Welcome to the PROFILES-Newsletter Issue 05/2014

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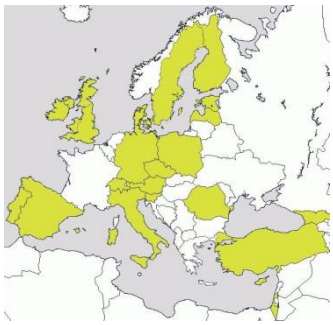

Editorial

Dear readers,

After three years of PROFILES – the project members met in October 2013 at the last Consortium Meeting in Baião, Portugal to reflect upon already achieved milestones as well as further steps to take.

In this newsletter the project partners from Portugal, Slovenia, Cyprus and Poland give an insight in the development of teachers' ownership. We include examples and experiences which cover methods and experiences of partners.

Furthermore, we include a PROFILES module example where the partners of Bremen, Germany ask "How to diagnose an allergy or disease?"

Finally this newsletter gives an overview of (future) conferences and meetings.

Your PROFILES team

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1 Teachers' Ownership within PROFILES

1.1 What is PROFILES Ownership

by Avi Hofstein and Rachel Mamlok-Naaman (Weizmann Institute, Israel)

One of the key goals of PROFILES is to develop a strong 'sense of ownership' (called self-efficacy in the PROFILES Description of Work) among the teachers who participated in the various CPD (Continuous Professional Development) initiatives. The idea is that those teachers who go on to develop a high level of ownership will, in the future (when the PROFILES formal project ends), become leading teachers who will continue to develop and implement (to include professional development) PROFILES ideas and pedagogy. There are four basic skills relevant to be effective leaders, namely: (1) technical skills, (2) conceptual skills, (3) interpersonal skills, and (4) self-learning skills. It is assumed that the PROFILES' CPD programs provide science teachers with opportunities to develop these skills through teachers' active involvement in the professional development process. Clearly, CPD models such as Teachers as curriculum developers and Action Research may provide opportunities to develop self-efficacy, ownership and as a result, leadership.

What are the indications for the development of a sense of PROFILES ownership?

Information or evidence on development towards ownership (i.e. self-efficacy) could be obtained in a variety of ways, for example, through observation of the participating teachers (during the CPD); their self-reflections (orally or on the basis of reflective essays), and through interviews conducted by partners or PD providers. The development of ownership can extend beyond the CPD and some indicators could be:

1. The willingness to involve other teachers in school in implementation of the project ideas.
2. The willingness to identify relevant, context-based teaching ideas i.e. socio-scientific issues (to be developed) that have local characteristics (e.g. an environmental-type issue).
3. By providing evidence, able to identify themselves with the rationale of the project (development and implementation).
4. Identifying oneself, through evidence-based participation, with the newsletter (published on the web).
5. Involving the school principal in appreciating the philosophy of the project (interaction with stakeholders).
6. Based on the recognised feedback by the partner on PROFILES involvement, telling your student that you were involved in the development or adaptation of the module as part of an international project.
7. The commitment to disseminate the project or module to other teachers.
8. From the evidence provided, teachers make an attempt to bring items (artefacts) for their classroom behaviour and practice in line with PROFILES approaches.
9. When teachers perceive that the topic or issue taught is relevant and provides meaningful learning to his/her classroom (the nature of the students) related to the project.
10. When teachers decide to make changes, alternations, and amendment to the original module to better reflect the project philosophy and approach.
11. Their acceptance by the relevant partner, based on their self-efficacy in

operationalising project ideas and their willingness to serve as leaders in the 2nd round of a CPD program.

Based on the PROFILES initial proposal and its related objectives it is assumed that about 5% -10% of the teachers, who were involved in the CPD program, will demonstrate a sufficiently high level of self-efficacy to point to the development of a significant sense of ownership, and thus, in the future will act as leading teachers supporting new teachers who are novice in the PROFILES program. In addition, we also believe that after the termination of the PROFILES project, in each country there needs to be a few experienced teachers (leading teachers who have provided evidence of project ownership) who can keep the "flame burning". In other words, through their ownership of PROFILES, these teachers can ensure that PROFILES will remain a long lasting and sustainable pedagogical idea.

