



CEDEFOP

European Centre for the Development
of Vocational Training



Education and Culture DG

Lifelong Learning Programme

Study visit group report



Group No 85

Title of the visit Content-based approach and competence acquisition in teaching mathematics and scientific subjects

Topic Learning mathematics and science

City, country Udine, Italy

Type of visit General education

Dates of visit 21 - 25/10/2013

Group reporter Joan Knott

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.

The group identified examples of best practice and suggest the following initiatives will be useful for more detailed exploration in future projects.



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
KOLE Cooperative learning	Austria	HTL Steyr	Christoph Kimbacher Christoph.kimbacher@htl-steyr.at	All learners	Students take responsibility for their own learning. The basis of lessons is group work and cooperation between students. E.g. placemate or jigsaw.
Narration de recherche	France	IREM de Montpellier http://www.irem.univ-montp2.fr/C-est-quoi-une-narration-de	Aurore Gelot Maths.gelot@gmail.com	All learners	Students work on open problems. They have to write down all their ideas, not only the correct solutions.
MATH.en.JEANS	France	Association MATH.en.JEANS www.mathenjeans.fr	Aurore Gelot Maths.gelot@gmail.com	Secondary school learners	Exchange between professional mathematicians and students from high school
Maths projects with another high school	Spain (Catalonia)	www.xtec.cat/sesserradenoet	Fina Madrid jmadrid@xtec.cat	All learners	Working collaboratively with other schools with in our city. The project involves seeing our town through mathematical eyes. Mathematical Gymkhana and conferences.
One student one pc	Spain (Catalonia)			For students	Every student has their own pc or tablet. There is a a lot of interesting, interactive educational software available which students enjoy using. The software indicates whether or not they are correct meaning that they gain confidence, practice more and do not practice incorrect methods.
Try, research and find out	Spain (Catalonia)			For students	It is very important to awaken the student's curiosity. Asking interesting questions, giving clues, or not giving

					clues, depending on the student and the complexity of the problem. We have to allow the students opportunities to think, research and try to find the solution. If they find the solution they will learn and they will remember the strategy
General education system	Poland	www.zs10.zabrze.pl	Mirek Mendecki mirmn@interia.pl	All learners	Ongoing reform over 20 years period has led to significant reduction in dropout, raised achievement and greater engagement in HE. PISA ranking provides evidence
Motivating students in Mathematics.	England		Joan Knott Joanknott80@gmail.com	Upper Secondary School Students	Explore the concrete do not rush students into the abstract before they have grasped the concepts being taught. Giving students the opportunity to explore concepts practically and work in small groups to develop confidence. Working on projects in small groups and presenting to the class. E.g. Using Chocolate to develop an understanding of fractions. Difference of 2 squares proved by tearing paper.
Overcoming the fear of Failure	England			All students	Helping students to realise that 'wrong' answers are as important as correct ones in understanding new concepts. Wrong answers can lead to the question why does this not work?
Using project work with small groups	England			All students	Allowing groups of students to choose their own topics for investigation in Statistics. Setting problems or investigations to be completed in small groups (4) Group presents to the class. Everyone in the group

					<p>must contribute.</p> <p>Rest of the class assess by criteria laid out by the teacher.</p> <p>Less threatening than an individual presentation. Class listen for errors and learn from the assessment process.</p>
General and professional education system	Latvia	www.izqlitiba.daugavpils.lv DAUGAVPILS CITY GENERAL AND PROFESSIONAL EDUCATION DEPARTMENT	Yelena Azarevica Azalena2@inbox.lv	Secondary school learners	<p>Experience in teaching mathematics and sciences, laboratory works method.</p> <p>Working collaboratively with other schools in our city and country. Teachers meeting to exchange ideas.</p> <p>Using ICT in education.</p>
Challenges in retention due to learning modes.	Northern Ireland		Collettecarson@serc.ac.uk	All Teachers	Interactive learning strategies used to improve retention and success for FE students.
Bridging the gap between High School and University	Sweden	www.LTU.se		Upper Secondary School Students	The gap between upper secondary school and university is too wide. We are looking for better ways to prepare students for University.
Structure of classifying competences and content for the revision of the curriculum of secondary schools	Germany	www.stmbk.wk.bayern.de www.isb.bayern.de	Holger Wirth hkwirth@web.de	Secondary school learners	<p>In Bavaria for Maths, six different competences (argumentation, problem solving, modeling, using graphics/representations, being able to use symbols, formal and theoretical elements of mathematics, communicating) as well as five content areas (numbers and operations, values and measurements, space and form, functional relation/coherence, data and probability) have been defined.</p>
Using a personal blog for using and classifying useful resources	Spain (Canary Islands)		Juan José Florido Díaz IES Nueva Isleta Tony Gallardo	All Teachers	Using a personal blog for collecting and classify useful resources.

