done at an early age. Problem sensitivity has to be formed, as they have to understand the importance of observations as well as that of experiments and measurement.

At the age of ten or twelve the use of devices for scientific research can be taught parallel with conveying the most important scientific terms.

This process can be most efficient if topics are chosen by children themselves thus getting acquainted with the laws and procedures of scientific research.

H.7 INQUIRY-BASED LEARNING

Experiments with fire, colours and forms

Katalin Horváthné Szombathelyi
PIOK Pal Raday Grammar School
Chemistry, Biology, Physics

Spectacular and surprising experiments that make people of all age-groups become interested in chemistry.

- Why won't the match strike when it is put into the middle of a flame fast?
- Can carbon-dioxide be poured from one pot into another in a spectacular way?
- Does carbon-dioxide feed burning?
- How can a flame be coloured into different colours?
- Why doesn't filter-paper burn, and why does a lump of sugar catch fire?
- How can one create visibly growing coloured plant-like formations with the help of a liquid and some coloured salt?
- How can water be created from fire and vice versa?
- Demonstration of an active volcano on a maquette.

H.8 INFORMATION AND COMMUNICATION TECHNOLOGIES

Physics is Life – without misconception

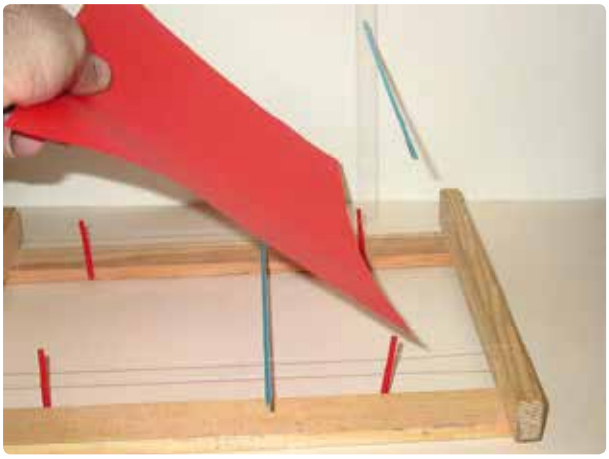
Zsolt Zsigó
Bánki Donát Műszaki Középiskola
Physics, Others

Physics teachers and students of 7 European countries (Latvia, Czech Republic, Portugal, Greece, Turkey, Italy, Hungary) managed to change the pupil's attitude to physics. The basic idea of the project was born by teachers registered on E-twining. Our most important goal was to make the understanding of the subject easier, enjoyable, taking advantage of the children's natural interest in IKT devices. Thus during the work we have possibility to modernizing the methodology of physics subject, so that we use the element of the today's modern media. The full program and the schedule can be seen on the website of the project. After finishing the work the teachers rethink the innovations and show on the professional forums and striving to integrate the useful elements into the subject.

H.9 INQUIRY-BASED LEARNING

Cheap and does not electrocute you!

János Márki-Zay, Ferenc Márki-Zay
Teacher
Physics, Mathematics



Fundamental experiments that cannot be found on the Internet using simple devices that can be made at home. Some materials used: paper, straws, water, oil, magnets, colour television, etc. Multiple hours of experimentation are based on the fundamental characteristics of the materials. For example, an electrically charged straw is used to model an electron. We take advantage of the fact that the volume of a sheet of paper is very small compared to its size, that cooking oil and water have a similar density and do not mix with each other, and that electrons accelerated by a cathode ray tube do not adhere. We also demonstrate longitudinal waves using a magnetically coupled pendulum.

IRELAND

IRL.1 INQUIRY-BASED LEARNING

Hydrogels- a smart material

Maria Sheehan
Saint Caimin's Community School, Shannon, Co. Clare
Chemistry

A smart material is one that changes shape in response to changes in its environment. Hydrogels are one such smart material. The hydrogel that this demonstration focuses on are Superabsorbent Polymers (SAPs). SAPs absorb over 100 times their weight in water. A number of activities can be carried out to show this SAPs response to different solutions and concentrations of the same solution. Another useful application of this SAP is that if the gel formed when sodium polyacrylate absorbs water is exposed to ionic substances the interference of the ions with the polymer-water bond causes the breakdown of the gel. Therefore it can be used to identify whether a substance is ionic or covalent.

IRL.2 INQUIRY-BASED LEARNING

Future Fuels

Brigid Corrigan
Mount Sackville Secondary School,Chapelizod, Co. Dublin
Chemistry

This is a chemistry-based demonstration that involves a display of Energy from different sources. The sources are a mix of everyday materials you find in your kitchen, along with some lab-only stuff. The experiments are not new but recycled ones, to showcase Energy, to prompt students thinking about future fuels. By briefly describing the chemistry involved in the reaction, the energy source and energy released can be discussed as a Future Fuel? The energy displayed by the different experiments is in the form of light, sound and smell and if they work, make good viewing.

The experiments are:
1. H_2 production
2. Methanol as a fuel
3. Glucose as a fuel

IRL.3 INQUIRY-BASED LEARNING

Students in motion

Aoibheann O'Gara
Coláiste Chraobh Abhann, Kilcoole, Co. Wicklow
Physics

The ideas presented are activities where students are moving and learning. One idea deals with students learning about speed, and the other about light wave interference after passing through a diffraction grating. Students are introduced to distance time graphs by a game that involves moving along metre sticks while a time keeper counts out seconds and marking progress on a graph. The diffraction grating activity allows students to see wave interference by marking a large gap on a piece of paper and moving waves on acetates to see the constructive and destructive interference.

IRL.4 INQUIRY-BASED LEARNING

Inquiry based Physics in Ireland

Richard Moynihan
O'Carolan College VEC, Nobber, Co. Meath
Physics, Others

This project presents a number of inquiry activities/small research projects developed for use in Physics classes in Ireland. These activities cover topics such as heat transfer and mechanics. These experiments have been designed to use commonly available equipment and materials. In using these materials, the students can easily see and relate to various concepts, which we can then delve into at a deeper level.

IRL.5 INQUIRY-BASED LEARNING

Self Discovery

Feargal Close
St Paul's College, Raheny, Dublin 5
Physics, Others

This project gives ideas and a strategy to make physics more interesting and relevant to students. The inquiry-based project offers an interdisciplinary approach to science through design. By participating in the design process, students begin to experience and understand how much of the world around them is created. Engaging in real design and scientific concepts and applications gives students an opportunity to look more critically at the designed world and tap into their own capacity to create change.

ITALY

I.1 INQUIRY-BASED LEARNING

Mare Nostrum

Ernesta De Masi
Liceo A.Gatto, Agropoli (SA)
Physics, Mathematics, Biology, Chemistry, Others

The project originates from the study of the coast line of the students' hometown, it rediscovers also the cultural values and traditions of the Cilento Area. The Project has a multidisciplinary approach. Activities relative to the presence of micro-organism, macro-fauna and marine flora, concerning the analysis and measurements of tissues and organs of marine creatures as well as the environment in general have been carried out.

The project has dealt with: floating, sailing, meteorology and orientation, but also proverbs about life at sea, culinary traditions and sea tales …

I.2 INQUIRY-BASED LEARNING

Inquiry in Virtual World

Annalisa Boniello, Marina Gallitelli
I.I.S. Pitagora, Pozzuoli (NA)
Chemistry, Physics, Biology, Others

The project starts from the methodology of the Inquiry-Based Science Education in3D virtual environments. An Island, called Science Island, was created in 3D, in which, through a role play, learners cross the various steps, 10 activities based on inquiry. The theme chosen for the task is "Water and Life", from chemical, physical and biological point of view. The level of inquiry for the path is structured typw. The Island is part of a bigger virtual world called Edmondo developed by teachers under the guide of the Indire Educational Agency. Each step begins with a question before moving on to experimental activities with specific goals to achieve competence to return then to virtual where you can switch to the next step.

I.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Kids science – Scientific literacy for children

Emanuela Bianchi, Anna Vinella, Nicoletta Balzaretti
I.C. Rubri, Imola (BO)
Physics, Chemistry, Biology, Mathematics

The project presents a variety of living insects (for example exatatosoma tiaratum, bombix mori), by a large documentation produced by children (pictures, drawings, stories, arts).

The main learning goals are the following:

1. Teaching a scientific methodology (see Reference Framework for PISA Scientific Literacy) by focusing on the process rather than on content.
2. Acquisition of scientific concepts and "operational techniques".
3. Understand the concept of "life cycle".
4. Recognize and describe phenomena related to the biological world.
5. Working in a group, try to observe, reflect and express.
6. Use consciously the experience to observe, reflect and express knowledge.
7. Assume correct attitudes for the conservation of the natural environment.
8. To "live" Science with creativity/fantasy.

I.4 INFORMATION AND COMMUNICATION TECHNOLOGIES

Mathland, teaching geometry with OpenSim

Master class
Michelina Occhioni
I.C. Muro Leccese (LE)
Mathematics, ICT

Mathland, the city of math, is a virtual world built with an open source 3D graphics software called OpenSim and it is part of Techland, a group of thematic islands dedicated to math and science.

Geometry topics are developed as a sort of urban path and, through avatar mediation, is possible to move around the city and interact with objects and other avatars. Every animated object is a dynamic representation of a geometric property and can be considered as a 3D paragraph of a full immersive book.

Students understand better abstract concepts and have a correct perception of space, size and geometric transformations. Learning geometry becomes easy and fun without abandoning scientific precision.

I.5 LEARNING LANDSCAPES

Sound and Music

Maria Grazia Gallo
I.I.S. Maserati, Voghera (PV)
Physics, ICT

The "Sound and Music" project is in the exhibition field; old instruments designed to generate sounds and modern devices that use electronic and information technology will be presented. The basic concept is the belief that music is based on the mathematics used both in computers and electronics. Activities were carried out in collaboration with other classes, other schools and external companies.

I.6 LEARNING LANDSCAPES

From Synthetic Polymers to Biodegradable Plastics

Anna Madaio, Tullia Aquila
ITIS Focaccia, Salerno
Chemistry, Biology

The project was proposed to students of the ITI Basilio FOCACCIA in Salerno attending classes in the last three years of their chemical curriculum in the school year 2011/12. The project concerns possible applications of the sustainable chemistry. The lectures topics were the production, the use and the disposal of synthetic polymers and biopolymers. In the laboratory activity, syntheses of polymeric materials were carried out by using different techniques. As an example of green biotechnology applications an edible and biodegradable mixed composition biofilm was prepared from fennel wastes and cheese whey, which could be possibly used for food packaging. Mutimedia were produced for dissemin.

I.7 INQUIRY-BASED LEARNING

The Gravitational Calculator

Pietro Cerreta
ScienzaViva, Calitri (AV)
Physics, Mathematics

The Gravitational Calculator extracts the square root of a number using a mechanical device. It consists of a sloped graduated track along which, starting from a certain point, a ball is allowed to descend. When the ball comes to the end of the ramp it jumps out as if it were in a ski jumping competition. With remarkable precision the point where the ball lands corresponds to the square root of the number of its departure. This contraption is not simply an only-gravity-fed machine able to do calculations but a Galilean exhibit, owing to the evidence in it of Galileo's studies on falling bodies, the inclined plane and projectile motion.

I.8 LEARNING LANDSCAPES

Matebilandia, Experiencing Mathematical Modelling in an Amusement Park

Workshop
Lorenza Resta, Giovanni Pezzi
Liceo Torricelli, Faenza (RA)
Mathematics

In the Matebilandia project, the Italian amusement park Mirabilandia becomes an effective laboratory, where teachers and students experience the pleasure of mathematical discovery and have fun and learn at the same time.

The students analyze the mathematical curves which are present in some parts of the rides or in the trajectory during the movement of the rides. In order to realize this, the students fol-

low, through guided-discovery, the characteristic steps of the modelling-application process. During this process students use some particular mathematical instruments and "mathematical machines", which act as "bridges" between mathematics and reality.

I.9 INFORMATION AND COMMUNICATION TECHNOLOGIES

Was there life before computer?

Nicola Marras, Patrizia Picchietti
-
Mathematics

The modern world was build with calculators conceived in the XVII century: the calculating machines of Pascal and Leibniz were the driving force of the financial globalization and the slide rule, invented in 1622, served to design everything, from the James Cook's flagship to the Jumbo Jet.

But in 1972 appeared the first modern calculator and 300 years of history vanished in a flash, by 1980 were completely forgotten. It takes just a few minutes to communicate the existence of a world "before computer": let us remember those who create the modernity using technology, not depending on it. Einstein had a slide rule less powerful of any iPhone, how many will be able to do better?

I.10 INQUIRY-BASED LEARNING

Kipp's apparatus

Francesca Butturini, Andrea Albiero
Liceo Agli Angeli, Verona
Chemistry, Mathematics

Our project concerns the study of equilibrium in chemistry. Among many reactions considered, the simplest to study from the point of view of thermochemistry appeared to be that between the solid calcium carbonate and the diluted chloridric acid. The environment of reaction for better appreciating the quantitative and qualitative characteristics of the chemical reaction is Kipp's apparatus.

I.11 INQUIRY-BASED LEARNING

Hands-on Evolution

Giulia Realdon, Immacolata Ercolino
I.I.S. Buonarroti – Monfalcone
Biology, Mathematics

Hands-on Evolution is a project aimed at improving the teaching of evolution by means of different kinds of experiences: practical labs, e-learning and educational games to be performed in the classroom with very little – if any – equipment. In this festival we are presenting some of these experiences focusing on two main topics:

- ★ Evolutionary changes and the mechanics behind them
- ★ The building of evolutionary trees
- ★ Our proposal includes:
- ★ The evolution of "paper fish"
- ★ The evolution of "biomorphs"
- ★ Darwin's Evolution game
- ★ "Evolve or Perish" board-game
- ★ Toilet paper Evolution timeline
- ★ Tea biscuits evolutionary trees
- ★ "Paper beetles" evolutionary trees
- ★ Bioinformatics with pen and paper

I.12 SCHOOL COOPERATION

Chemistry is light

Elisabetta Gaita, Nadia Semino
I.I.S. Sobrero, Casale monferrsato (AL)
Chemistry, Others

The project is a mix between providing the knowledge about a subject and a method to explain its content using new technologies.

High-school students create a glogster (on-line) to explain the activity related to a chemical synthesis, as realized in University labs.

We had two groups executing different parts: peer teaching and peer reviewing. Students were monitored in activities by teachers, who were the directors of the activity; but students were the main protagonists and they taught both practical and scientific methods to younger students. The project is based on the method of cooperative learning which enhances the centrality of the teaching-learning relationship and CLIL methodology.

I.13 INQUIRY-BASED LEARNING

Sciences and Digital Media in Mixed Age Learning Groups

Dr Monica Zanella, Dr Harald Angerer
Primary School Prad, Area Innovation and Consultation – Science
Physics, Chemistry, Biology, Mathematics, Others

The project aims at implementing team based working in mixed-age learning groups into everyday school life focusing on promoting digital media (ICT) and science. Due to the fact that scientific work is firmly anchored in the class schedule the pupils can autonomously "inquire the nature" with experiments. Doing so, they can use partially devices and materials which are normally used only in laboratories for adults. And like scientists and researchers of the adult world they use digital media like notebooks and tablets to keep records and communicate the results.

NETHERLANDS

NL.1 SCHOOL COOPERATION

Differentiated learning for pre-university students

Robert Tatsis, Andrea Bruggen-van der Lugt
Junior College Utrecht/Utrecht University
Chemistry, Biology, Mathematics, Physics

The JCU (Junior College Utrecht) has developed assignments and a pedagogy for differentiation in the sciences. These open-ended assignments can stimulate students' interest and activity and come in 3 levels: repetition, comprehensive and enrichment. The students choose assignments based on their individual needs. This material is developed in a network of secondary schools in cooperation with the JCU.

In the workshop we present examples of assignments and student work. Teachers will learn how to use existing teaching material to develop a program for differentiation and excellence. Depending on the needs of the teacher, this can be on a school-wide level or just in their own lessons

NORWAY

N.1 LEARNING LANDSCAPES

Technology and design

Siri Krogh
Melvold Ungdomsskole, Oslo
Physics, Mathematics, Others

Funs, creative and practical work with Technology and Design. In the project simple models and toys have been made which give students a better understanding of, electric circuits, hydraulics and mechanics. By making models, which utilize these principles, students gain a better understanding for themselves. The subject "Technology and design" are a subject where science, math and art are working together. The focus is to plan, develop and represent products that are important in our daily life. The interaction between science and technology are important to show and learn the pupils. The scientistic principal will be the foundation to understand the technology.