1.2 Developing Ownership of PROFILES through Learning and Teaching Experiences by Portuguese Teachers

by João Paiva, Carla Morais, José Barros and Nuno Francisco (University of Porto, Portugal)

Definition of ownership

One of the most difficult education definitions translated to Portuguese is ownership. Some authors say it is leadership; others associate it with self-positivism; the PROFILES documents refer to it as a stage beyond self-efficacy (PROFILES, 2010). PROFILES partners from the Weizmann Institute define ownership as: "*a sense of belonging towards the project among participating teachers; a feeling that the PROJECT belongs to them and is not imposed on them.*" We also agree that ownership is a key PROFILES element, which brings unique characteristics to the project.

Characterization of ownership

The continuous professional development of teachers promotes the basic principles of self-efficacy and, in a further step, initiates teacher ownership. Ownership can be understood as the teachers' active involvement in appropriate adaptation and development of teaching-learning materials, meaningfully supportive of the PROFILES philosophy and approach.This involves the application of the diverse pedagogical ideas, together with a strong students' role. However, the meaning of this sentence surpasses the simple implementation of existing materials. Teachers with PROFILES ownership add their personal touch to the production of such materials, based on their own experiences and different methodological strategies, according to the specifics of the class of students being taught. (Hofstein & Even, 2001; Borko, 2004).

Nevertheless, PROFILES goals are not limited exclusively to teacher professional development. Other PROFILES aims are: a) to establish a conscious dialogue and interaction between teachers; b) to develop teachers' networks; c) to broaden approaches, reactions and reflections about different methodological strategies.

In a first stage, these teacher networks are seen as local, regional and national. But, in the long run, European networks will be established so that teachers of different nationalities can share, spread and upgrade their opinions and perceptions about science teaching.

Evidence from Portugal CPD workshops about developments towards ownership

We developed a 2nd version of the PROFILES CPD in Portugal, using very interesting, new modules and with a different methodology/practice and focusing on the knowledge/experience shared by the leading teachers from the first version. The colleagues working in the application of new modules werehighly motivated and produced new educational material, encompassing Inquiry-based Science Education, for students of different grades.

Within the 2nd CPD cycle several presentations of the developmental stages were made by the teachers involved. Teachers found these sessions to be very useful as they brought new ideas through contributions made in large group, which, in some cases, provided meaningful solutions to specific constraints (as was also the case insynchronous and asynchronous discussion forums). There was real interaction between colleagues, trying to reach solutions to the IBSE questions and SSI (socio-scientific issue) decision-making procedures in the development of the modules. In the final CPD session, teachers presented the strengths and weaknesses of this research work, based on a SWOT analysis. Thus, in this way, teachers in the 2nd CPD determined and justified modifications and additions to the modules for the 1st CPD program, still bearing in mind the curricula and Portuguese social context. The teachers tried to enrich these modules with digital resources – simulations, videos, animations, games and webquests – along with capabilities to use web 2.0 tools in an educational sense. A further positive factor was enhancement of the teachers' motivation to cooperate with the leaders of the 2nd year CPD program and the attempts at dissemination to teachers of the same school and to other colleagues from different schools.

Developing a sense of ownership through promoting activities

Our experiences point to the following evidence of developing a sense of ownership among the teachers:

- teachers deciding and justifying the changes and additions to the original modules, bearing in mind the curricula and Portuguese social context and trying to enrich these modules with digital resources – simulations, videos, animations, games and webquests – along with capabilities to use web 2.0 tools in an educational sense.
- teachers being enthusiastic about informing their colleagues and students that they were involved in the PROFILES project.
- disseminating the project ideas and modules to other teachers.
- teachers trying to bring simple materials from home to the classroom.
- teachers perceiving that the topic or issue taught was relevant, interesting and meaningful learning for their students.
- teacher willingness and possessing the ability to produce evidence of ownership.

