



Study visit group report

Group No	226
Title of the visit	Creativity Increase in Science Teaching and Learning
Topic	Learning Mathematics and Science
City, country	Krakow, Poland
Type of visit	General Education
Dates of visit	7 - 10 April 2014
Group reporter	Frank Wedding

I FINDINGS

This section summarises the findings of the group while visiting host institutions, discussing issues with the hosts and within the group. You will be reflecting on what you learnt every day. But to put them together and give an overall picture, you need to devote a special session to prepare the final report on the last day of the visit.

In this section, it is important that you describe not only things you learnt about the host country but also what you learnt about the countries represented by group members.

1. One of the objectives of the study visits programme is to exchange examples of good practice among hosts and participants. Cedefop will select well-described projects/programmes/initiatives and disseminate them to former participants and a wider public, including potential partners for future projects. Therefore it is important that you identify and describe all aspects that, in your view, make these projects/programmes/initiatives successful and worth exploring.

When a group of professional educators from different disciplines meet in a study visit like this one, it is natural there is a sharing of views, opinions, and good practice. During a couple of hours of presentations and discussions we had the chance to explore and explain how the different educational systems in our countries operate.

The topics explored were population in the educational system, pupils and teachers, per capita spend (GDP) and the way the educational system is organized from primary school to the university. We identified common challenges and despite our differences a lot of our challenges are similar.

During the presentations and discussions contributors concentrated on delivery of the science curriculum in various contexts. Again, it was obvious that each country has a different approach in encouraging and developing creativity among the student body.

Each presenter gave concrete examples of how he/she has endeavoured to instil an interest in the various Science disciplines. Due to the fact that presentations were short and informative presenters have already distributed their presentations for further study and dissemination.

During the visit we had an interesting trip to a very traditional Polish secondary school where the headmaster gave an illuminating address describing all aspect of his institution. Presenters were surprised at the emphasis put on rewarding students with high academic standards with no mention of students with any learning difficulties and special needs. However, there were some very good aspects of traditional schooling which were evidently encouraging students to excel in studies. These included rewards for academic success, evidence of the history of the school, contacts and visits by past pupils and strong pride in the ongoing success of the school. Presenters were interested in the physical aspects of the building which resonated with the different generations. This should not imply that teaching and learning in any way suffers as a result of this.

We were able to compare and contrast several aspects of the Polish system with those of our own countries. It makes one appreciate some things you have and encourages you to change other aspects.

The conference that was included in the visited was highly beneficial to the overall quality of this visit. There was input from many different areas and many institutions. However, the conference could have been more interactive, with time for discussion/reflection and sharing of ideas, for example through workshops. The aim of the study visit was to make connections and through workshops these are more easily made. There was one workshop in the end that raised our spirits and made us put creativity in practice. The objective of the presented project was to make a connection between science teaching and theatre play.

A special experience was one in which participants were totally immersed into a science class for 13 year old students. In the class, the teacher, himself a University Chemistry lecturer, provided analysis equipment for testing the environment. The students' enthusiasm and motivation was evident and this was due to the fact that instead of learning in a class the same learning took place in its actual context, the outdoors.

Describe each of the good practices you learnt about during the visit (both from the hosts and from one another) indicating the following:

title of the project/programme/initiative	country	name of the institution that implements it (if possible, provide a website)	contact person (if possible) who presented the programme to the group	whom the project/programme/initiative addresses	what features of the project/programme/initiative make it an example of good practice
Inclusion of students in international visits	Poland	Pedagogical University of Krakow	Katarzyna Potyrala	Student teachers	Inclusion of students in innovative practises of the university gives the impressions of cross collegial support.
Evidence of student respect for their buildings and facilities	Poland	Pedagogical University of Krakow and the secondary school		School community	It is so much easier to learn in an environment where it is calm and order.
Lecture of the Polish education system	Poland	City Council		Public	Candid and transparent explanation of successes and sometimes drawbacks of the Polish educational system.
Flipping the classroom	Netherlands	Betapartners/Its academy www.itsacademy.nl	Linda Ris	Students	Thinking outside the box to provide an opportunity for more individual support for students who need it.
The Outdoor Classroom	Malta	Secretariat for catholic education.	Angela Coppini	Students	Creative use of the environment in science education.
Jet-Net (companies and school working together)	Netherlands /Denmark	www.jet-net.nl	Linda Ris	Students	Companies have structured ties with schools to ensure sustainable cooperation between them.
Virtual Communities	France	MOVID program 'eco responsive consumption' Olivier.galibert@u-bourgogne.fr	Olivier Galibert	Students/Teachers/universities	Schools, teachers and universities can start online communities to make connections and work together
Dream machine	Poland		Piotr Hnidan	Students/Primary schools and universities	Children come up with ideas for a dream machine. Students from universities design and create the machine. Even the industry can be involved. Innovation and creativity go together in