POLAND

PL.1 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Young explorers – physics and chemistry for kids

Edyta Dzikowska, Hanna Moczko
Secondary School in Czarnków
Physics, Chemistry

The project is designed as a help for kindergarten and primary schools teachers. With its help we want to point out possibility of introducing young children into the world of science. Project is planned in a specific way to inspire young kids to discover surrounding world and have a lot of fun at the same time. We want also to inspire other teachers to action.

PL.2 INQUIRY-BASED LEARNING

Biophyics at hand

Aneta Mika
VI Liceum Ogólnokształcące im. Stefana Czarnieckiego w Szczecinie
Physics, Biology

Biophysics is a science which applies research methodology characteristic of physics to perform the analysis of the structures of organ systems, biological phenomena and processes. Since a living organism and processes taking place inside it are very complex, biophysical modeling – a simplified method of solving a particular research problem – is applied. Biophysical models made by students themselves combine a number of cognitive elements. Students do not merely get familiar with the composition and operation of a given system or biological structure but also, in order to visualize it, make use of the physical laws and dependencies they know.

PL.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Hocus-pocus, one must focus

Performance
Ryszard Pieluchowski, Jacek Włodarski
Technical Schools in Dobre Miasto
Physics

To perform all experiments there are everyday usage object necessary such as: Glasses, balloons, bottlers, water, a kettle, eggs, empty drinks cans, etc. With the use of 12 wine glasses, two wooden boards and LEDs to enlighten the object there was an unusual musical instrument prepared. The tuning is done by pouring a different amount of water into the glass and marking the level of it next.

The atmospheric pressure phenomenons are always really fascinating and interesting for the audience. Pushing an egg into a bottle or crashing the can with the air pressure is a real 'hocus pocus'. A high voltage performance is always a very impressive one too. To perform it one needs a plasma ball to be bought in shops, a few energy saving bulbs and a luminous tube.

PL.4 SCHOOL COOPERATION

Polish teachers and their students at Joint Institute for Nuclear Research in Dubna (Russia)

Ewa Strugała, Kazimierz Paprzycki
High School – Poznan, Secondary School – Objezierze
Chemistry, Biology, Mathematics

Polish teachers have been cooperating with the JINR in Dubna within the framework of educational part of the Program Bogolubov-Infeld since 2001. High school students have a chance to get familiar with unique research equipment and devices, practical application of research results and contribution of Poles in the works of JINR. They carry out laboratory exercises and deliver presentations on "Physics in the kitchen". The participants get familiar with everyday life of Dubna, visit Moscow and places related to the Russian religious tradition. They also meet Russian youth. The evaluation of B-I program takes place every year at the Faculty of Physics of the Poznań University.

PL.5 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Realization of the international educational program Globe by the students of primary school

Barbara Grześkiewicz
Primary School number 88
Biology, Physics, Chemistry, Others

GLOBE is an international program enabling students to learn about environmental problems. The coordinator of the program in Poland is 'Centrum UNEP/GRID-Warszawa' http://globe.gridw.pl/globe-w-polsce.

Primary School number 88 in Poznań has been participating in the GLOBE program since the 8th of September, 2003.

Students taking part in the program observe, monitor and take measurements of the chosen climate indices, which are then sent via Internet to Washington. As part of the atmosphere examination they measure daily: the type and the degree of cloud cover, air temperature, atmospheric pressure, rainfall and rain acidity. Based on the data and visual observation they analyze the current meteorological situation and assess changes in the atmosphere. Partaking in the program allows students to better understand the global processes happening on the Earth.

PL.6 LEARNING LANDSCAPES

Talent search

Master class
Dr Anna Kaczorowska, Dr Agnieszka Korgul, Marzena Saladra, Konstancja Nowakowska
University of Warsaw and XIX High School, High School-Włoszczowa, Secondary School – Zloty Stok
Physics, Others

The physical competition "Talent Search" was organized in Poland six times. In order to participate in it, you have to send work done in a variety of categories. These categories include:

- writing about physics,
- photography and film,
- visual arts,
- experience,
- teaching physics.

Regulations are designed so that most of the participants taking part in the competition gets a diploma and badge "Golden Quant". Participants do not solve physical tasks. Contest is an alternative to the Olympics, and the other physical competitions. The main prize is the trip to one of the centre modern physics in Europe.

PL.7 LEARNING LANDSCAPES

Contests in physics teaching

Stanisław Plebański, Wiesława Idziak
Zespół Szkół Ponadgimnazjalnych nr 1 w Kaliszu and I Liceum Ogólnokształcące Jarocin
Physics, Others

The primary aims of this project are to arouse various forms of students' creative activity like:

- research skills development
- presentation skills and public speaking skills development
- research, selection, transformation and creation of information
- the use of techniques and means of communication like: poster, photography, project, multimedia presentation, literary creations (poem, essay, ect.)

The contests are thematic and are concerning a specific topic or problem related to understanding of surrounding world and science development.

The contests were summarized by a popular science session and exhibition of best works.

PL.8 LEARNING LANDSCAPES

About a bit romantic meeting of Electricity with Magnetism and what happened next

- Performance
- Ewa Wegner, Piotr Wegner, Urszula Grabowska, Hanna Korpik
- Prof. S. Kielich Middle school in Borowo
- Physics, Others

Our performance is the following part of the project which was set up eight years ago. We called it "From Gimnazjum to University". The main aim of the project is to interest young people in Science and Maths. We are using different artistic ways of presenting scientific achievements to tell the history of discovery of electricity, magnetism and electromagnetism and their importance in the development of our civilization. We travel through the centuries from the ancient Greece up to the present times and we underline the idea of protecting our planet. All important issues are presented in the form of theatre, films and song. The play includes a rich scope of multi-media and visual effects.

PL.9 LEARNING LANDSCAPES

From lower secondary school to university

- Urszula Grabowska, Hanna Korpik, Piotr Wegner
- Secondary School - Borowo
- Physics, Others

A presentation of educational activities based on theatre like performances explaining the laws governing natural phenomena, taking part in Science and Art Festival in Poland and Science on Stage Festival competitions, establishing contacts with school of higher education.

PL.10 INQUIRY-BASED LEARNING

The measurement of temporary air dustiness

- Adam Grześka, Agnieszka Grześka
- Secondary School - Warka
- Chemistry, Biology, Physics

The aim of the project is to interest students in environmental protection issues. Methods of air pollution monitoring and assessment of air quality. Promoting environmentally friendly behavior among young people. The experiment consists in measuring dust concentration: The first part of the bag is filled with air. Put the funnel with the filter into the air bag. The second part of the experiment is to investigate contamination at height of 2 meters.

PL.11 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Blow physics

- Adam Buczek
- Poznan University of Technology
- Physics, Others

Our project has been devoted to experiments presented fluid mechanics laws: Heron's engine, ping-pong cannon and vortex ring generator.

PL.12 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Science experiments in the primary school

- Katarzyna Kowalska, Helena Howaniec
- Anglojęzyczna Szkoła Podstawowa przy Szkole Europejskiej
- Biology, Chemistry, Others

Three experiments for small children that show very effectively some chemical and physical aspects of different substances.

In the first experiment, children can admire the effect of chemical reactions between baking soda and vinegar (imitating volcano eruption). The second one enables them to distinguish between different liquids according to their densities (higher or lower level in the glass). In the third, they learn about healthy food, what kind of products should be avoided because of bad effect to bones and teeth.

PL.13 INQUIRY-BASED LEARNING

Sciene always cross borders

- Dariusz Maliszewski
- Zespół Szkół Ponadgimnazjalnych Nr 2
- Physics

First borders which cross science and science teaching are geographic and political borders. Now we have united Europe but it was not like this in the past. Europe was divided by the reason of wars, religious or political opinions. I will present a few devices, which in past crossed borders of countries and continents.

PL.14 INQUIRY-BASED LEARNING

GEOGEBRA – from elementary school to university level

Zbigniew Trzmiel
High School - Leszno
Mathematics, ICT

GeoGebra is a free mathematics software for learning and teaching. The user-friendly packet contains interactive graphics, algebra and spreadsheet. We can publish the results by exporting them into web files (java applets or html files).

For example, as the input data we can use a basketball trajectory obtained from the video measurements. The application helps students to construct a model, understand and explain the motion of the thrown object. We verify our model when the graph of the parabolic function covers exactly the experimental points. Finally, when we drag the ball, we get the parameters of motion and temporary values. There is a correlation between the theory and reality.

PL.15 INQUIRY-BASED LEARNING

Natural Environment – contemporary pollution

Aleksandra Karasek
High School - Wielun
Chemistry

The contamination of cadmium, lead and aluminium has been examined in the experiments. Useful vegetables frequently gather a big amount of toxic metals in their edible parts. The sourer soil is the more heavy metals are taken. They come on food chain and accumulate in organisms, because they cannot be metabolized.

The project also focused on the influent of acid rain on the condition of pine needles.

The SO_2 is the reason of chlorophyll decay and the earlier fall of needles.

The experiment allows us to gain comprehensive knowledge about pollution of the natural ecosystems and their effect on living organisms.

PL.16 INQUIRY-BASED LEARNING

Surprising and amazing effects of energy transmission

Zdzisław Smolarz
Vocational Schools -Sroda Wielkopolska
Mathematics, Physics

The main objective of this presentation is to demonstrate different aspects of energy transmission, in particular elements which accompany the process of transmission and energy transformation. This presentation will chiefly aim at drawing attention to transformation of mechanical energy.

PL.17 SCHOOL COOPERATION

Bielsko-Biała protect the climate

Workshop
Janina Kula, Aneta Gut-Sulima, Anna Handzlik, Katarzyna Kordas
High School - Bielska-Biala
Physics, Mathematics, Chemistry, Biology

The theme of energy conservation and climate protection is an issue necessary to be promoted at present, especially among the younger generation. The implementation of this education was based on a combination of academic tasks Comenius project entitled "Friendly people, friendly energy" and the European ENGAGE project, whose only partner in Poland is the city of Bielsko-Biala. The overall name of this educational and promotional campaign ion the school premise is: "Bielsko-Biala protect the climate – school activation." The aim of the campaign is to shape responsibility for the environment and raise awareness about renewable energy sources. Our work has an interdisciplinary character.

PL.18 INQUIRY-BASED LEARNING

Why are knives sharp and what does it have to do with wandering glaciers?

Regina Zawisza-Winiarczyk, Joanna Kalisz
High School-Lublin
Physics

Experiments concerning pressure of solids and the application of results in everyday life. The project aims to inspire other teachers to implement easy experiments during their classes

to show physics as something accessible, practical and fun, thus encouraging students to take more interest in the subject.

PL.19 INQUIRY-BASED LEARNING

Young's Explorers Club

Katarzyna Górkiewicz, Anna Pikus
Copernicus Science Centre - Warszawa
Chemistry, Biology, Physics

The Young Explorers Clubs Program (KMO) is dedicated for the children, students and their educators all around Poland.

Its main purpose is to interest young people in science and to encourage them to search knowledge and actively explore the world. The KMO young explorers carry out experiments and scientific research. All clubs are affiliated to a nationwide network. Their communication platform is a website: www.kmo.org.pl – a social network that connects users with other clubs, helps them to share ideas and inspiration, to plan collective research projects and to take part in competitions. The website contains also a database with experiments recipes and gives a possibility to contact with Copernicus Science Centre explainers specialized in science demonstrations and workshops.

PL.20 INQUIRY-BASED LEARNING

Physics tells you the truth

Joanna Misiura
High School - Boleslawiec
Biology, Chemistry

The main objective of the project "Physics tells you the truth" is to present application of natural science in selected methods and techniques of criminal researches. Prepared for the festival "Science on Stage 2013" in Poznan presentation describes the experiments personally performed by Luke, his own drawings, photographs and fragments of music. To intensify expression of Luke's performance was varied by dialogue with his friend who asks puzzling and insightful questions. The valuable source of information for students making the presentation was a few hours stay in a modern forensic laboratory. On the stand during the festival our project will be presented in the form of educational poster, experiment and friend media stand with presentation in English.

PL.21 INQUIRY-BASED LEARNING

Warm, Bright and safe – physics in the house

Joanna Misiura
High School - Boleslawiec
Biology, Chemistry

The main goal of the „Warm, Bright and Safe – Physics in the House" project is to present

how physics can influence the quality of our life. Intelligent houses of the 21st century are filled with motion and smoke detectors and are heated by eco-friendly heat pumps. On top of that cheap house lighting is facilitated by energy-saving LED lamps. The project includes detailed descriptions of conducted experiments, drawings, photographs and a film with an adequate screenplay. In each of the discussed examples, the emphasis was put not only on benefits but also on dangers and losses. There will be a festival booth in which we will demonstrate the project, using an educational poster and experiment.

PL.22 INQUIRY-BASED LEARNING

Colours of light

Karolina Jarząbek
High School - Bolesławiec
Biology, Chemistry, Physics

The aim of my project is to analyse various aspects of the colours of light. Together with a group of pupils we will develop the topic of decomposition of light and the biological importance of light. In the first part we will choose a few substances and test their ability to decompose light. The second and more important part of the presentation will be the experiment studying the impact of the colour of light on the intensity of photosynthesis in plants.

PL.23 INFORMATION AND COMMUNICATION TECHNOLOGIES

From Mechanics to electronics by creating Physics Lab equipment

Dobromiła Szczepaniak, Wojciech Gańcza
High School Wroclaw
Physics

There is a lot of physics lab equipment on the market. However, we think there is no better apparatus that the handmade one.

Building the equipment together with students, we can not only describe, but show during real technical experiment the details of physics in the context of lessons. We would like to present equipment created during physics club meetings and some experiments that can be performed with that.

PL.24 INQUIRY-BASED LEARNING

Consumer chemistry in clasroom. Science from the supermarket.

Danuta Jesiak
High School - Rogozno
Chemistry

Activities that show students a practical use for chemistry using common items such as food products, pharmaceuticals, and household products as sources of chemical compounds are presented.

Chemistry is a big part of your everyday life. You find chemistry in daily life in the foods you eat, the air you breathe, your soap… What Chemical Substances can you find at a supermarket?

Demonstrations with Home/Materials from a Supermarket:
⋆ Vinegar and Baking Soda – Production of Foam
⋆ Alka-Seltzer Rocket

Demonstrations Requiring Chemicals from a Laboratory and a Supermarket:
⋆ Cooper Cycle
⋆ Bubbles filled with hydrogen or lighter gas
⋆ Polyurethane Foam
⋆ Fire with Steel Wool and a battery
⋆ Burning of alkohol

PL.25 INQUIRY-BASED LEARNING

We live on Earth – the rotating planet

Talk
Jerzy Jarosz, Aneta Szczygielska
University of Silesia- Katowice
Physics, Others

Project based on the mechanical, 2-dimensional model of rotating Earth, which allows to observe and examine in two reference systems: centripetal acceleration, Coriolis and centrifugal forces, effect of Coriolis force acting on moving objects, phenomena observed in nature, such as trade winds and cyclones, formation of river meanders as well as famous experiments like non vertically falling stones or Foucault pendulum.

PL.26 INQUIRY-BASED LEARNING

Light and Sound

Ewa Pater, Barbara Andrzejczyk
High School - Świnoujście
Physics

My science lessons in kindergarten. The experiments present the phenomena in which sound wave influences on radiated light. In Rubens' tube the sound, according to frequency, decides on the height of flame. We produce transversal stagnant wave in a glass plate. If we observe radiant objects through Venetian mirror on the background of common mirror we get endless reflections. The guitar has got a fixed laser, a photodiode and a single string. A small fire put on the rocking table and surrounded by the metal net, changes into high burning tornado. Show the experiments-pop pop boat, Goldberg's machine, humming-tops, photoelectric effect.

PL.27 INQUIRY-BASED LEARNING

Excitement, Enticements in learning

Rafał Jakubowski
Secondary School - Gorzyce Wielkie
Physics

Inspire … Then Educate. The world has become a 'global village' marked by constant innovation that influences cultures worldwide. In this world my greatest dream as a teacher of physics is to inspire my students to learn. New education must be simple. Likewise, at the root of all kinds of education is not only to pass a test, but rather the desire to share experiences from teacher to student and also from student to teacher their technological skills. The product of education will be a clear excitement of learning new things. Together with students we can "Build with enthusiasm a better world than we have today!"

PL.28 INQUIRY-BASED LEARNING

Physics and Toys

Workshop
Rafał Jakubowski, Piotr Chabecki
Secondary School - Gorzyce Wielkie
Physics

This workshop is designed for teachers at all levels in search of fun physics demonstrations using ordinary children's toys as interactive materials. More than 100 toys will be used in the demonstration, and the physical principles related to these toys will be discussed. This workshop will concentrate on toys that illustrate the concepts of force, motion, light, energy, electricity and magnetism. The workshop leaders have found that toys can be utilized at all grade levels from kindergarten to college. These same toys can also be used for informal presentations to public groups of all ages. Participants will be given a small assortment of toys to help start their own toy collection.