The model in Graph 1 shows the interaction between four keywords that were the core of the formation of PROFILES Ownership. First of all, teachers had an open-minded approach to a new project, in which they have an active participation. Teachers' revealed empathy for the challenges proposed, giving suggestions and improvements both for their workgroup and for the rest of the PROFILES colleagues. Some of them gain to investigation, showing grateful motivation even to promoting this project in their school and in nearby educational facilities. Many peers, from

science areas and others, asked what was sparked such enthusiasm and expressed the willingness to participate in the next CPD. Students also asked for more modules and IBSE activities, something that they had never had before – investigation and participation in a university project. Meanwhile, inevitable the obstacles appear and some teachers lose some motivation. The Leaders' group was very important because it brought confidence adding previous knowledge and experience from 1st CPD. Leaders' aided to potentiate the projects' development bringing different paths and more 'Teacher notes' in the module created. In the last part, we must highlight the extensive work shared between all PROFILES graduates and their peers (in articles included in school journal) and in the surrounding community (in local fairs and in science open days). This clockwise rotation as you can see in this ownership model didn't stop in the first stage because further initiatives were created like modules' adaptation and further applications whom made the IBSE a useful pedagogical tool that can be included in many other curriculum subjects throughout the school year.

Methods for assessing ownership (through artifacts collected):

- Reflection quotes by teachers of relevant, meaningful student learning in line with the PROFILES philosophy.
- Lesson plans in line with the PROFILES approach prepared by teachers for relevant and meaningful implementation of PROFILES modules.
- Documentations made by students during PROFILES modules implementation, with teacher comments, showing relevant, meaningful learning in with the PROFILES philosophy.
- Questionnaire responses by students point to motivational gains and meaningful learning geared to IL and ES in PROFILES.
- Analyzing photos about practical activities pointing to meaningful learning through IBSE and SSI in line with the PROFILES intentions of IL and ES.

Graph 1. The Portoguese Ownership Model

Evidence (three quotes), providing important testimonials that substantiate the previous hints of teacher ownership and possibly providing interesting proposals to the future:

i. "The quality and effectiveness of teaching and educational process is dependent on the involvement of teachers and on the skills that they try to develop in students for the real consolidation of learning."
ii. "The importance of ownership of these modules in the application of science education promotes changes in the practice of science education."
iii. "We propose that a science teacher group should be created on Facebook for greater PROFILES dissemination. We also think that it is possible to create material development teams of two or three teachers from different subjects. These materials could be tested by colleagues inserted into the same vocational area group. We also should exchange ideas with other colleagues of other scientific areas and use Google Drive to create new collaborative documents with further sharing."

Conclusions and future plans

Analysis of written (in paper and in Moodle forums) and oral reflection of teachers at different stages of CPD program, enable us to identify characteristics of self-efficacy and the initial developments towards ownership.

Sustainable and effective improvement of the teaching process through the promotion of self-efficacy through CPD programs and the developments towards teacher ownership strengthened by collaborative interactions and self-evaluation procedures focused on teachers' reflexive practices.

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1.3 Promoting Teachers' Sense of Ownership of Inquiry-based Science Education: The Case of PROFILES Cyprus

by Eleni A. Kyza and Yiannis Georgiou (Cyprus University of Technology, Cyprus)

Teachers' self-efficacy of inquiry-based science education occupied a key role during the Continuous Professional Development (CPD) programs provided by PROFILES Cyprus in attempting to establish a sense of teacher ownership of the PROFILES philosophy and approach. Given that the higher the sense of ownership, the more effective a science teacher , enabling our science teachers to see themselves gaining a high level of self-efficacy

of the inquiry approach, was seen as a goal of paramount importance. In this context, focusing on developing a sense of teacher ownership, our CPD activities during the two previous years related to teachers' Pedagogical Content Knowledge (PCK) aiming to increase their self-efficacy in science education and increasing their capacity for inquiry teaching through engagement in participatory design activities for the development of an inquiry-based module.

More specifically, during the first and the second teachers' network of PROFILES Cyprus, a main aim of the CPD program provided was to help PROFILES teachers develop relevant Pedagogical Content Knowledge (PCK) focusing on needs related to:

- The PROFILES 3 stage model linked to student motivation, scientific inquiry and decision-making
- Issues related to IBSE such as: types of scientific inquiry (e.g. open vs. guided) or the role of students and teachers in inquiry-based learning
- Integration of new technologies in IBSE

During the last two years we organized several workshops focusing on a variety of issues such as: computer-supported collaborative inquiry, experimental inquiry, field-based inquiry, technological tools for teaching science, the STOCHASMOS web-based platform for the design and scaffolding of inquiry-based modules, and inquiry-based learning in innovative learning environments. Below are photos from the PROFILES Cyprus workshops during 2012–13.