Activities outside of the classroom	Spain (Canary Islands)			Teachers and students	Going outside the normal classroom for practising and enabling students to perform practical activities. E.g. Calculating gravity using a pendulum, making soap from burned cooking oil.
Using Technology to engage students	Spain (Canary Islands)			Students	Managing a moodle for students, filming short videos to foster team work.
Games	Spain (Canary Islands)	Superteachertools.com		Students	Using games for engaging and getting the most out of students. E.g. Jeopardy, Hot Potatoes, moodle games, stop disasters game etc.
Real Research Work	Hungary		Anna Majer	Students	Students taking part in real Hungarian research groups in medicine, science, history etc.
Conferences and Summer Camps	Hungary			Students and Teachers	Students and Teachers meeting to exchange ideas.
National and International Competitions	Hungary			Students	Using competitions to motivate students.

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

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 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?

Common goal preparing students for university or vocational work.

In most of the participant's country, a broader range of subjects are studied until the age of 18. In the UK and Czech Republic this is more restricted. One reason is because Universities require evidence of specialist knowledge before they begin a course.

Diversity of methods of teaching.

Everyone tries to improve motivation and raise standards. Investigation, experiments and practical work, students hands-on, team work, projects and games are used in all countries because they motivate students and promote understanding.

Germany and Austria have both vocational education and vocational training.

These countries place a higher value on vocational education and training which covers a wider range of careers than is seen elsewhere. Because there is fuller employment and the tradition of the so called "dual system", the companies are eager to play an active part and students are confident of gaining employment at the end of the training.

2.1 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?

UK has challenges in encouraging students to follow vocational pathways because it is hard to find employment. Students usually value an academic education more than a vocational education.

Professional careers in finance, law or medicine are seen as having higher status than vocational careers like architecture, civil engineering or catering.

In all countries, there seems to be a lack of time and opportunity for cooperation in school and between schools to exchange ideas.

In the UK schools and colleges compete for students and this works against cooperation, despite this some excellent partnerships between good schools and failing schools have been developed.

All countries would like to do more projects group and practical work, but the curriculum restricts the time available. It is difficult to find the right balance between competence and content based approaches.

Facilities are not always available for practical work (especially in France).

National examinations do not yet test competences except in Austria (and France for Science).

All countries have a framework for assessment with high stakes examinations taking place at the transfer from school to University.

National tests allow comparison between students and school but because they are higher stakes, they restrict what is taught.

In Italy it is difficult to make comparisons between schools as whilst there is a National framework for assessment, schools set their own examinations and there is no standardisation of the papers, marks schemes or results.

2.2 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.

In Austria and in Germany, teachers are trained to teach competences and to create competences based tasks, exams and assignments.

In Northern Ireland and Catalonia, FE colleges encourage transference skills between different curriculum areas (for example, Sciences, creative studies).

Most countries offer interactive online courses to teachers.

UK, Poland and Catalonia have teachmeet events. (informal meeting organised by teachers)

In Latvia and Hungary, they are changing from traditional teaching to practical teaching, by providing motivational materials and training teachers.

2.3 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?

Generally yes, providing that the legal requirements as well as the structural needs are looked after. One should bear in mind that there are culture differences that are reflected in Education systems and these cause limitation to transferability.

Teachmeet events would be very cheap and easy to organise, they just need a motivated teacher.

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.

Participants feel this is the most important outcome of the study visit and continued cooperation is planned.

Having English as a common language has enabled the participants to share ideas and they will continue to do so.

Materials and ideas will be exchanged via the internet and links have been established on professional networks e.g. LinkedIn

Exchange visits between schools are being investigated.

Delegates plan visits to each others countries.

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?

Best practices have been communicated.

Awareness, similarities, challenges and differences have been openly discussed. Ideas have been exchanged.

New relationships have been established across Europe.

Most problems are the same in all countries:-

- Motivation of students,

- Money for practical equipment,

- (practical material often paid for by teachers!)

- Suitable accommodation for practical tasks not always available.

- Lack of time is seen as a reason for not doing much practical work.

- Lack of time for teachers to evaluate their work and share ideas.

The information will be invaluable to:

- People who are preparing study visits

- Ministries of Education

- Unesco

- Education Departments within and beyond the EU

- Future participants

THANK YOU!