PL.29 SCHOOL COOPERATION

Following Archimedes' teaching, how Archimedes' science influences our everyday life?

Izabela Okrzesik-Frąckowiak, Justyna Warzyńska
Secondary School - Wielen
Mathematics, Chemistry

Projects' method is based on an elaboration, planning and accomplishment. The advantages of this method derived from the individual students' work. The project method increases the students' activity and shows the school as a place where creation skills are released. The educational project encourages cooperation and planning of study. During the workshops we will attempt to explain difficult issues that students faced during the educational project: Who was Archimedes and in what times did he live in? How measure buoyancy force and how to check the rightness of Archimedes' principle? Moreover, there will be many physics experiments during the workshops.

PL.30 LEARNING LANDSCAPES

How my students are involved in science events

Maria Dobkowska
Integration Secondary School
Physics, ICT

In our school – because we want more people interested in sciences – we organize together with our most active students different science events: school festivals open to the public, science competitions, scientific sessions, events related to current situation (e. g. Venus transit), etc. For several years we present interesting experiments for the public in our stand at the annual national Science Picnic, Warsaw Science Festival and the Little Man Science Festival. We present our experiments to the young patients at the Child Health Center hospital. Selected examples of these events I will present on my posters and I will show several simple experiments my students play with young public.

PL.31 INFORMATION AND COMMUNICATION TECHNOLOGIES

Physical phenomena around us

Zenona Stojecka
Secondary School Wielun
Physics, Others

During Fair exhibition of most interesting photos from 3 latest editions of Polish national physics and photography competition „Physics Phenomena Around Us" will be presented. Competition is held in 2 categories – Phenomena Observations and Experiments. Additionally, all awarded multimedia presentations submitted to competition will be shown. They are submitted by students from junior high schools and high schools.

PL.32 INQUIRY-BASED LEARNING

How you can "see" sound

Justyna Bartol-Baszczyńska
Secondary School Rogozno
Physics

Activities that show students a practical use for physics using common objects. Our demonstration we want to prove: to understand and admire the sound we do not have to hear it, enough that we can see it and feel its vibrations.

Hand-made: Rubens Tube, Plasma Speaker, The Pyro Board (fire box), the speaker made of a hard disk, vibration of the speaker, which draw on the rubber membrane figures of porridge, dancing on the speaker no- newton's liquid.

PL.33 LEARNING LANDSCAPES

From simple observations and experiments to scientific research.

Mirosław Łoś
High School Czastkow Mazowiecki
Physics, Mathematics, ICT, Others

I propose an educational use in classroom practice images and movies recorded by student, an experimental and observation situation (outside and inside school). The realization of each of smaller projects (planning and doing simple experiments and observations to the end to collect the results and analyze them) – made possible the join the participation of all persons and groups of schools community.

PL.34 INQUIRY-BASED LEARNING

Rotational motion

Stefania Widuch, Marcin Łaciak
University of Silesia, Katowice
Physics, Chemistry, Mathematics

In everyday life we have learnt how to use the centrifugal force connected with the rotational motion. However, the understanding of this issue is problematic.

Starting from the kinematics we will show that the vector of velocity is tangential to the trajectory of the motion. Only Newton's dynamics will not lead us to satisfactory results because we are in a non-inertial reference frame. We will try to see this situation from two different points of view. What can we see: a centrifugal force or a centripetal force? What can cause this force connected with the rotational motion? How to control it and makes it useful for us at home, in a laboratory, at work and during playtime?

PL.35 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Science experiments for future engineers

Anna Hajdusianek
Technical University Wrocław
Physics, Others

Performing scientific experiments for children is an interesting and important part of stimulating their development. In this article there are presented several experiments with friction and which are introducing children to the technical and engineering issues. We present how to do with the children ball bearing, bolt, Archimedes' screw, how to build high and strong buildings, and how to transport blocks of rock etc.These experiments are easy to carry out and can be done with commonly available materials.

PL.36 INQUIRY-BASED LEARNING

Physicists gala

Wiesław Piotrowski
High School Szczecin
Physics, Mathematics, Chemistry

- Discovering new talents
- Exploring our skills – implement our own ideas through experience: shows of physical phenomena and physical processes,
- Perceiving the beauty of the surrounding nature through the lens of experimental physics
- Form of activity for all the students in the development of interest in the natural sciences

PL.37 INQUIRY-BASED LEARNING

Simple experiments in optics

Anna Maksimowska
I High School in Ostroleka /Mazovian In – Service Teacher Training Centre Department in Ostroleka
Physics

I will present several experiments in optics, for example: total internal refraction of light, images in the lens, monochromatic light crossing the diffraction grating. I have been carrying out experiments with my students in front of the class. They are feasible in everyday school life and can be financed with reasonable expenses. These experiments have a sustainable effect. They are all set to be implemented.

PL.38 INQUIRY-BASED LEARNING

Foton and Neutrino journals and more than that ...

Zofia Gołąb-Meyer
Institute of Physics Jagiellonian University, Polish Physical Society
Physics, Others

Foton and Neutrino journals, issued quarterly from 1991 (Foton) and 2008 (Neutrino) by Institute of Physics, Jagiellonian University are directed to physics students, high school students, pupils, teachers. Their purpose is to transfer to teachers and high school students knowledge about physics, important news in physics research and to provide didactic materials on physics topics. Editors of Journals are co-organizers of such events as: Kindergarden of Physics Academy of Physics, physics workshops for pupils, contests in science and physics (Firefly, Lion Cub), the local science festivals and The Researchers' Night.

PORTUGAL

P.1 LEARNING LANDSCAPES

The sky in your hands

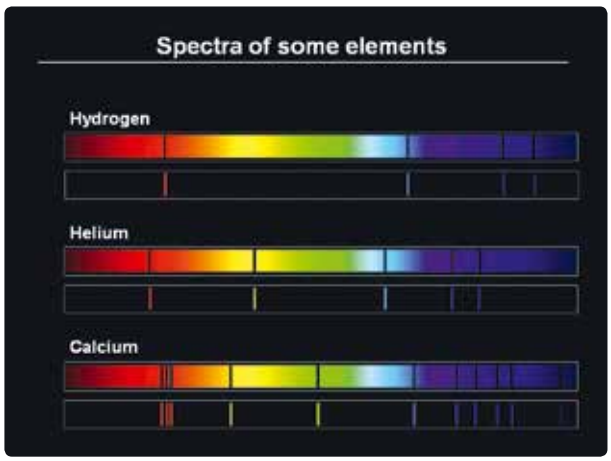
- **Workshop**
- **Isabel Borges, Lina Canas**
- **Planetarium Calouste Gulbenkian / Science Alive Centre, NUCLIO / Galileo Teacher Training Program**
- **Physics**

"The sky in your hands" is a project created in 2009, the International Year of Astronomy, which goal is to create an image of the Universe for the visually impaired and blind public as close as possible to the real world, seeking to foster other skills related to the understanding of science. It includes a planetarium show with an audio component and tactile semi-spheres that public can touch and follow a story about constellations and other objects in the Universe. A touchable exhibition with relief images is also available. Now this open source project goes inside the classroom using simple and inexpensive materials to teach astronomy and inspire teachers.

P.2a INFORMATION COMMUNICATION TECHNOLOGY

From the stars to the atom

- **Carla Isabel Ribeiro**
- **Escola Secundária Joaquim de Araújo**
- **Chemistry, Physics**



"From the stars to the atom" is a set of five presentations, in English, Portuguese and Spanish, designed for chemistry teachers. They all begin with a question and are to be explored with the students, so that in the end they can answer the initial question. The presentations are: "How is matter organized in the Universe?" (with real astronomical images of the Universe); "How was the Universe formed?" (Big Bang Theory); "Where do elements come from?" (Primordial and stellar nucleosynthesis); "How do we know what stars are made of?" (Identification of chemical elements through their spectra); and "What is the origin of the spectral lines" (Bohr's atomic model).

P.2b INFORMATION COMMUNICATION TECHNOLOGY

Discovering the sky

- **Carla Isabel Ribeiro**
- **Escola Secundária Joaquim de Araújo**
- **Physics**

"Discovering the sky" is a set of seven presentations about the night sky aimed at young students. They are: "Motion of the stars in the sky", "Northern Star"; "Constellations", "Constellations throughout the year", "Legends in the sky", "Constellations of the zodiac" and "Crux". The images and videos used were generated with the freeware planetarium program Stelarium, and they recreate the night sky as seen from the Earth (Northern and Southern hemispheres). The presentations are in English, Portuguese and Spanish.

P.3 INFORMATION COMMUNICATION TECHNOLOGY

A new light on Chemistry

- **Carla Isabel Ribeiro, Isabel Maria de Lima Fernandes**
- **Agrupamento de Escolas de Joaquim de Araújo, Escola Secundária de D.Dinis - Santo Tirso**
- **Chemistry, Physics**

The project explores the use of glow sticks as a cheap and different way to teach Chemistry. They can be used in the study of chemical reactions and how temperature influences their rate. The discontinuous spectrum of light emitted by glow

sticks, a cold source of light, can also analysed and compared with a continuous spectrum of a hot source of light to understand that the mechanisms involved (chemiluminescence and black body) are different. The project also distinguishes between phosphorescence and fluorescence presenting materials with different relaxation times.

Science on Stage Festival 2013 · Słubice/Frankfurt (Oder)

ROMANIA

RO.1 INQUIRY-BASED LEARNING

Infotube

Corina Lavinia Toma
Computer Science High School „Tiberiu Popoviciu“
Physics

The INFOTUBE project showcases the electromagnetic induction phenomenon in two different ways. At the same time, it allows for data recording and processing through ICT.

The purpose of the project is to observe what happens when a magnet is pulled through the INFOTUBE.

What can be observed:

- the deceleration of a permanent magnet (rare-earth neodymium) caused by Eddy/Foucault induction currents
- the lightning of LEDs caused by induced currents in the two induction coils.

These observations are done with the help of a Smartphone/accelerometer, which fulfills two functions, as the body which pulls the whole system and also as a data acquisition device.

The project INFOTUBE combines the classic experiments with modern investigation and recording methods.

RO.2 LEARNING LANDSCAPES

The MaST Game

Oana Bârtaș, Camelia Chinde Pop, Negruțiu Codruța
”Iulian Pop” Finance High School
Physics, Chemistry, Biology, Mathematics

Interdisciplinary content and learning activities.

This game starts with the letters MaST (Ma – mathematics, S – Sciences, T – technologies) built on electric circuits linked to a set of interdisciplinary questions that might be solved by means of five experimental kits (L = 18 cm, l = 14 cm).

This game may involve 2 pupils or 2 pupils groups which have to go through an interdisciplinary road map. The pupil/group that will answer accurately at all questions will follow the red and yellow leds. While going on the game's trail, the pupils will develop their practical skills by means of experiments existing in the kits named conventionally: DNA, Detective, Solar System, Respiration-photosynthesis, Values Markets.

RO.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

An open mind for Discovery-Life Sciences

Ioana Alina Mitrea
”Constantin Brancusi” High School
Biology, Physics, Chemistry

“An Open Mind for Discovery” – Life Sciences, is a Comenius project that was funded with support from the European Commission.

The main target of the project was to elaborate a complete set of efficient and easy to apply methods, in order to attract students towards the interdisciplinary study of Biology, Physics and Chemistry.

The project involved pupils from primary clases up to 10th form.

The study themes selected were: sound, light, fluids, air, movement and photosynthesis, all of them belonging to the curricula of each country participating in the project.

The outcome consists in a bilingual book and a CD, which contains good practice examples and themes description.

RO.4 INQUIRY-BASED LEARNING

EquiMaST

Ioan Balc, Iudita Balc
”Onisifor Ghibu” High School,
”Iuliu Hatieganu” Secondary School
Mathematics, Physics, Chemistry, Biology

This project focuses on the unitary treatment of the concept of equilibrium regarding perspectives from various Mathematics, Physics, Chemistry, Biology and Information Technology. The emphasis is on the application of theoretical knowledge to

explain the daily life phenomena and to develop strategies, methods and key skills to MaST subjects. The development of didactic tools enhances the collaboration between students and teachers and also the teacher-student interactions. The use of Microsoft Office is also a key competence for this work.

RO.5 INQUIRY-BASED LEARNING

Green Cosmetics

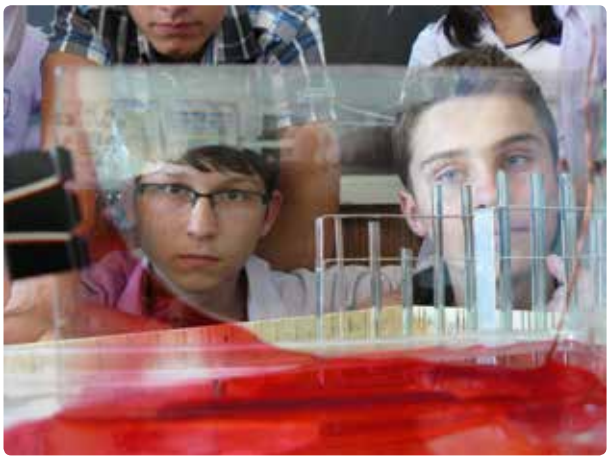
Felicia Boar
"Alexandru Borza" High School
Biology, Mathematics, Physics, Chemistry, ICT

The aim of this project is connected to one of the important aspects of schools activities namely education for sustainable development, providing multiple learning opportunities for students. Another aspect focused on the education for health of the pupils that might be accomplished by new, integrative, interdisciplinary approaches, by helping them to learn about bio products. This project promote a change in the school's educational policy by creating an all school innovative network focused on pupils' needs and interests and facilitating development of pupils' key competencies in the Biology, Chemistry, Technology, Computer science and Economics teaching subjects by means of inquiry learning and research projects.

RO.6 SCHOOL COOPERATION

Water – miracle and life

Marginean Steliana
"Queen Mary" Secondary School
Biology, ICT, Mathematics, Physics



The purpose of the project „Water – miracle and life" is to offer genuine real-life situations and to identify the phenomena studied in physics, biology and model them mathematically using IT technology.

Also through this project aims the promotion of innovative and creative approaches to the subjects mathematics, physics, computer science and biology, with the aim of realizing interdisciplinary approach to content.

SLOVAKIA

SK.1 INQUIRY-BASED LEARNING

Water in motion

Zuzana Ješková
Faculty of Science P.J.Šafarik University in Košice
Physics

The project Water in motion presents a series of experiments aimed at exploration of water motion caused by capillarity, gravitational forces and external pressure. The designed experiments involve collisions of water streams, water disc caused by water stream falling down vertically, gentle water stream and its structure, how does the siphon work, how does the water move in a capillary tube, Putt-putt boat, and others.

SK.2 INQUIRY-BASED LEARNING

Balloons and its properties

Ľudmila Onderová
Faculty of Science P.J.Šafarik University in Košice
Physics

The project Balloons and its properties present a series of simple low-cost experiments that can be carried out with balloons using very simple materials found at home. They involve experiments on different physical concepts, such like air pressure, forces of buoyancy, thermal expansion, sound properties, elasticity, etc. The experiments can be carried out at different ways, such like interactive demonstrations or students' independent experimentation as well as the assignments carried out as students' project work.

SK.3 INQUIRY-BASED LEARNING

What sound can do?

Mária Nováková
Gymnazium F. Assisi, Vranov nad Topľou
Physics

The project "What sound can do?" presents a series of experiments aimed at exploration of acoustic propulsion, moving object by sound during Helmholtz resonance, photoacoustic effect and standing wave pattern on a string. The designed experiments involve Helmholtz carousel, apparatus for production of sound by light and standing wave distribution on string model.

SK.4 INQUIRY-BASED LEARNING

Pet bottle physics

Mária Goláňová
Gymnazium D. Tatarku, Poprad
Physics

The project PET bottle physics presents a series of experiments using PET bottles. The designed experiments involve inertia demonstration, lens properties, light refraction, centrifugal forces, under pressure paradoxes and thermal insulation.

SK.5 INQUIRY-BASED LEARNING

Chemistry in everyday life

Mária Ganajová
Faculty of Science P.J.Šafarik University in Košice
Chemistry

Today there are about half a million chemical products used at home for everyday use, including foodstuffs, cleaners, detergents, cosmetics, and other products. Within the project it is shown what are some kinds of food composed of and how we can prove its content (why we cry when we cut onion, what substances an orange, salt, baking powder, fruit tea contains, etc.). There are also experiments on the composition of mineral waters, rain water, drinks and fruit and vegetable juices presented. The project also involves experiments on what principles the baby nappies work from the point of view of chemicals that they contain in order to absorb liquid.