					this project.
Theater and science	France		Daniel Raichvarg	Students/Secondary/Teachers/ etc.	Through workshops participants work in groups to produce a funny sketch which transmits and important scientific idea to the audience.
Archeology and shamanism	Poland	Museum of natural history of polish Academy of Science		Students teachers	Visit of the museum through history of shamanism: an amazing point of view to visit a museum and a interesting reflexion about the science evolution. The aim is to allow the pupils to take position and to reflect about his own choices.
Discover electricity	Poland	Museum of urban engineering		Students	Groups of pupils are building the famous Volta battery, according to historic experiment and exploring conductivity of the human body.
Real House Project	France	LP Freyssinet VERDUN	BERINGUE Stephane	Students	Students design, plan and build a big model of a house using mathematical skills and knowledge of basic physical ideas.
European Vocational Training	Romania-France	Technical College Iuliu Maniu, Bucharest-Ensemble Scolaire Catholique Saint Louis, France	Gabriela Ceacu	College students	Hard-working students are invited to participate in a work experience at auto industry. This could lead to eventual employment.
Introduction of new course: Applied Sciences.	Italy	Liceo Scientifico, Galileo Ferraris, Varese	Giuseppe Carcano	College students	New curriculum without Latin and less Philosophy gives more time to Chemistry, Biology and ICT.
Science Degrees Project	Italy	Liceo Scientifico, Galileo Ferraris, Varese-Universita degli studi di Varese	Giuseppe Carcano	High school students	In order to increase student application for science degrees, University representatives visit school for conferences and also offer support in terms of knowhow and resources.
On-going professional development of teachers	Spain	Centro Territorial de Innovación y Formación-Madrid Norte	M ^a Elia Vaello	Teachers of Science	Teachers within schools provide training to their peers in methodology. A teacher trainer coordinator has at least two monthly meetings with teacher trainers.
Sharing and awarding	Spain	Centro Territorial	M ^a Elia Vaello	Teachers in different	Teachers can publish and share their practises in an

teacher good practices		de Innovación y Formación-Madrid Norte		subjects in non-university levels	ISSN digital magazine, <i>Revista Digital Educamadrid</i> , promoted and awarded by the Educational Institution.
Mathematic projects	Sweden	Kattegattgymnasiet Halmstad.	Frank Wedding	Students and teachers	Youtube-maths project. Students make their own mathfilm and publish it on Youtube. Younger student can use them as flipped classroom.
Pilot-lab for physics teachers	Belgium	Collège Sainte-Gertrude, Nivelles http://sciences.csgn.be/labopilote.htm	Philippe Godts	Physics teachers	The physics teachers can learn how to use a great assortment of equipment for demonstrations as well as for pupil's experiments.

* You can describe as many good practices as you find necessary. You can add rows to the table.

2. The study visits programme aims to promote and support policy development and cooperation in lifelong learning. That is why it is important to know what you learnt about such policies and their implementation during your visit. You are invited to describe your findings concerning the following:

2.1 APPROACHES TAKEN BY PARTICIPATING COUNTRIES (BOTH HOST AND PARTICIPANTS') REGARDING THE THEME OF THE VISIT. ARE THERE ANY SIMILAR APPROACHES/MEASURES IN PARTICIPATING COUNTRIES? WHAT ASPECTS ARE SIMILAR AND WHY? WHAT ASPECTS ARE DIFFERENT AND WHY?

There was a common trend that policy makers are very concerned about PISA results because of the external perception of the success or otherwise of their educational system.

There was common agreement to encourage students to get involved in science subjects and technology. There is a shortage of science graduates and teachers. Also, many primary teachers seem to lack confidence in teaching science and there was common agreement that on-going training is needed and that changes to University pedagogical courses should be implemented.

Within each individual institution there seems to be different policies about the amount of activity learning taking place and resources available within that institution. The variety of contexts, countries, cultures and traditions explain these differences.

Another difference between countries was the number of contact hours. Poland has 18 hours a week, while many other countries have more, even up to 26. These hours must have an influence on the time needed for on-going professional development of teachers.

On-site learning activities are part of the science curricula of most of the participating countries. However, the complex organisation of such field trips such as parent authorisations etc, seem to discourage their implementation. Therefore, support is needed for these activities by school administrations. Notwithstanding these difficulties, it has been suggested that the first step to outside learning is carrying out such activities on the school premises.

2.2 CHALLENGES FACED BY PARTICIPATING COUNTRIES (INCLUDING HOST) IN THEIR EFFORTS TO IMPLEMENT POLICIES RELATED TO THE THEME OF THE VISIT. WHAT ARE THE CHALLENGES? ARE THEY COMMON CHALLENGES? IF SO, WHY? IF NOT, WHY NOT?