SLOVENIA

SLO.1 INQUIRY-BASED LEARNING

Innovative materials in physics class

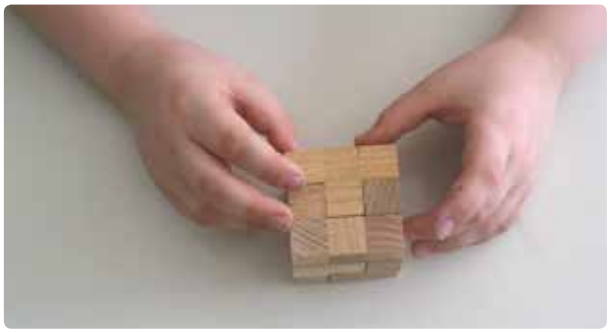
Jaka Banko, Luka Bole, Dalibor Šola
The National Education Institute
Physics

Findings of modern science have led to the discovery of new materials. Their interesting properties can be used as a motivational tool in science classes. We will show a few possibilities of how to introduce those materials, through interesting experiments, to our youth. Besides, we will demonstrate the production of lenses made of wax.

SLO.2 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Instant ice

Urška Kenda Mavrar
Primary school Dušan Munih Most na Soči
Physics, Chemistry



Some people do not belive, that you can make ice in 5 seconds witout freezer. If you have some useful accessories like lighter, straw and some things that are indispensable in every kitchen, you can do this experiment.

SLO.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Top to Bottom Change, Attractive Chemistry Class Experiments

Romana Turk
Primary school Tržič
Chemistry, Others

Teachers often look for new, more attractive routines for executing famous experiments. The described attempt is made with a view to the very famous experiments demonstrate more clearly and more attract the interest of the students.

The experiment "Changes from Top to Bottom" is a display of step by step color changing, resulting from the changes in the pH solutions, which we examine. It allows for a gradual observation of these changes "in levels".

Therefore students can monitor the pH level changes and other changes (precipitation) on the vertical line.

SLO.4 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Levitation and other disillusions

Master class
Ambrož Demšar
Primary school Simon Kos Podbrdo
Physics, Biology, Mathematics, Chemistry

Levitation is the act of ascending into the air and floating in apparent defiance of gravity.

The easiest is Anti Gravity Magic Ketchup Trick (changing water pressure in plastic bottle make ketchup sink), then I continue with tricks with Invisible thread and the Balducci Levitation (I stand on the front of one foot, while raising the other foot)

At the end of the year I demonstrate Matrix levitation. Students see me balanced while leaning backward at an impossible angle. http://www.youtube.com/watch?v=TIJcjwhPj8o. I comfort them with opening of Aerodium (vertical wind tunnel) in Slovenia in 2013. The wind stream of 200 km/h will lift them up enough to enjoy "Zero gravity".

SPAIN

E.1 INQUIRY-BASED LEARNING

Physics experiments with electric household appliances

- Talk
- Hugo Pérez
- Universidad de Murcia, MURCIA
- Physics

All over we are surrounded by electric household appliances that are, to a great extent, the consequence of advances in science, particularly in physics. Among these appliances we can mention the following: microwave oven, mixer, vacuum cleaner, hairdryer, record player, television and much more. Generally, the use of these devices is restricted to activities for which they were originally devised: heating, whipping, sucking, drying... However, it is also possible to use these items to do physics experiments, directly with the whole apparatus or by using some of its constituents.

E.2 INFORMATION AND COMMUNICATION TECHNOLOGIES

5 seconds: Lorca's earthquake

- Ana Barranco, Juan Manuel Delgado Pérez
- IES J ibanéz Martín, MURCIA
- Physics, Others

The Southwest of Spain is a seismic area where earthquakes are usual. We were not prepared for the shake of the eleventh of May in 2011, an earthquake of 5.3 Mw magnitude. We think that science is a very effective tool to understand the reality; increasing our knowledge about a subject will let us better understand what surrounds us and also help us comprehend what has happened.

For this reason we begun the project 5 SECONDS whose objective is to better understand the causes and effects of the seismic movements and, particularly, the Lorca´s earthquake.

The students were invited to choose one of the several subjects. Theses formed a mosaic intending to achieve a more complete general view.

E.3 INQUIRY-BASED LEARNING

Recreative Physics

- Miguel Cabrerizo
- University of Granada
- Physics

Year after year I have collected experiments that judged useful to empirically illustrate my courses of General Physics, Mechanics or Thermodynamics. To my surprise, this repeated eagerness has been the germ of a Recreative Physics subject for students, a book, a collection of experiments, a Web page, a number of posters, etc., that collect a varied catalogue of surprising experiments going from the pure physical facts to everyday experience. I have tried that these experiments be both suggestive and capable to quickly catch the student s attention.

But I also have sought that they were reasonable both from the educative and economic points of view. That is, they are designed for educating and attracting the students, by means of their paradoxical and funny ingredients. Undoubtedly, the educative success would be evident if the students fall in the temptation of successfully showing them to their families and friends. This will have the additional merit of contributing to generational re-education.

E.4 INQUIRY-BASED LEARNING

Science and technology a working tool in a school for all

- Master class
- Manuel Hernández, Beatriz Martín-Oxinalde
- Fundación Peñascal, BILBAO
- Mathematics, Physics, Chemistry, Biology, Others

We want to show you some projects we develop in our workshops, such as one model of a steam engine which works normally and have been manufactured for our students. For that purpose, to be able to manufacture it with guarantees of success, it's necessary they learn many mathematics concepts,

technical design, physic and so on. Furthermore to collect information in the class room we make trips to see real and old steam engines and we ask questions to knowledgeable persons on the subject in our environment.

Things like these make the students show interest to learn the different subjects because they see the practical utility of the knowledge learned, and of work they should develop to fulfill all our many and different projects.

E.5 INQUIRY-BASED LEARNING

Reacciona Project

Diego Tobaruela, Susana Mª Martín Salguero
School El Carmelo, Granada
Chemistry

It is interesting to observe our present-day society's opinion on Chemistry. It is usually associated to complex and abstract concepts, the importance of which is not ignored but seems to be isolated from the world around us. In this project we would like to prove the strong relationship between our world and this discipline.

For this reason, we developed some experiments where we will associate, in a simple and attractive way, glowworms, wasp and bee stings, heating a cup of coffee or the amount of gas in a soft drink, with concepts like chemiluminiscence, acid-base reactions, thermochemistry or chemical balance.

These and other chemical experiments are part of ReAcCIONa, a project which intends to demonstrate the importance of science in our world and to motivate students to do research and experimental work.

E.6 INQUIRY-BASED LEARNING

Experiments and simulations on forensic science: A motivating approach for learning chemistry.

Fina Guitart
CESIRE-CDEC, BARCELONA
Chemistry

We present a set of lab and virtual experiments in the context of forensic science to be used as hands-on activities in science classes at secondary level. These resources aim to promote students interest towards science, to foster learning about chemical concepts and to develop the students' scientific competencies. The lab experiments include haemoglobin detection, metallographic etching, fingerprint detection, shoe prints conservation, identification of counterfeit banknotes, ink identification and textile fibers observation with a digital microscope. Two activities using a virtual lab are also included and a wrapping activity oriented to solve a simulated police case is also provided.

E.7 INFORMATION AND COMMUNICATION TECHNOLOGIES

School research work in Catalonia: Between tradition and innovation

Ivan Nadal
IES El Vern, BARCELONA
ICT, Others

The research work is implemented in Catalonia for decades and is part of an official school curriculum. Academically, representing a 10 % of the final qualification of high school.

His tutoring varies by center and teacher. Usually, it begins during the final third of the first year of high school and delivered during the first quarter of the second year. The theme is free and often interdisciplinary. It evaluates both written work and oral presentation in front of an academic tribunal.

It is increasingly important to use new technologies throughout its implementation, monitoring and evaluation. This is intended to improve it as the tutor and student interact and communicate more efficiently.

E.8 LEARNING LANDSCAPES

The engine of human body

Carmen Cabezas
Colegio Base, MADRID
Biology, Physics, Chemistry

The aim of this project is to show how human heart works in our daily life in a simple and didactic way in order to make learning of basics principles about cardiovascular system appealing for student aged 12–18. The work reported here focuses on the heart as a vital organ for life. Therefore, the main objective of this project is to offer students the possibility of discovering and going deeply into heart biology concepts through a practical vision. Biology, Physics and Biochemistry concepts are combined in a heart model realized by students to teach heart engineering and its influences in our life.

E.9 LEARNING LANDSCAPES

Some curious experiences to teach chemistry in the classroom

Carlos Duran
Centro Principia MALAGA
Chemistry

We present a series of experimental demonstrations which can be carried out in the classroom to arouse the curiosity, the motivation and the interest of students for chemistry and for science in general. These experiences are presented giving students absurd explanations so that they wonder what is actually happening and try to find a scientific answer.

E.10 INQUIRY-BASED LEARNING

The Five ways to produce a movement of the electric current

Laureà Huguet
Instituto Joan Oro, LERIDA
Physics, Chemistry, Others

There are five basic ways to produce a movement of the electric current. The work presented is a compilation of five physical mechanisms that produce the electronic movement in a solid conductor. The proofs of these five mechanisms are simple, interactive and very educational.

Students can have an exact idea of the different energy conversion to electricity.

Experiments show the electrical energy conversion by the following physical mechanisms:
a) Chemical reaction (electrochemical effect)
b) Photoelectricity (photovoltaic effect)
c) Piezoelectric effect.
d) Electromagnetic effect
e) Thermoelectric effect (Peltier-Seebeck)

E.11 INQUIRY-BASED LEARNING

In vitro fertilization by stimulation with potassium chloride in paracentrotus lividum

Ismael Bermudez
Colegio Maria Auxiliadora, ALGECIRAS
Chemistry, Biology

IVF is a used in animals for a variety of purposes, such as the improvement of genetic characteristics in certain species. As sea urchins reproduction has external fertilization, developmental stages are clearly defined. Our project is based in IVF using as an example 'Paracentrotus lívidus', a common species of sea urchin found the Algeciras bay. We used a solution containing KCl for stimulation and release of the sea urchin's gametes. Then, we mixed the gametes in salty water and let nature to do its job. Once the zygote had been fertilized, we were able to watch, with the help of a microscope, the different developmental phases of the embryo. We worked to identify them and at the same time to carry out research on how different chemicals affect the reproductive process, as it is very sensitive to enviromental changes.

SWEDEN

E.12 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Why a salty sea?

Meritxell Bartroli
Escola Mare de Déu de Montserrat
Others

The experiment has three different parts. Part one: You make a model simulating a mountain made of layers of sedimentary rocks. It is made from a plastic box filled with three layers of clay, salt and sand while the sea is made with a tray. Part two: You pour water onto the sand layer. The water filters through the top porous layer and flows down through the salt layer, dissolving some of it. The water become salty and runs toward the basin. Part three: The results are shown by tasting the water from the basin, observing the structure formed in the front part of the box created from the dissolution of salt, collecting water from the basin and reprecipitating the salt using a heat source.

S.1 INFORMATION AND COMMUNICATION TECHNOLOGIES

The Flipped classroom

Workshop
Daniel Barker
Norra Real gymnasium
Physics, Mathematics

Traditionally, teachers plan the lessons and teach the student so that his students afterward can perform something. Do scientific calculations for example. Often the students can follow what the teacher do during class. Later back home to many students don't know how to do what the teacher explained.

In my method "the flipped classroom" the teacher video record his briefing and publish it in advance so that the students can watch it (as many times they want). The students can start doing a few tasks at home and can go back to the video if they need. Back in school both the students and the teacher are prepared and can start work immediately.

S.2 SCHOOL COOPERATION

The World is my classroom: Using Social media to promote International Scientific Collaboration in Middle school

Master class
Fiona Luna
Internationella engelska skolan
Biology, Others

After two years experimenting with the use of social media tools within my classroom, I wondered how I could use this to bring the outside world into my classroom. I have investigated whether it is possible to use social media to create relevant opportunities for students to create opportunities to explore new cultures and provide real experience of doing science. This paper describes what happened when a school in Sweden linked up for an ecology project with a school in the USA.

S.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Berta the dragon and her wonderful world of Chemistry

- Workshop and performance
- Anna Gunnarsson
- Navet Science center
- Chemistry, Others

Chemistry with Berta is a great activity for children 4–8 years. Her activities can really cross borders – as her activities are interesting to children anywhere – with every day materials. Berta loves to tell stories about her adventures and the lovely Chemistry we have around us every day. To ensure that children like the activities, they have been selected with children in science centers. And one thing that we really have seen is that if the activities are great for children (to see and do at their level) then it's fun for everyone! Berta has the ability to pick activities that are sometimes a bit unexpected. Her favourite is to mix things that wouldn't normally be together!

S.4 INQUIRY-BASED LEARNING

Inquiry based learning in primary school

- Workshop
- Christoffer Danielsson
- Gärdesskolan
- Chemistry, Physics, Biology

Inquiry based learning has been more highlighted in the new Swedish curriculum (Lgr11) and should reflect the scientific work and thought that characterize science.

This workshop gives an example of how it can be implemented in the age of 12–16 years using existing experiments and turn them into open and to learn how to create own new.

You will receive a presentation of the work I have done at my school for the past four years in terms of context, time use, results, examples in content and how to create your own material. You will get to try an example and together with other participants get to create your own based on a model I developed. It should be seen as a tool and are meant to be adapted based on your "micro-environment" you work in.

S.5 INQUIRY-BASED LEARNING

Poetry in Chemistry

- Anders Erixon
- Strandskolan
- Chemistry, Biology

We wrote our own chemistry books on handmade paper with handmade ink. Paper made from recycled papers or polyporuses (mushrooms). Ink made of mushrooms, berries and chemicals. One illustration and one poem or text for each chapter in the chemistry book. We tried this with both 9th grade students from a compulsory school and A-level students in an upper secondary school (gymnasium).

The older students studied modern poetry with their Swedish language teacher before the project. The younger ones were marked both in Chemistry and Technology.

Time for the project: About 10 x 60 minutes.
The books were exhibited in the local library.

S.6 INQUIRY-BASED LEARNING

Density with sugar solutions

Margareta Hynge
Adolf Fredriks musikklasser
Chemistry, Physics

In this lab, students learn how to determine the density of a liquid and then challenge themselves to take these miscible solutions and devise a way to combine them so that they remain as separate layers. Students learn to work and think in a scientific way. After performing the lab, they will understand the concept of density of liquids, which can otherwise be quite difficult. This Activity contains different levels of difficulty and can be used for several ages of students. It can also be used as a peer to peer lesson. Other subjects such as mathematics can be integrated.

S.7 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Studying the decomposition of dead animals/Playground physics

Master class
Anette Barr
Mumindalens förskola
Physics, Chemistry, Biology

I work as a preschool teacher in Klågerup, Svedala Sweden. My major subject is science and outdoor methods. Through outdoor education I have developed an approach that reveals science in the preschool everyday and opens the children's desire to learn.

In the past I have been involved in different projects, among them one involving physics that can be experienced at the playground. By focusing on the physics in the playground, we want to give the children an opportunity through their own spontaneous studies to lay a foundation for the understanding of physics. For example through childrens questions such as: What is snow? Where do rainbows come from? What happens to dead animals in nature? We teach the children science.

S.8 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Childrens best tables

Fredrik Lundgren, Jenny Andersson, Laila Petersen
Hattstugans förskola
Mathematics, Others

Best Children's Table from a Science, Mathematics, Technology and Environment / Health perspective

The children get to experience different tastes and themselves decide whether it tastes good or not. They also help to put into words taste words: Sweet, Salt, Sour and Umami. They may describe and put into words their experiences in relation to this work. The children follow recipes that are made for one portion, and may take away the finished portion home. It creates a lot of good discussions between children and adults and is a good basis for the children to shape and reflect on their own hypotheses. How is it that my bun was lower than my buddy bun? How is it that my dough is stickier than my buddy dough?

SWITZERLAND

CH.1 INQUIRY-BASED LEARNING

Chemistry for dummies

Marc Montangero
Gymnase de Morges
Chemistry, Others

To mark the occasion of the International Year of Chemistry, each week in 2011 I posted a two-minute film demonstrating and explaining an experiment on the site www.chimie.ch/nuls.

Each film begins with the demonstration of a simple and safe experiment, followed by its theoretical simplified explanation, and then a practical application in our daily life.

Since the target audience was the general public, I christened this project "La chimie pour les NULS" (Chemistry for DUMMIES). I therefore choose experiments that only require everyday household products, and not present any danger, so the experiments could be tried by everyone at home.

CH.2 LEARNING LANDSCAPES

A water drop – thousands ice crystals

Franz Steiger
Kantonsschule Alpenquai
Chemistry, Physics

For 5 years I examine the crystallization of substances. I found that a substance can build in dependence of various factors hundreds of crystals. In this context I have seen phenomenal pictures of ice crystals of Masuru Emoto and read several of his books. He hypothesizes that water molecules can store information of music, texts, words, prayers, moods of people and much more. With my experiments I will show with movies and photos and prove why it is for reasons of principle not possible to show the storage of information of water molecules by crystallization of the water.

Under a light microscope I show under polarized light direct the forming of ice crystals under various conditions. This is made possible by a new low temperature crystallization equipment.

CH.3 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Explore-it

Workshop
Maurice Cosandey
ETH Lausanne
Physics, Others

Photo: © explore-it.org

The project consists of four parts.

1 – Energy. The children build a four-wheels and study how far it goes down a slope, or drawn by an elastic, then pushed by an electric motor.

2 – Electricity. The children study the reversible behavior motor – generator.

3 – Magnet. The children build a magnetic letter scale, a compass, and a home-made motor.

4 – Water. The children build a chamber where water is evaporated from the sea, condensed in a mountain lake, then produces electricity by flowing down on a home-made generator

UK

UK.1 INFORMATION AND COMMUNICATION TECHNOLOGIES

Be Amazed by Apps

Alessio Bernardelli
TES
Physics, ICT

In this workshop I show a selection of new and engagin apps for handheld devices, from note taking to game apps. Delegates are shown how these apps can be used for effective learning in Science lessons and they are supported by the resources I have created to get beyond the wow effect of holding a tablet, or a smartphone. I also encourage delegates to bring their own devices and favourite apps as I give an opportunity to share ideas and resources with other delegates through round table discussions!

UK.2 INFORMATION AND COMMUNICATION TECHNOLOGIES

Free and Easy – ICT in Biology

Richard Spencer
SRC Bede Sixth Form
Biology, ICT

As part of a national LSIS case study in 2011, I researched A-level students' attitude to eLearning, it's benefits and how it could be improved. Numerous resources were developed, and the outcomes of the project show how ICT can be used to engage students in A-level Biology to support learning. Since completing the case study, I have extended use of ICT to include development of short award-winning videos and worked with European colleagues on simulation of evolution using ICT. This project, "Brer Rabbit, Rare Rabbit" is part of an SoS study on use of ICT in Natural Sciences (iStage).

UK.3 INQUIRY-BASED LEARNING

Plants 'R' Mint

Richard Spencer
SRC Bede Sixth Form
Biology

This project aims to foster student interest in plant biology. It is supported by a SAPS (School and Plant Science) Associate Award. As part of this project, students are surveyed on their interest (or otherwise!) in plant biology topics. With a view to encouraging more interest, students take cuttings of mint plants (various species and varieties) and look after their needs. The study of mint is used a a vehicle to help students foster synoptic links to make connections between different areas of biology and how they relate to the study of mint genus Mentha. A final survey is planned to find out how much participation in the project engaged students' interest in plant biology.

UK.4 SCHOOL COOPERATION

School Science Fairs to engage pupils and the local community

Jenny Search
Dr Research
Biology

I worked with teachers and pupils (aged 9–11) in two schools in County Durham. After showing a range of STEM hands on activities to the pupils, they chose their favourites, adapted them where necessary and decided which to include in a science fair for the rest of their school and local community. The children had a lot of ownership during the project and designed posters and cartoons explaining the science behind the activities. The science fairs were run by the students with help from adult volunteers from the local community. Parents were invited to the science fairs after school.

UK.5 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Excellence and Enjoyment in Primary Science

Kathy Schofield, Lisa Wood, Linda James, Helen Hewitson, Shenaz Vorajee, Peter Sainsbury, Sue Martin, Nina Spilsbury, Sophie Franklin, Martin Hollins, Mary Haughey, Ciaran Kinney, Lesley Hunter, Sinead McGleenon
AZSTT/MMU
Chemistry

AZSTT are extremely proud of the College of Primary Science Teachers and their achievements. There are 45 College members, of which, two have won Rolls-Royce Science Prizes, one is an Institute of Physics Teacher of the Year and another is recipient of the Royal Air Force Award for Teacher of the Year.

Myself and other members of AZSTT and would welcome the opportunity to showcase our achievements at Science on Stage. College members work hard to promote excellence in primary science through dissemination of their projects at conferences across the UK and would welcome the opportunity to broaden their network.

UK.6 INQUIRY-BASED LEARNING

Teaching physics with balloons, straws and elastic bands

Ruth Wiltsher, Alison Alexander
Institute of Physics
Physics

This is a collection of experiments to illustrate and explore physics concepts at a variety of levels. The activities have been used in a variety of contexts from examination specification to outreach events. They appeal to all ages and use inexpensive and readily available materials.

Some are noisy, many are fun and all have good response.

UK.7 SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Today's Questions are Tomorrow's Answers

Sarah Langford
Sphere Science
Physics, Chemistry, Biology

I would bring ideas for practical investigative science to Science on Stage. The activites allow primary pupils to raise questions and then explore them in a scientific way. I can provide activities suitable for three to eleven year olds. The activities have been developed over many years with input from more than 1800 teachers, education lecturers and trainee teachers.

UK.8 INQUIRY-BASED LEARNING

Kitchen Chemistry

Stephen Ashworth
University of East Anglia
Chemistry

A stage show and/or teacher workshop using (mostly) easily obtainable chemicals and unsophisticated equipment to illustrate chemical principles.

UK.9 INQUIRY-BASED LEARNING

Loudspeakers made from ..... anything!

Trevor Plant
Institute of Physics
Physics

To demonstrate how simple loudspeakers can be made from boxes, equipment trays, cups etc. Making of the speakers, which can be run competitively, allows students to develop an understanding of electromagnetic forces, but can be extended to consideration of waveforms, resonance etc. After construction, they can hear music from their own iPod or similar device so feel ownership of the product.

UK.10 LEARNING LANDSCAPES

The Experiment Mats

Workshop
Lara Woods
Robert Gordon's College
Physics

The experiment mats are a differentiated, active learning and assessment resource for class experiments, from planning to evaluation. They are designed to help make the full experimental process more streamlined, time efficient and, most importantly, cooperative. The assessment activities are also designed to

demonstrate the relevance and importance of the core science skills, using the idea of peer review. They can be used with any experiment or investigation and make the write-up a far more integrated part of the practical lesson. There are currently two differentiated versions for integrated classes. The resource comes with the assessment lesson plan and ideas for other simple, cost-effective experiments.

UK.11 INQUIRY-BASED LEARNING

Money Matters: Science with Money

Niloufar Wijetunge
David Game College/Institute of Physics
Physics, Mathematics

A collection of short experiments and demonstrations using coins and notes that illustrate scientific principles from physics, chemistry, mathematics and psychology.

The use of money brings the science to the real world, and enables students of all ages and abilities to experiment at home and school. Demonstrations cover a wide range of subject matter, (and history!) and can be applied across national boundaries. Students are fascinated that experiments can be done with the money they handle every day. Science on Stage Europe is an ideal platform for different countries to see these demonstrations, experiment with their own coinage, and make discoveries themselves.

UK.12 SCHOOL COOPERATION

Science of Magic

Brian Macken
Science Oxford
Physics

The Science of Magic show uses a magic theme to frame demonstrations and encourage scientific curiosity in a primary school audience. Each demo is presented as a magic trick, and the students have to use their scientific knowledge to deduce how it works. This format has proven to be very successful, as it is both entertaining and informative for the students, and can usefully be applied to many counterintuitive science demonstrations. I'd like to show how you can use this framework to make a simple demo into an engaging, memorable presentation.

ADDITIONAL PROJECTS

Higgs boson and LHC

Plenary Talk
Dr Rolf Landua
CERN – The European Organization for Nuclear Research

The discovery of a new boson at CERN's Large Hadron Collider is the most important advance in particle physics since three decades. The present status of the data analysis suggests that two experiments, ATLAS and CMS, have found the elusive 'Higgs boson' – the last missing element of the jigsaw that is the Standard Model of particle physics. The Higgs boson was proposed in the 1960s, as the quantum of a field that accounts for the masses of elementary particles. In this talk, I will give an overview about the LHC, the detectors, the data analysis, and our present knowledge about this new particle.

Getting to know, discovering and learning together through science

Plenary Talk
Andreu Cardo Martinez, Carme Alemany (Spain)
Escola El Roure Gros, Santa Eulàlia de Riuprimer

The project "Getting to know, discovering and learning together through science" was started at the state school El Roure Gros back in 2006–2007.

Our school project is based on Science and Math, and it is through those two subjects that students build their learning of the rest of the subjects.

Science helps us to understand the world, it helps us to find and to put words to the objects, it helps us to discover and to better understand the world, it helps us to think and to communicate our discoveries. It eases the relation between reality, language and thinking because words on their own have no meaning, the meaning is given by the human action when words are needed and wanted.

What happens next?

Workshop
David Featonby (United Kingdom), Zuzana Jescova (Slovakia)
Teacher
Physics, Others

The strategy presents a series of simple experiments often with discrepant outcomes that can be either performed by students or demonstrated. Students are asked to predict and explain outcomes. The experiments cover a huge range of mostly physics but can be adapted to other subjects, and reveal both understanding and misunderstandings of, for example, forces, gravity, light, electrostatics, heat, electricity. Ideas have been contributed by several Science on Stage participants.

Participants have access to a list of over 60 experiments which can be adapted to individual abilities and situations.

Dynamic Maths with Tablet and PC – Sketchometry

Workshop
Prof. Dr Peter Baptist, Carsten Miller, Matthias Ehmann (Germany)
Universität Bayreuth

- The dynamic maths app Sketchometry allows you to use your tablet computer as a sketchpad, but with dynamic constructions.
- Sketchometry enables mobile learning with interactive worksheets and e-books.

- Sketchometry is suitable for different tablet platforms, for PCs, and for white-boards.
- Sketchometry helps to improve teaching and learning maths.

Getting to know, discovering and learning together through science

Workshop
Andreu Cardo Martinez, Carme Alemany (Spain)
Escola El Roure Gros, Santa Eulàlia de Riuprimer
Physics, Chemistry, Biology, Others

Ever since they are born, children learn investigating since it is a natural way to learn. The school system is often responsible for the rupture of this natural way of learning. In the primary students are expected to be seated, to listen, to make exercises, etc … and all this in a certain order and, if possible, at the same time. In our School we truly believe that teachers must promote this innate capacity of the students to investigate and at the same time make the students aware of the process, make it richer, systematic, more objective and to provide materials that really help to be more curious, more observant, that help the students create mental images to help them reasoning.

Teachers' TryScience

Workshop
Peter Kusterer (Germany), Anna Jawor (Poland)
IBM Deutschland / IBM Poland

Introduce into Teachers' TryScience and the underlying concept for educators to understand and more effectively use science, technology, engineering and math (STEM) learning, design-based lessons, and summative and formative assessment strategies. Identify the potential how to potentially utilize Teachers TryScience website as an instructional resource for Science on Stage teachers. Teachers' Tryscience is a non-commercial offering, developed by the New York Hall of Science, TeachEnginnering (a collaborative project between faculty, students and teachers associated with five universities and the American Society for Engineering Education), the National Board for Professional Teaching Standards and IBM Citizenship.

Digital teaching materials for instructors – the media portal of the Siemens Stiftung

Workshop
Susanne Mühlbauer (Germany)
Lokando AG, Siemens Stiftung

The media portal of the Siemens Stiftung contains over 4,000 digital teaching materials for instructors, available for free download. They teach essentials of science and technology (STEM) while also addressing social, ecological, and cultural aspects. The spectrum of materials ranges from content packages for interactive whiteboards to graphics, worksheets, experimentation instructions, video clips, and much more. The media are available in English, German, and Spanish.

During the workshop teachers will learn how to use a content package for interactive whiteboards, as an example on the topic "How a battery works". The media in this content package provide a suitable way of acquainting students with the functioning of a galvanic cell during a chemistry or physics class starting from grade 7.

SCIENCE IN KINDERGARTEN AND PRIMARY SCHOOL

Hot Science

Workshop
Dr Maeve Liston (Ireland)
Mary Immaculate College
Physics

This workshop will explore the main concepts behind the topic of Heat. The workshop will explore both adult and children's misunderstandings on the topic of Heat and will involve hands-on interactive problem solving ideas and a wide range of activities

and demonstrations that can be used in the classroom to alleviate such misconceptions. The workshop will introduce a number of activities which primary level teachers can adapt for their classes and is aimed at enhancing teachers' confidence in the teaching about Heat by presenting many practical ideas and examples that teachers can use in their classes.

Modeling the Hero Scientist

Master class
Johanne Patry (Canada)
Instructional Leadership
Mathematics, Physics, Chemistry, Biology, Others

It is a new approach aimed at developing emotional relationships between the learner and science content through the use of a character which possesses the knowledge, the wisdom, and sometimes special powers. It enables the teacher to construct inspiring lessons by the use of mythical hero-scientists who have helped the main hero-character (e.g.: King Arthur, hero; Merlin, hero-scientist) in a mythical or legendary adventure.

Today's students are very taken by fantasy heros and less by actual scientists as role models such as Einstein whom they consider out of their intellectual league. For many pupils, such a person as the latter is inaccessible and is remote from their reality since Einstein is perceived as the supreme scientist with oceans of knowledge, i.e. the most intelligent person. Most students think that they cannot attain such a degree of intelligence.

How to benefit from International network of Science Fairs

Master class
Michał Dzoga (Poland)
Intel

Many European countries in order to increase the level of their competitiveness need to attract more and more R&D investments. The key factor for multinational companies to invest in this area is availability of good educated workforce. Besides right policies and curricula, an important component of STEM education is recognition of efforts and encouragement for young people. We will present how to best use international network of science fairs to increase motivation of students to pursue science careers. We will showcase best examples of student projects and their way to the top of worldwide science fairs ladder.

The impact of technology on education

Master class
Andrzej Grzybowski (Poland)
Intel

The education system has not change since centuries. The classroom model remains the same, for most of the time students consume information and then are obliged to prove their progress by completing tests. This model does not fit challenges of recent times. The purpose of the class is to show benefits of using information and communication technology as well as provide teachers and decision makers the knowledge about the latest tools and devices that can be used at any school subject. We will discuss case studies and research results from different countries all over the world.

Google, facebook or Big Brother – who knows more about you?

Talk
Dr Steffen Ortmann (Germany)
IHP Institute – Innovations for High Performance Microelectronics

A lack of media competence but also ignorance of technological possibilities of internet applications are the reasons, that personal, in many cases very private, information can be captured by other users or operating companies of web applications. The amount of information can become so big, that detailed profiles of single persons can be designed. Beside simple items like name and date of birth also practices, hobbies, social environment, and even residence and general behavior of the user can be included. Beside the (still) world leading internet-related company Google applications of the "Web 2.0", like the social network Facebook, are examined and analyzed due to their opportunities to collect information. Additionally to the virtual data acquisition in the internet an insight into the real-life opportunities of data capture will be given with a main focus on prosecution of criminal offences in Germany.

FOLLOW-UP ACTIVITIES

The impetus for all Science on Stage activities is the international festival. Subsequent activities focus on sharing, developing and sustaining the inspiration gained at the festival.

The follow-up activities include:

- Workshops
- Teacher-training courses
- Travel scholarships for teacher-exchange programmes
- Publications with teaching ideas
- Exchange forums during and after the festival
- National pre-selection events for the festival

If you would like to continue collaborating with a colleague you meet at the festival, we invite you to fill in the teacher-exchange form, which you find in your conference bag.

We would also like to encourage you to organize teacher trainings in your country after the festival! Maybe someone you meet at Słubice could help with a project in your own country. Then get in touch with your National Steering Committee. Depending on uptake, travel grants are available for such cooperation.

To emphasize the follow-up activities, five network meetings take place during the lunch breaks on Friday and Saturday.

Smartphones in science teaching

Network meeting leaders:
Dr Jörg Gutschank, Jean-Luc Richter

According to recent studies, project work is very suitable to foster students' competences for the world of work: team work, collaboration beyond national borders, problem solving etc. Furthermore, a complex topic, which is implemented during a longer period of time, motivates students better than single tasks.

However, teachers often do not get help with implementing these projects. How can a project be integrated in everyday school life? Are there European examples for successful project work? In this network meeting we focus on projects with smartphones.

SonSD aims to fill this gap and to develop such a guideline by teachers for teachers. From November 2013 approximately 20 teachers from 15 countries work together on an international project about smartphones in science teaching. The results will be documented in a guideline and distributed throughout Europe.

In the network meeting we will have a brainstorming and discuss possible topics, e.g. reasonable use of apps, realising and analysing measurements with smartphones and ideas for experiments with smartphones.