The main challenge is to increase the creativity within the teacher body in delivering science curricula. It is not enough to do the same thing every year. These are common challenges that we found. Some teachers will not come with us on the journey.

The reason could be human nature, lack of confidence of teachers, the natural inclination not to embrace new methodologies, the old view of teachers' role of giving out facts to students instead of inquiry based learning.

In Poland there is a clear difference between working conditions for teachers in public and private schools, where in the former there are many privileges such as extended sick leave. One challenge related to the training program on management that was discussed was that we see universities as a place solely for research, as opposed to an open institute in contact with the labour market. Many of the participants recognised this innovative approach and have the same discussion in their own countries. Furthermore, Poland described that 50% of their graduates have not found work up to six months from graduating and this happens in other EU countries, such as Spain. On the other hand, in the Netherlands, there is a lack of chemistry graduates and new graduates immediately find a job, sometimes even before graduating. In Malta many students find internships during their actual studies. These differences show that collaboration between EU countries would benefit the employment of new graduates.

Another challenge that many countries face is to find innovative ways to increase student motivation, especially when there is little or no parental support. Therefore, all the creative ideas put forward in this study visit should serve to increase the willingness of students to learn. When a teacher engages students in a holistic, interdisciplinary way, learning will take place even in the most unmotivated learner.

2.3 NAME AND DESCRIBE EFFECTIVE AND INNOVATIVE SOLUTIONS YOU HAVE IDENTIFIED THAT PARTICIPATING COUNTRIES (BOTH HOST AND PARTICIPANTS) APPLY TO ADDRESS THE CHALLENGES MENTIONED IN QUESTION 2.2. PLEASE MENTION SPECIFIC COUNTRY EXAMPLES.

An interesting development in Poland was the pilot programme for the management training at the chemistry department. It aims to support students and the process of transition from studying to career life. But it also

helps employers to reach the best candidates for the job and ultimately also influences university curricula to the requirements of this job market.

One solution to bridge the gap between the new graduates and the labour market is the setting up of a career and promotion office, which carries out job counselling, course and training, student/company meetings. These regularly send out questionnaires to industries to obtain feedback regarding the requirements. This actually affects the university programs.

In France, an innovative practice of using ‘science mediators’ in transmitting ecological principals, especially regarding biodiversity, has been undertaken by The Garden of Science in Dijon. Besides targeting the education of young people, it also aims to affect policy making. One example is that kids from all over France contribute to research by taking photos of insects and sending them to the institute. The mediator provides the method, but not the result. But they do need experts and teachers in the transfer of knowledge.

The University of Burgundy, France, has developed a program called: Science and Theatre: a workshop to foster creativity. This workshop is conducted in such a way that student can learn science principles, building on the knowledge they know already. The program is an example of how teaching can be cross curricular. It does not only address the different subjects but also informal skills such as self-confidence and presentation skills, not to mention team building. Another example of ‘cross curricularity’ is that faculties work together on different projects connected to science education. For example, the business/economy faculties work together with the Chemistry Faculty on an innovation project.

We also had the opportunity to take part in 2 presentations at museums: the main idea was to give the pupils the chance to practice experimental activities and make contact with animals.

Such activities can increase students’ motivation.

Another innovative practice this time from Romania, gives high school students from technical colleges opportunities to work in famous industries in EU countries.

2.4 ASSESSMENT OF THE TRANSFERABILITY OF POLICIES AND PRACTICES. COULD ANY EXAMPLES OF GOOD PRACTICE PRESENTED IN THIS REPORT BE APPLIED AND TRANSFERRED TO OTHER COUNTRIES? IF SO, WHY? IF NOT, WHY NOT?

In reality, most of our universities are very closed to input from the working world and changes in policies are extremely rare and difficult to achieve. Such a program may act as a catalyst and eye opener to faculty deans so that the graduates produced do in fact become effective workers on the market.

Various institutions such as Universities and museums need to open their doors to the education of youth so that learning becomes more innovative and contextualised. Bureaucracy and financial issues should be seriously addressed by policy makers so that these institutions become an integral part of the learning experience of children.

3. Creating networks of experts, building partnerships for future projects is another important objective of the study visit programme.

Please state whether and which ideas for future cooperation have evolved during meetings and discussions.

- Another study visit
- Perhaps form partnership among different countries for future projects
- A Belgium-Netherlands exchange for a day
- Possible collaboration between virtual communities.

TO SUM UP

4. What is the most interesting/useful information that the group believes should be communicated to others? To whom, do you think, this information will be of most interest?

To the EU educational organisation:

When teachers from different countries meet and mix their experiences and ideas the result is that we feel that we are not alone in our daily challenges and that we open our minds, finding solutions and improving our work.

To participants' educational institution:

To make an effort together with policy makers, students, parents and teachers, as well as all the stakeholders, to improve science education.

THANK YOU!