Teachers and Scientists

Network meeting leaders:
Dr Ulrich Scheller, Dr Ute Hänsler

A lot of projects are aiming to link students with scientists, like school labs, partnerships between institutes and schools etc. These non formal learning initiatives offer students the chance to gain a real insight into research.

Three aspects should be considered more carefully in cooperation between schools and research institutes:

- The active role of the teachers and the work with "real" research,
- the transfer of results into the classroom and
- the international networking.

Science on Stage aims to fill this gap by initiating and supporting up to five joint projects between teachers and scientists. One objective is to include the teachers in the work of the scientists, so that the teacher will be part of real research projects. The results of such joint activities will be published and guidelines subsequently issued which should motivate other teachers to start such cooperation in their own region. In the network meeting we will brainstorm methods of cooperation and exchange experiences in this field. If you have any contacts with research institutes or if you are interested in collaborating with them, you are invited to participate in the network meeting!

Science events

Network meeting leaders:
Maria Dobkowska, Jenny Search

There are many ways in which science can be shared with local communities. These can range from a small-scale event such as including fun experiments at a school fair, to a large festival dedicated to science that runs over several days. As part of this

group you will share your ideas and experiences of taking science to the public. There will be the opportunities to discuss future events and form partnerships. We plan to compile the network's experiences to create a manual of best practices, including potential funding opportunities.

Outcomes from the meeting:

- A publication describing different types of science events, tips on how to run them and examples of best practice
- Practical ideas that participants can put into practice after the meeting including working with other organizations (e.g. universities) and evaluating events
- Opportunities for forming partnerships and working together after the meeting
- A list of places to apply for funding for future events

Digital Media in primary school

Network meeting leader:
Mario Spies

Digital media has become an indispensable part of our everyday lives. This development may also in primary schools not be ignored, because an effective media education begins at an early age. Moreover, they open up many new possibilities of learning. Therefore, students should perceive digital media as elements of learning environments and use them independently as tools of working and learning.

But how can their use be organised effectively in the classroom? What conditions must be created for media-based teaching and learning processes? A successful and sustainable implementation requires media literacy of parents and teachers. Their job also includes supporting students to develop a responsible use of digital media.

The aim of the network meeting is to exchange about experiences and the integration of digital media in primary education, discuss prospects of learning with digital media and related challenges for all involved parties and to advance this field.

Sharing Workshop Ideas across Borders

Network meeting leader:
Alison Alexander

The Institute of Physics Teacher network in the UK runs several well tried workshops, some have been presented at SOS conferences. We would like to make these freely available across the Science on Stage network, by providing instructions and apparatus details to those wishing to take the workshops to their own country. The networking group will consider the best ways to facilitate this, and also whether other workshops could be included.

The workshops include:

- **Lights, Cameras, Images**
  Discover a variety of activities for use in the classroom when teaching light, colour and spectra
- **What Happens Next?**
  Discover a series of experiments with unexpected outcomes to challenge students' presumptions and so encourage them to explore and debate physics principles.
- **Cloud Chambers and cool Carbon Dioxide**
  Making and operating a cloud chamber with a fish tank
- **Software for Skint Schools**
  Discover 19 bits of free software to use in school to enliven your teaching while saving your budget.
- **Shocked and Stunned**
  This workshop aims to improve your knowledge of how the Van de Graaff generator works
- **Rockets – Make and Take**
  Build your own "rocket" launcher.

Go to www.iop.org/education/teacher/support/network/page_44093.html to see videos for some of these.

FORUM

Foundations, companies and educational institutions present their materials and projects in the Forum.

think ING.
German industry lives off the innovative ideas of its engineers and therefore relies on high-qualified new blood. The initiative think ING., introduced by Gesamtmetall, the Federation of German Employers' Associations in the Metal and Electrical Engineering Industries, is a leader in efforts to provide information for young people about studying engineering and the engineering profession, and to encourage them on this path.

think ING. promotes and supports educational projects on a large scale, in both science and technology, in schools and universities, for example Science on Stage.

INTEL
At Intel stand the company will present The Intel® Education Solutions, which is a collection of hardware, software, content, infrastructure, and training – all purpose-built for education. This solution are produced by local manufacturers, vendors, and retailers, they are not sold directly by Intel. Instead, Intel provides the Product Reference Designs and development requirements necessary for these manufacturers to create Intel-powered and Education Solutions-enabled PCs and products. The Intel LS Software Suite makes learning engaging, fosters efficient classrooms, and provides tools for smooth deployment and reduced Total Cost of Ownership of the overall education solution.

Siemens Stiftung
The Siemens Stiftung wants to empower people to actively address today's social challenges and is dedicated to the values of Werner von Siemens. Together with partners, the foundation designs and implements local and international projects with the aim of promoting individual responsibility and self-initiative. The foundation is committed to promoting education, strengthening of culture and enlarging basic services and social entrepreneurship. The education projects are focusing on science and language development. With materials – prepared especially for classroom use and tailored to the curriculum – and training programs the Siemens Stiftung supports instructors fulfilling their educational mandate.

Jugend forscht
Jugend forscht is Germany's most famous science contest. Young scientists from 10 to 21 years of age choose their own research projects on which they work independently. Some 10,000 young scientists per year sign up for one of the disciplines: working environment, biology, chemistry, geo- and space sciences, mathematics/computer sciences, physics or engineering. Projects are evaluated at science fairs on three levels. For nearly 50 years Jugend forscht is a successful platform for young scientific talents to strengthen and develop their special abilities.

European University Viadrina Frankfurt (Oder)

The Viadrina is situated at the heart of Europe – internationality is its trademark. Its students and instructors hail from over 80 countries. European and international aspects of law, economics and culture play a special roll in degree plans offered by our faculties of Law, Business Administration and Economics and Cultural Sciences.

Since the reopening of the Viadrina in 1991, the European University has developed into an internationally renowned address on the German-Polish border, with approximately 6,000 students now enrolled.

Adam Mieckiewicz University in Poznań

AMU follows the legacy Adam Mickiewicz – one of the most important poets of European Romanticism. AMU is one of the largest academic centers in Poland. It has 5 campuses in Poznań, Gniezno, Kalisz, Piła and Słubice. The University currently employs nearly 3,000 teaching staff and serves over 47,000 students with 15 faculties offering BA, MA and PhD programs in Polish, English, German and courses in a variety of other languages. Polish-speaking students can choose from over 170 majors and 30 sport disciplines.

IBM

Enablement through the Web. Continuously sharing of best practices is key for today's advancement of education. Teachers' TryScience, a non-commercial offering provides free and engaging standards-based lessons, integrated with teaching strategies and resources, which are designed to spark students' interest in science, technology, engineering and math (STEM). Social networking tools enable educators to engage in focused discussions with colleagues around the globe. Teachers at the Stage on Science Festival will have an opportunity to get a deeper insight into the site and discuss how it could support Stage on Science International.

German Aerospace Center (DLR)

Out of the Classroom – into the Lab!

The German Aerospace Center (DLR) is one of Europe's largest and most modern research institutions. Here is where the aircrafts and high-speed trains of the future are being developed, rocket engines tested, images of distant planets analyzed, clean energy investigated, and much more...

We are happy to pass on to young people our enthusiasm for all these fascinating topics. So we are inviting them to visit our ten DLR_School_Labs to conduct experiments and discover many exciting things related to aviation and aerospace, transportation and energy.

Make it in Germany

"Make it in Germany" welcomes qualified professionals to Germany!

German companies are increasingly looking to recruit qualified professionals – particularly in science, technology, engineering and mathematics. And there is also a need for qualified professionals in the health sector – even below graduate level. Qualified professionals from abroad can use the welcome portal www.make-it-in-germany.com to find out how they can come to live and work in Germany. The web portal is a part of the joint Qualified Professionals Initiative of the Federal Ministry of Economics and Technology, the Federal Ministry of Labour and Social Affairs, and the Federal Employment Agency.

sketchometry

University of Bayreuth

Dynamic Maths with Tablet and PC – Sketchometry

- The dynamic maths app Sketchometry allows you to use your tablet computer as a sketchpad, but with dynamic constructions.
- Sketchometry enables mobile learning with interactive worksheets and e-books.
- Sketchometry is suitable for different tablet platforms, for PCs, and for white-boards.
- Sketchometry helps to improve teaching and learning maths.

MINTec

Association of excellent mathematic and natural scientific schools – STEM excellence center

MINT stands for **M**athematics, **I**T, **N**atural science, **T**echnology, EC stands for **E**xcellence-**C**enter. MINT-EC is a non-profit organization that contains a German wide network of excellent secondary schools. These "MINT-EC schools" have outstanding offerings in mathematics/IT/science. The MINT-EC school network currently consists of 165 schools, having 115.000 pupils and 14.000 teachers in all German Bundesländer. For these schools MINT-EC offers events, activities and programs to their pupils, teachers and principals to supporting excellent MINT education, improving science teaching and by increasing the output of MINT-gifted pupils promote and support potential future scientists and engineers.

Tekniklyftet

Tekniklyftet (Boost for Technology) - KTH

Tekniklyftet is an ESF funded project that during two years offers education to technology teachers in Sweden. We believe that new methods and new ways to teach in technology will boost teachers' and pupils' confidence in science and technology. The intention is to secure Sweden and the Stockholm region as a high technology hub in the world.

OUTLOOK

SCIENCE ON STAGE FESTIVAL 2015

The General Assembly of Science on Stage Europe elected London, U.K. as the next host for the upcoming Science on Stage festival in 2015.

The festival will be held at the People's Palace, Queen Mary University of London on the dates 17-20 June 2015. Science on Stage in the UK has recently established a base at Queen Mary University and the University is keen to support our work. The University at Mile End, London, is situated just a short distance from the Olympic Park and is a short journey by public transport to the centre of London.

The selection process for science teachers will be carried out by national events throughout the year 2014 in up to 27 European countries. The National Steering Committees (NSCs) are responsible for the calls for proposals.

Queen Mary
University of London
Centre for Public Engagement

SCIENCE ON STAGE
UNITED KINGDOM

LIST OF PARTICIPANTS

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Alois	Regl	Austria	**NSC Austria**	
Andrea	Scheinig	Austria	**Cooperation "Kids into technology"**	A.3
Bernhard	Stehrer	Austria	**Understanding Dementia – Youth and Alzheimer's**	A.1
Burkhard	Grabner	Austria	**Cooperation "Kids into technology"**	A.3
Harald	Gollner	Austria	**Running Water Uphill**	A.2
Ida	Regl	Austria	**Jury**	
Ludwig	Eidenberger	Austria	**Running Water Uphill**	A.2
Norbert	Spindler	Austria	**Individualised lessons across different disciplines in professional preparation for carpenters**	A.6
Oskar	Redhammer	Austria	**Individualised lessons across different disciplines in professional preparation for carpenters**	A.6
Uwe Karsten	Simon	Austria	**Young Science Journalism – learning to write science**	A.4
Arlette	Dambremez	Belgium	**NSC Belgium**	
Francis	Moreau	Belgium	**Electromagnetism**	B.2
Joséphine	Giambusso	Belgium	**Slime / Become an alchemist**	B.3 / B.4
Katrijn	Govaert	Belgium	**Physics in primary schools**	B.5
Marc	Govaert	Belgium	**Physics in primary schools**	B.5
Mileen	Malbrain	Belgium	**Toys and physics**	B.7
Patrik	Claes	Belgium	**Combustion!**	B.6
Philippe	Delsate	Belgium	**Brilliant Chemistry**	B.1
Pierre	Hautier	Belgium	**Brilliant Chemistry**	B.1
Tina	Michetti	Belgium	**Slime / Become an alchemist**	B.3 / B.4
Ana Ivanova	Georgieva	Bulgaria	**NSC Bulgaria**	
Desislava	Yordanova	Bulgaria	**Heavy metals-nature and role inside and outside the human organism**	BG.5
Ivelina	Hristova	Bulgaria	**Heavy metals-nature and role inside and outside the human organism**	BG.5
Ivo	Jokin	Bulgaria	**Science education through the development of simple tools from available materials and ICT**	BG.4
Krasinela	Georgieva	Bulgaria	**Science from a Grandma's Drower Chest**	BG.8
Lyuba	Dimitrova	Bulgaria	**Heavy metals-nature and role inside and outside the human organism**	BG.5
Lyubka	Misheva	Bulgaria	**An Unusual Journey**	BG.2
Magdalena	Beluhova	Bulgaria	**Science in my life**	BG.7
Marianka	Hristova	Bulgaria	**The future in our hands**	BG.3
Milena	Gosheva	Bulgaria	**The future in our hands**	BG.6
Nikola	Dyulgyarov	Bulgaria	**Simplified construction of a transverse excitation atmospheric pressure laser and its application in the classroom**	BG.1
Rositsa	Hristova	Bulgaria	**An Unusual Journey**	BG.2
Rositsa	Konova	Bulgaria	**Simplified construction of a transverse excitation atmospheric pressure laser and its application in the classroom**	BG.1
Simona	Stoyanova	Bulgaria	**Heavy metals-nature and role inside and outside the human organism**	BG.5

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Tsanka	Nencheva	Bulgaria	**The future in our hands**	BG.3
Tsvetelina	Nikolova	Bulgaria	**Science from a Grandma's Drower Chest**	BG.8
Anjuli	Ahooja	Canada	**Science Club Activities with Scientists at the Canadian Light Source**	CDN.3
Huguette	Thibeault	Canada	**Design of a Micro internship in a research center: from pedagogical intention to action in pre-university**	CDN.5
Johanne	Patry	Canada	**NSC Canada**	
Louis	Laroche	Canada	**Problem-Based Woodworking**	CDN.1
Robin	St-Pierre	Canada	**Three hands-on projects in science**	CDN.4
Tim	Molnar	Canada	**Western and Indigenous Science: merging approaches, practices, philosophies**	CDN.2
Aegli	Balkwill	Cyprus	**Macromolecule Modelling**	CY.1
Anna Maria	Pavlou Grzeczinski	Cyprus	**Educational Module for Learning the peration of a Relay in Design & Technology class**	CY.2
Maria	Tsierkezou-Georgiou	Cyprus	**Do two pints of beer make me a criminal? / Natural and synthetic soaps / Natural Gas: A curse or a blessing?**	CY.3 / CY.4 / CY.5
Michalis	Hadjimarcou	Cyprus	**Executive Board SonSEu / Jury / NSC Cyprus**	
Barbora	Mikulecká	Czech Republic	**The Story of Light bulb**	CZ.8
Daniel	Lessner	Czech Republic	**By magic to the basis of information theory**	CZ.7
Jan	Pavelka	Czech Republic	**The Story of Light bulb**	CZ.8
Jitka	Houfkova	Czech Republic	**NSC Czech Republic**	
Katerina	Lipertova	Czech Republic	**Leonardo's bridge**	CZ.5
Pavel	Konečný	Czech Republic	**Heat Engine Olympic Games**	CZ.4
Renata	Rydvalová	Czech Republic	**What's floating around us?**	CZ.1
Václava	Kopecká	Czech Republic	**Playing with plastic**	CZ.3
Vojtěch	Hanák	Czech Republic	**The Story of Light bulb**	CZ.8
Zdenek	Drozd	Czech Republic	**NSC Czech Republic**	
Zdenek	Rakusan	Czech Republic	**Physics in a library**	CZ.2
Zdeněk	Šabatka	Czech Republic	**Measurements in the electrostatics**	CZ.6
Anne	Appe	Denmark	**How colors of visible light affect the a ctivity of photosynthesis, and why LED lights are interesting for production in greenhouses**	DK.4
Bjarne	Johansen	Denmark	**Explore the sunlight**	DK.2
Deia	Vejby	Denmark	**Global School**	DK.1
Erik Bruun	Olesen	Denmark	**NSC Denmark**	
Jesper	Vejby	Denmark	**Global School**	DK.1
Jesper Terp	Jørgensen	Denmark	**Freediving and Life in Water**	DK.3
Martin	Soegaard	Denmark	**Explore the sunlight**	DK.2
Poul	Hedegaard	Denmark	**Faraday's Law of Induction – a new teaching concept**	DK.5
Anssi	Lindell	Finland	**Nanoschool**	FIN.4
Asko	Aikkila	Finland	**Model of Solar System**	FIN.5
Eila	Hämäläinen	Finland	**Tasty meat sauce and heated onion studies with FTIR spectrometer**	FIN.3
Greta	Kula	Finland	**Guest**	
Irma	Hannula	Finland	**Arcturus – astronomy teaching environment**	FIN.1
Kirsti	Koski	Finland	**The Co-Designing Learning Environments**	FIN.6
Maria	Sjöblom	Finland	**Guest**	
Sakari	Ekko	Finland	**Sunrise Eratosthenes Experiment**	FIN.2
Timo	Tuomi	Finland	**Tasty meat sauce and heated onion studies with FTIR spectrometer**	FIN.3
Tom	Nevanpää	Finland	**Guest**	

List of Participants

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Emmanuel	Thibault	France	**The "Objectif Tourne-Sol project" or How to shorten the flight of a solar balloon safely?**	F.3
Jean-Luc	Richter	France	**iStage and Application of SmartPhones in Science Teaching**	F.4
Ouadi	Beya	France	**The world of turbulence**	F.1
Philippe	Jeanjacquot	France	**PocketLab**	F.2
Vincent	Devaux	France	**The world of turbulence**	F.1
André	Steffans	Germany	**"Border-crossing research and discovery – a German-Dutch school project"**	D.5
Arzu	Gül	Germany	**Forum: Make it in Germany**	
Astrid	Gärtner	Germany	**BiPhy – Experience sciences**	D.12
Barbara	Rinser	Germany	**Forum: Siemens Stiftung**	
Benita	Otto	Germany	**Nobody is too young to be a Scientist – How to enable Primary School Pupils of the second to the fourth grade to transfer own ideas into project thesis taking part in the science competition "Jugend forscht"**	D.18
Birgit	Krämer	Germany	**Virtual Science Fair**	D.22
Charlotte	Schroer	Germany	**Science on Stage Deutschland**	
Christa	Müller	Germany	**Astronomy in primary school, Section: Solar system/earth and moon**	D.10
Christian	Karus	Germany	**"Border-crossing research and discovery – a German-Dutch school project"**	D.5
Christine	Prem-Vogt	Germany	**Once upon a time ... fairy tale science**	D.19
Christoph	Bauer	Germany	**HOBOS – students learn from the bee**	D.1
Christoph	Pawek	Germany	**Forum: DLR**	
Claudia	Frühinsfeld	Germany	**Once upon a time ... fairy tale science**	D.19
Claudia	Harpain	Germany	**Cutting motives**	D.20
David	Spitzl	Germany	**Science on Stage Deutschland**	
Detlef	Knebel	Germany	**Once upon a time ... fairy tale science**	D.19
Dieter	Hausamann	Germany	**Forum: DLR**	
Dorothée	Brauner	Germany	**Border-crossing research and discovery – a German-Dutch school project**	D.5
Dr Carsten	Miller	Germany	**Forum: University of Bayreuth, Sketchometry**	
Dr Matthias	Ehmann	Germany	**Forum: University of Bayreuth, Sketchometry**	
Eirik	Otto	Germany	**Nobody is too young to be a Scientist – How to enable Primary School Pupils of the second to the fourth grade to transfer own ideas into project thesis taking part in the science competition "Jugend forscht"**	D.18
Elmar	Winkel	Germany	**The Science Show SG**	D.6
Fabian	Hilpert	Germany	**SocialGenius – Game Enthusiasm with Seniors – Developing senior-friendly Games**	D.2
Frank	Walter	Germany	**Magic of the mountains**	D.4
Gabriela	Jonas-Ahrend	Germany	**Virtual Science Fair**	D.22
Gesine	Schönheid	Germany	**Nobody is too young to be a Scientist – How to enable Primary School Pupils of the second to the fourth grade to transfer own ideas into project thesis taking part in the science competition "Jugend forscht"**	D.18
Günter	Grudnio	Germany	**Physical handicrafts and physical toys**	D.7
Hannelore	Scheid	Germany	**Jeans – from raw materials to the final consumer product**	D.15
Hans-Otto	Carmesin	Germany	**Students Discover the Dynamics of the Big Bang with an 11-Inch-Telescope**	D.3

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Heidrun	Boll	Germany	**Astronomy in primary school, Section: Solar system/earth and moon**	D.10
Heike	Magg	Germany	**Jeans – from raw materials to the final consumer product**	D.15
Holger	Seefried	Germany	**HOBOS – students learn from the bee**	D.1
Ina	Esselmann	Germany	**Forum: Make it in Germany**	
Ines	Engelhardt	Germany	**BiPhy – Experience sciences**	D.12
Jens	Viehweg	Germany	**Chips are not equally chips!**	D.25
Jens-Henning	Kreker	Germany	**Guest**	
Jörg	Gutschank	Germany	**Leibniz Gymnasium Dortmund / Jury / Science on Stage Deutschland**	
Julia	Brimer	Germany	**Teaching physics with a smartphone**	D.14
Jürgen	Miericke	Germany	**Experiments and tricks – a combination of physics and music on stage**	D.17
Karen	Wilkening	Germany	**BiPhy – Experience sciences**	D.12
Karoline	Kirschner	Germany	**Science on Stage Deutschland**	
Karsten	Bolte	Germany	**My Microcontroller does what I want**	D.13
Kirsten	Biedermann	Germany	**SocialGenius – Game Enthusiasm with Seniors – Developing senior-friendly Games**	D.2
Kirsten	Yüzüncü	Germany	**Paper-Automata: Moving, mechanical Toy**	D.16
Klaus	Strienz	Germany	**Junior-Pilot-License – hands-on-learning and physics**	D.24
Ludwig	Huber	Germany	**Learning at stations: Experiments on electromagnetic induction with the base station of an electric toothbrush.**	D.11
Manja	Erb	Germany	**Once upon a time ... fairy tale science**	D.19
Marco	Oetken	Germany	**Electrical Energy out of a carbon sandwich – the first experiments on the topic of 'lithium-ion-battery'**	D.8
Marian	Scheibe	Germany	**Chips are not equally chips!**	D.25
Mario	Spies	Germany	**Schulverband Landkern / Science on Stage Deutschland**	
Martin	Fischer	Germany	**Experiments and tricks – a combination of physics and music on stage**	D.17
Martin	Hasselmann	Germany	**Electrical Energy out of a carbon sandwich – the first experiments on the topic of 'lithium-ion-battery'**	D.8
Martin	Simon	Germany	**Forum: Make it in Germany**	
Matthias	Hauck	Germany	**Zebra Effect**	D.9
Nadine	Chasté	Germany	**Once upon a time ... fairy tale science**	D.19
Norbert	Baur	Germany	**HOBOS – students learn from the bee**	D.1
Otto	Lührs	Germany	**Science on Stage Deutschland**	
Peter	Kusterer	Germany	**Forum: IBM**	
Petra	Breuer-Küppers	Germany	**Guest**	
Prof Dr Peter	Baptist	Germany	**Forum: University of Bayreuth, Sketchometry**	
Sabine	Streller	Germany	**Once upon a time ... fairy tale science**	D.19
Sarah	Berger	Germany	**Forum: Make it in Germany**	
Saskia	Wüst	Germany	**Magnetism Inquiry Corner to encourage inquiry-based Learning**	D.26
Sebastian	Funk	Germany	**The Science Show SG**	D.6
Shahbaz	Starke	Germany	**SocialGenius – Game Enthusiasm with Seniors – Developing senior-friendly Games**	D.2
Silvia	Savelsberg	Germany	**Burt Sampson's problems – a bilingual project**	D.21
Stefanie	Schlunk	Germany	**Science on Stage Deutschland**	
Stephen	Kimbrough	Germany	**Teaching physics with a smartphone**	D.14

List of Participants

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Susanne	Mühlbauer	Germany	**Forum: Siemens Stiftung**	
Tim	Kreckel	Germany	**Burt Sampson's Problems – A bilingual starter**	D.21
Tobias	Bohnhardt	Germany	**Forum: DLR**	
Tobias	Jagsch	Germany	**BiPhy – Experience sciences**	D.12
Tobias	Schüttler	Germany	**Junior-Pilot-License – hands-on-learning and physics**	D.24
Ulrich	Jucknischke	Germany	**My Microcontroller does what I want**	D.13
Ulrich	Scheller	Germany	**BBB Management GmbH / Science on Stage Deutschland**	
Uta	Çelik	Germany	**Paper-Automata: Moving, mechanical Toy**	D.16
Ute	Eckhof	Germany	**Magic of the mountains**	D.4
Ute	Hänsler	Germany	**two4science / Science on Stage Deutschland**	
Volker	Smit	Germany	**Gustav-Conserve-Energy**	D.23
Werner	Reithmeier	Germany	**Cutting motives**	D.20
Wilfried	Meyer	Germany	**Paper-Automata: Moving, mechanical Toy**	D.16
Wolfgang	Gollub	Germany	**Forum: think ING.**	
Wolfgang	Sobtzick	Germany	**Teaching physics with a smartphone**	D.14
Zeljko	Malinovic	Germany	**Gustav-Conserve-Energy**	D.23
Andreas	Patsis	Greece	**Micro – nano – quanto: a teaching appoach of Millikan's experiment in Primary and High School in Greece**	GR.6
Andreas	Valadakis	Greece	**Learning Physics with my Body**	GR.9
Antonis	Margaritis	Greece	**Flexibilities of light**	GR.5
Aristomenis	Nikolaidis	Greece	**Brachistochrone-tautochrone-horisontal projectile**	GR.4
Efthymios	Karachalios	Greece	**The science teaching in primary school with straight through and materials leading the creative and experiential learning**	GR.2
Eleni	Lebesi	Greece	**Brachistochrone-tautochrone-horisontal projectile**	GR.4
Eugenia	Tsitopoulou-Christodoulides	Greece	**NSC Greece**	
Ioannis	Gatsios	Greece	**Micro – nano – quanto: a teaching appoach of Millikan's experiment in Primary and High School in Greece**	GR.6
Nikos	Skoulidis	Greece	**Supergravity and Antigravity: Effect of Gravity on Simple Pendulum**	GR.7
Panagiotis	Lazos	Greece	**Polarization of light. Seeing the invisible**	GR.3
Panteleimon	Bazanos	Greece	**Simple and functional seismograph – a relief of the Mediterranean area for the visualization of some aspects about earthquakes**	GR.1
Serafeim	Spanos	Greece	**Construction and use of an interactive umbrella Planetarium**	GR.8
Adam	Kovach	Hungary	**Executive Board SonSEu**	
Endre	Szórád	Hungary	**Redox reactions and colour changes**	H.4
Ferenc	Márki-Zay	Hungary	**Cheap and does not electrocute you!**	H.9
János	Márki-Zay	Hungary	**Cheap and does not electrocute you!**	H.9
Károly	Piláth	Hungary	**HiTech ripple tank for peanuts**	H.3
Katalin	Horvathne Szombathelyi	Hungary	**Experiments with fire, colours and forms**	H.7
Márta	Gajdosné Szabó	Hungary	**Don't Worry be healthy!**	H.1
Péter	Baló	Hungary	**Physics therapy**	H.5
Sándor	Ujvári	Hungary	**NSC Hungary**	
Tünde	Kontai	Hungary	**"Secrets of the dough" – How can we apply the inquiry-based teaching / learning method in biology?**	H.2

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Zsolt	Zsigó	Hungary	**Physics is Life – without misconception**	H.8
Éva	Wagner	Hungary	**Ice-cream project**	H.6
Aoibheann	O'Gara	Ireland	**Students in motion**	IRL.3
Brigid	Corrigan	Ireland	**Future Fuels**	IRL.2
Feargal	Close	Ireland	**Self Discovery**	IRL.5
Maeve	Liston	Ireland	**Hot Science**	only Workshop
Maria	Sheehan	Ireland	**Hydrogels – a smart material**	IRL.1
Paul	Nugent	Ireland	**NSC Ireland / Jury**	
Richard	Moynihan	Ireland	**Inquiry based Physics in Ireland**	IRL.4
Andrea	Albiero	Italy	**Kipp's apparatus**	I.10
Anna	Madaio	Italy	**From Synthetic Polymers to Biodegradable Plastics**	I.6
Anna	Vinella	Italy	**Kids science – Scientific literacy for children**	I.3
Annalisa	Boniello	Italy	**Inquiry in Virtual World**	I.2
Antonio	Gandolfi	Italy	**NSC Italy**	
Elisabetta	Gaita	Italy	**Chemistry is light**	I.12
Emanuela	Bianchi	Italy	**Kids science – Scientific literacy for children**	I.3
Ernesta	De Masi	Italy	**Mare Nostrum**	I.1
Francesca	Butturini	Italy	**Kipp's apparatus**	I.10
Giovanni	Pezzi	Italy	**Matebilandia, Experiencing Mathematical Modelling in an Amusement Park**	I.8
Giulia	Realdon	Italy	**Hands-on Evolution**	I.11
Harald	Angerer	Italy	**Sciences and Digital Media in Mixed Age Learning Groups (Primary School)**	I.13
Immacolata	Ercolino	Italy	**Hands-on Evolution**	I.11
Lorenza	Resta	Italy	**Matebilandia, Experiencing Mathematical Modelling in an Amusement Park**	I.8
Maria Grazia	Gallo	Italy	**Sound and Music**	I.5
Marina	Gallitelli	Italy	**Inquiry in Virtual World**	I.2
Michelina	Occhioni	Italy	**Mathland, teaching geometry with OpenSim**	I.4
Monica	Zanella	Italy	**Sciences and Digital Media in Mixed Age Learning Groups (Primary School)**	I.13
Nadia	Semino	Italy	**Chemistry is light**	I.12
Nicola	Marras	Italy	**Was there life before computer?**	I.9
Nicoletta	Balzaretti	Italy	**Kids science – Scientific literacy for children**	I.3
Patrizia	Picchietti	Italy	**Was there life before computer?**	I.9
Pietro	Cerreta	Italy	**The Gravitational Calculator**	I.7
Tullia	Aquila	Italy	**From Synthetic Polymers to Biodegradable Plastics**	I.6
Adriana	van der Lugt	Netherlands	**Differentiated learning for pre-university students**	NL.1
Robert	Tatsis	Netherlands	**Differentiated learning for pre-university students**	NL.1
Adam	Buczek	Poland	**Blow physics**	PL.11
Adam	Grześka	Poland	**The measurement of temporary air dustiness**	PL.10
Agnieszka	Grzeska	Poland	**The measurement of temporary air dustiness**	PL.10
Agnieszka	Korgul	Poland	**Talent search**	PL.6
Aleksandra	Karasek	Poland	**Natural Environment – contemporary pollution**	PL.15
Andrzej	Grzybowski	Poland	**Forum: INTEL**	
Aneta	Gut-Sulima	Poland	**Bielsko-Biała protect the climate**	PL.17
Aneta	Mika	Poland	**Biophyics at hand**	PL.2
Aneta	Szczygielska	Poland	**We live on Earth – the rotating planet**	PL.25
Anna	Hajdusianek	Poland	**Science experiments for future engineers**	PL.35

List of Participants

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Anna	Handzlik	Poland	**Bielsko-Biała protect the climate**	PL.17
Anna	Jawor	Poland	**Forum: IBM**	
Anna	Kaczorowska	Poland	**Talent search**	PL.6
Anna	Maksimowska	Poland	**Simple experiments in optics**	PL.37
Anna	Pikus	Poland	**Young's Explorers Club**	PL.19
Barbara	Andrzejczyk	Poland	**Light and Sound**	PL.26
Barbara	Grzeskiewicz	Poland	**Realization of the international educational program Globe by the students of primary school.**	PL.5
Dagmara	Sokolowska	Poland	**Foton and Neutrino journals and more than that ...**	PL.38
Danuta	Jesiak	Poland	**Consumer chemistry in clasroom. Science from the supermarket.**	PL.24
Dariusz	Maliszewski	Poland	**Sciene always cross borders**	PL.13
Dobromila	Szczepaniak	Poland	**From Mechanics to electronics by creating Physics Lab equipment**	PL.23
Edyta	Dzikowska	Poland	**Young explorers – physics and chemistry for kids**	PL.1
Ewa	Pater	Poland	**Light and Sound**	PL.26
Ewa	Strugala	Poland	**Polish teachers and their students at Joint Institute for Nuclear Research in Dubna (Russia)**	PL.4
Ewa	Wegner	Poland	**About a bit romantic meeting of Electricity and Magnetism and what happened next**	PL.8
Hanna	Korpik	Poland	**About a bit romantic meeting of Electricity and Magnetism and what happened next / From lower secondary school to university**	PL.8 / PL.9
Hanna	Moczko	Poland	**Young explorers – physics and chemistry for kids**	PL.1
Helena	Howaniec	Poland	**Science experiments in the primary school**	PL.12
Izabela	Okrzesik-Frąckowiak	Poland	**Following Archimedes, how Archimedes' science influences our everyday life?**	PL.29
Jacek	Włodarski	Poland	**Hocus-pocus, one must focus**	PL.3
Janina	Kula	Poland	**Bielsko-Biała protect the climate**	PL.17
Jerzy	Jarosz	Poland	**We live on Earth – the rotating planet**	PL.25
Joanna	Kalisz	Poland	**Why are knives sharp and what does it have todo with wandering glaciers?**	PL.18
Joanna	Misiura	Poland	**Physics tells you the truth / Warm, Bright and safe – physics in the house**	PL.20 / PL.21
Justyna	Bartol-Baszczyńska	Poland	**How you can "see" sound**	PL.32
Justyna	Warzyńska	Poland	**Following Archimedes, how Archimedes' science influences our everyday life?**	PL.29
Karolina	Jarząbek	Poland	**Colours of light**	PL.22
Katarzyna	Górkiewicz	Poland	**Young's Explorers Club**	PL.19
Katarzyna	Kordas	Poland	**Bielsko-Biała protect the climate**	PL.17
Katarzyna	Kowalska	Poland	**Science experiments in the primary school**	PL.12
Kazimierz	Paprzycki	Poland	**Polish teachers and their students at Joint Institute for Nuclear Research in Dubna (Russia)**	PL.4
Konstacja	Nowakowska	Poland	**Talent Search**	PL.6
Marcin	Łaciak	Poland	**Rotational motion**	PL.34
Marcin	Witkowski	Poland	**Forum: AMU**	
Maria	Dobkowska	Poland	**How my students are involved in science events**	PL.30
Marzena	Saladra	Poland	**Talent Search**	PL.6
Michal	Dzoga	Poland	**Forum: INTEL / Jury**	
Miroslaw	Los	Poland	**From simple observations and experiments to scientific research**	PL.33

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Piotr	Chabecki	Poland	**Physics and Toys**	PL.28
Piotr	Wegner	Poland	**About a bit romantic meeting of Electricity and Magnetism and what happened next / From lower secondary school to university**	PL.8 / PL.9
Prof Zdisław	Błaszczak	Poland	**Science on Stage Poland**	
Rafal	Jakubowski	Poland	**Excitement, Enticements in learning / Physics and Toys**	PL.27 / PL.28
Regina	Zawisza-Winiarczyk	Poland	**Why are knives sharp and what does it have todo with wandering glaciers?**	PL.18
Ryszard	Pieluchowski	Poland	**Hocus-pocus, one must focus**	PL.3
Stanisław	Plebański	Poland	**Contests in physics teaching**	PL.7
Stefania	Widuch	Poland	**Rotational motion**	PL.34
Urszula	Grabowska	Poland	**About a bit romantic meeting of Electricity and Magnetism and what happened next / From lower secondary school to university**	PL.8 / PL.9
Wiesław	Piotrowski	Poland	**Physicists gala**	PL.36
Wiesława	Idziak	Poland	**Contests in physics teaching**	PL.7
Wojciech	Gancza	Poland	**From Mechanics to electronics by creating Physics Lab equipment**	PL.23
Wojciech	Nawrocik	Poland	**Science on Stage Poland**	
Zbigniew	Trzmiel	Poland	**GEOGEBRA – from elementary school to university level**	PL.14
Zdzisław	Smolarz	Poland	**Suprising and amazing effects of energy transmission**	PL.16
Zenona	Stojecka	Poland	**Physical phenomena around us**	PL.31
Zofia	Golab-Meyer	Poland	**Foton and Neutrino journals and more than that…**	PL.38
Carla	Ribeiro	Portugal	**From the stars to the atom / Discovering the sky / A new light on Chemistry**	P.2 / P.3
Isabel	Borges	Portugal	**The sky in your hands**	P.1
Isabel	Fernandes	Portugal	**A new light on chemistry**	P.3
Lina	Canas	Portugal	**The sky in your hands**	P.1
Anuta Steliana	Marginean	Romania	**Water – miracle and life**	RO.6
Balc	Ioan	Romania	**EquiMaST**	RO.4
Balc	Iudita-Mirela	Romania	**EquiMaST**	RO.4
Camelia	Chinde Pop	Romania	**The MaST Game**	RO.2
Corina Lavinia	Toma	Romania	**Infotube**	RO.1
Felicia	Boar	Romania	**Green Cosmetics**	RO.5
Ioana Alina	Mitrea	Romania	**An open mind for Discovery-Life Sciences**	RO.3
Luminita	Chicinas	Romania	**NSC Romania**	
Negrutiu	Codruta	Romania	**The MaST Game**	RO.2
Oana Maria	Bartas	Romania	**The MaST Game**	RO.2
Ludmila	Onderova	Slovakia	**Balloons and its properties**	SK.2
Maria	Ganajova	Slovakia	**Chemistry in everyday life**	SK.5
Maria	Novakova	Slovakia	**What sound can do?**	SK.3
Mária	Goláňová	Slovakia	**Pet bottle physics**	SK.4
Marián	Kireš	Slovakia	**NSC Slovakia**	
Zuzana	Ješková	Slovakia	**Water in motion**	SK.1
Ambroz	Demsar	Slovenia	**Levitation and other disillusions**	SLO.4
Dalibor	Šolar	Slovenia	**Innovative materials in physics class**	SLO.1
Jaka	Banko	Slovenia	**Innovative materials in physics class**	SLO.1
Luka	Bole	Slovenia	**Innovative materials in physics class**	SLO.1
Romana	Turk	Slovenia	**Top to Bottom Change, Attractive Chemistry Class Experiments**	SLO.3

List of Participants

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Urška	Kenda Mavrar	Slovenia	**Instant ice**	SL0.2
Ana Isabel	Barranco	Spain	**5 seconds: Lorca's earthquake**	E.2
Andreu	Cardo Martinez	Spain	**Invited talk: Inquiry-based learning**	
Beatriz	Martin Oxinalde	Spain	**Science and technology a working tool in a school for all**	E.4
Carlos	Durán	Spain	**Some curious experiences to teach chemistry in the classroom**	E.9
Carme	Alemany	Spain	**Invited talk: Inquiry-based learning**	
Diego J.	Tobaruela Hernández	Spain	**Reacciona Project**	E.5
Fina	Guitart	Spain	**Experiments and simulations on forensic science: A motivating approach for learning chemistry.**	E.6
Hugo	Pérez-García	Spain	**Physics experiments with electric household appliances**	E.1
Ismael	Bermúdez Chaves	Spain	**In vitro fertilization by stimulation with potassium chloride in paracentrotus lividum**	E.11
Ivan	Nadal Latorre	Spain	**School research work in Catalonia: Between tradition and innovation**	E.7
Juan Manuel	Delgado Pérez	Spain	**5 seconds: Lorca's earthquake**	E.2
Laureà	Huguet Caufapé	Spain	**The Five ways to produce a movement of the electric current**	E.10
Manuel	Hernández Tavera	Spain	**Science and technology a working tool in a school for all**	E.4
María del Carmen	Cabezas	Spain	**The engine of human body**	E.8
Meritxell	Bartroli Checa	Spain	**Why a salty sea?**	E.12
Miguel	Cabrerizo	Spain	**Recreative Physics**	E.3
Rosa Maria	Ros	Spain	**Executive Board SonSEu / Jury**	
Sergio	López Borgoñoz	Spain	**NSC Spain**	
Susana	Martín Salguero	Spain	**Reacciona Project**	E.5
Anders	Blomqvist	Sweden	**NSC Sweden / Jury**	
Anders	Erixon	Sweden	**Poetry in Chemistry**	S.5
Anette	Barr	Sweden	**Studying the decomposition of dead animals / Playground physics**	S.7
Anna	Gunnarsson	Sweden	**Berta the dragon and her wonderful world of Chemistry**	S.3
Christofer	Danielsson	Sweden	**Inquiry based learning in primary school**	S.4
Daniel	Barker	Sweden	**The Flipped classroom**	S.1
Daniel	Bengtsson	Sweden	**NSC Sweden / Jury**	
Fiona	Luna	Sweden	**The World is my classroom: Using Social media to promote International Scientific Collaboration in Middle school**	S.2
Fredrik	Lundgren	Sweden	**Childrens best tables**	S.8
Jenny	Andersson	Sweden	**Childrens best tables**	S.8
Laila	Petersen	Sweden	**Childrens best tables**	S.8
Margareta	Hynge	Sweden	**Density with sugar solutions**	S.6
Marie-Louise	Enochsson	Sweden	**Guest**	
Franz	Steiger	Switzerland	**A water drop – thousands ice crystals**	CH.2
Marc	Montangero	Switzerland	**Chemistry for dummies**	CH.1
Maurice	Cosandey	Switzerland	**Explore-it**	CH.3
Alessio	Bernardelli	United Kingdom	**Be Amazed by Apps**	UK.1
Alison	Alexander	United Kingdom	**Teaching physics with balloons, straws and elastic bands**	UK.6
Brian	Macken	United Kingdom	**Science of Magic**	UK.12
Bryony	Frost	United Kingdom	**NSC UK**	

NAME	SURNAME	COUNTRY	PROJECT TITLE/FUNCTION	BOOTH
Charlotte	Thorley	United Kingdom	**NSC UK**	
Ciaran	Kinney	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
David	Featonby	United Kingdom	**Executive Board SonSEu**	
Eleanor	Hayes	United Kingdom	**Jury**	
Helen	Hewitson	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Jane	Turner	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Jenny	Search	United Kingdom	**School Science Fairs to engage pupils and the local community**	UK.4
Kathy	Schofield	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Lara	Woods	United Kingdom	**The Experiment Mats**	UK.10
Lesley	Hunter	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Linda	James	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Lisa	Newton	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Martin	Hollins	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Mary	Haughey	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Niloufar	Wijetunge	United Kingdom	**Money Matters: Science with Money**	UK.11
Nina	Spilsbury	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Peter	Sainsbury	United Kingdom	**AZSTT College Project**	
Richard	Spencer	United Kingdom	**Free and Easy – ICT in Biology / Plants 'R' Mint**	UK.2 / UK.3
Riggulsford	Myc	United Kingdom	**Moderator**	
Ruth	Wiltsher	United Kingdom	**Teaching physics with balloons, straws and elastic bands**	UK.6
Sarah	Langford	United Kingdom	**Today's Questions are Tomorrow's Answers**	UK.7
Shehnaz	Vorajee	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Sinead	McGleenon	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Sophie	Franklin	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Stephen	Ashworth	United Kingdom	**Kitchen Chemistry**	UK.8
Sue	Martin	United Kingdom	**Excellence and Enjoyment in Primary Science**	UK.5
Trevor	Plant	United Kingdom	**Loudspeakers made from ..... anything!**	UK.9

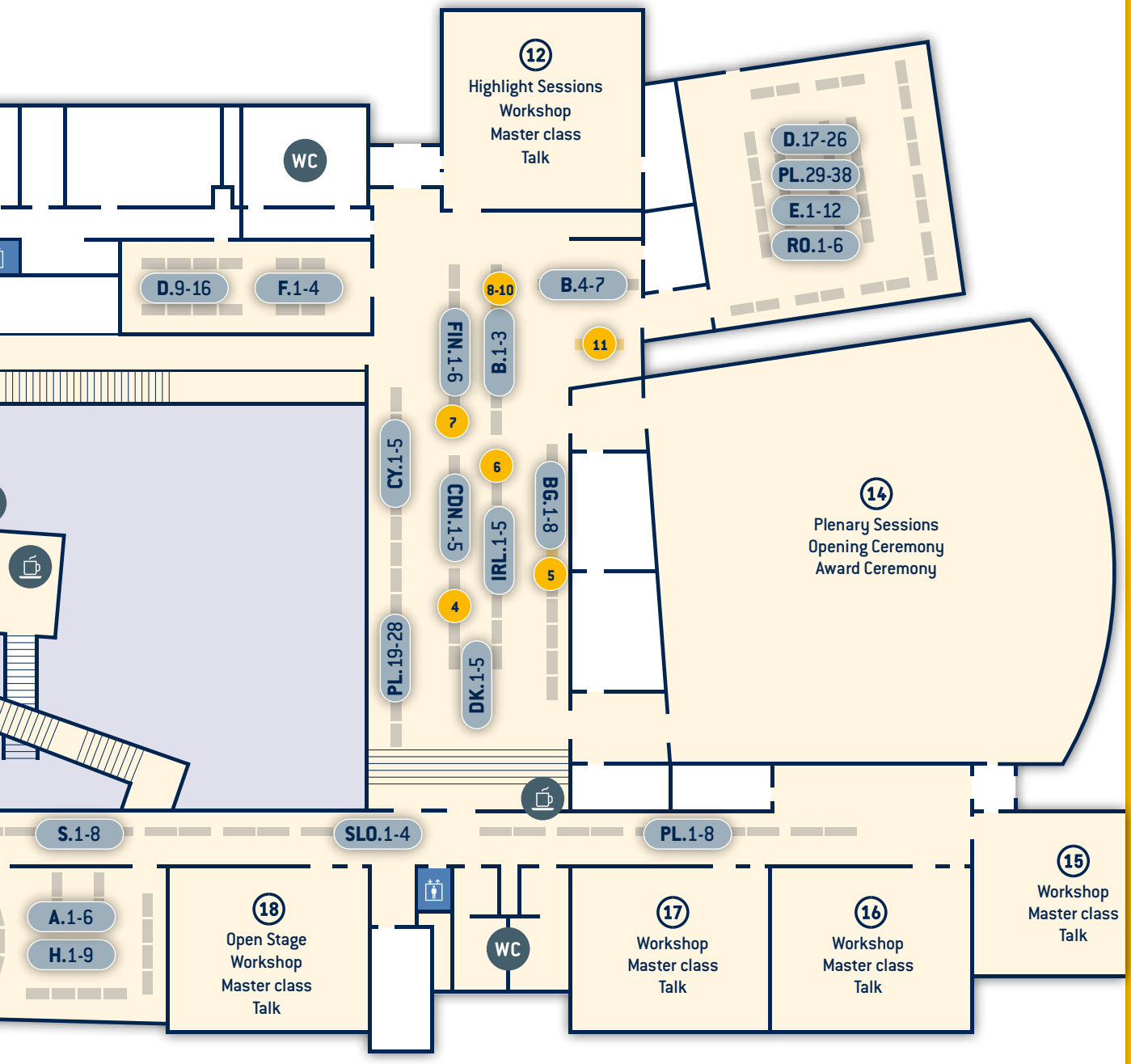
PLAN OF VENUE

List of participating countries

A	Austria
B	Belgium
BG	Bulgaria
CDN	Canada
CY	Cyprus
CZ	Czech Republic
DK	Denmark
FIN	Finland
F	France
D	Germany
GR	Greece
H	Hungary
IRL	Ireland
I	Italy
NL	Netherlands
PL	Poland
P	Portugal
RO	Romania
SK	Slovakia
SLO	Slovenia
E	Spain
S	Sweden
CH	Switzerland
UK	United Kingdom

Forum

1	Viadrina/AMU/ Collegium Polonicum
2	IBM
3	Tekniklyftet/KTH
4	Siemens Stiftung
5	Jugend forscht
6	Make it in Germany
7	Intel
8	think ING.
9	MINT-EC
10	University of Bayreuth
11	DLR



- A Science on Stage UK
- B Science on Stage Europe/Poland/Germany
- Information/Registration
- Buffet
- Coffee
- WC Toilet/Restrooms

SCIENCE ON STAGE EUROPE – THE EUROPEAN SCIENCE TEACHER NETWORK

The European initiative Science on Stage brings together science teachers from across Europe to share best practice in science teaching. Inspiring teachers is an effective way to address the lack of young scientists in all European countries. Science on Stage Europe believes that a good way to encourage schoolchildren to consider a career in science or engineering is to motivate and encourage their teachers. Science on Stage Europe therefore provides a forum for science teachers to exchange and develop teaching ideas and gives them access to science teaching resources.

Science on Stage Europe, a nonprofit association, works through the Science on Stage communities in the participating countries. Each country has its own national steering committee (NSC). These NSCs provide representatives to Science on Stage General Assembly which meets annually and elects the Executive Board. In turn the board is supported by the staff of Science on Stage Europe, which is hosted by the Science on Stage Germany office in Berlin.

The international festivals are the great highlights of Science on Stage taking place every two years, as the culmination of all the national Science on Stage activities. At the festivals about 350 of the best science teachers from 27 countries come together to exchange innovative teaching methods, ideas and examples – in workshops, in a fair and on stage. The participants are chosen through competitive national events. Activities that take place between the festivals focus on sharing, developing and sustaining the inspiration.

The main sponsor of Science on Stage Europe is the Federation of German Employers' Associations in the Metal and Electrical Engineering Industries (Gesamtmetall) with its initiative think ING.

think ING.

JOIN US

Your benefits:

- Get into contact with teachers from other countries
- Exchange and share teaching ideas and projects for your science lessons
- Discuss current issues of (science) teaching with colleagues from all over Europe
- Get the opportunity to present your projects

If you would like to join the Science on Stage activities in your country, please send an e-mail to info@science-onstage.eu. We will forward the information to the contact person of the National Steering Committee and they will contact you.

On our webpage you can also subscribe for our newsletter.

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SCIENCE ON STAGE EUROPE

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