Furthermore, participatory design took a central role in our local CPD program, according to which teachers were asked to collaboratively design and enact inquiry-based modules in their classrooms. Teachers who participated in our local PROFILES network during the last year were asked to join one of three groups, organized according to disciplines (Biology, Chemistry, Elementary School Science) to facilitate a design approach to professional development. As a result, during the 2012–2013 academic year the three disciplinary groups developed three inquiry-based modules based on the PROFILES "Education through Science" approach. The development of all of the modules followed the three-stage PROFILES methodology, according to which students are presented with a motivating, socio-scientific problem and engage in discipline-specific but also general skill-developing inquiry activities in order to solve a problem.

Participatory design meetings were realized as face to face meetings, or as web-based meetings hosted on a WebEx system that supported synchronous video conferences, in which PROFILES teachers were involved in discussions regarding the next steps of the designing process. The participating teachers collaborated in their groups for an extended period of time to iteratively develop web-based, data-rich investigations with the goal to motivate students, increase their self-regulated involvement in inquiry and, at the same time, support conceptual understanding of the socio-scientific concepts addressed by each module. Below are photos of the

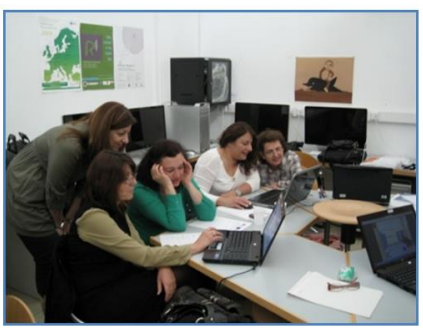




Fig. 1–3. Photos from workshops during PROFILES Cyprus 2012/13 © CUT



Fig. 4–6. Photos from teachers' face to face designing meetings during PROFILES Cyprus 2012/13 © CUT

PROFILES teachers' face to face designing meetings.

The contribution of the PROFILES Cyprus CPD approach in terms of developing teachers' ownership was evaluated employing a repertoire of different approaches such as: questionnaires about teachers' sense of ownership of the inquiry approach, case studies of selected teachers, videos of classroom teaching, interviews with teachers, questionnaires regarding the participatory design approach, and documentation of various teachers' initiatives.

Our findings indicated a gradual increase of teachers' sense of ownership towards IBSE, the PROFILES philosophy and underlying ideas. For instance, a radial diagram (adapted from the Weizmann Institute) was completed by 15 science teachers at the end of PROFILES 2012-13. Teachers were asked to report the 6 main aspects of the CPD program which contributed to the development of a sense of ownership and to evaluate the impact of each aspect by shading the diagram, indicating thus their total sense of ownership diagrammatically. An analysis of the teachers' diagrams indicated that the teachers developed a high-sense of ownership (see Fig. 7 & 8).

PROFILES teachers reported that the CPD program enriched their pedagogical background about an inquiry-based approach. At the same time, they stated that the participatory design process promoted their involvement and familiarization with the inquiry-based modules developed. Finally, according to them, the implementation of the teaching modules increased their sense of ownership since it had a positive impact on student learning, and gave them the opportunity to reflect and to improve their teaching practice.

In this context, we could argue that the CPD provided in the context of PROFILES Cyprus has been successful in helping the PROFILES teachers increase their sense of ownership of inquiry and becoming agents of change in the field of science teaching and learning.

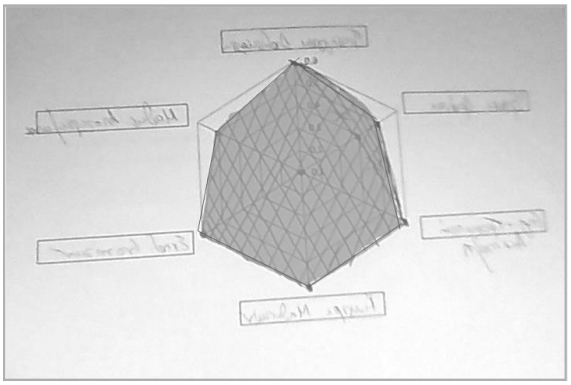
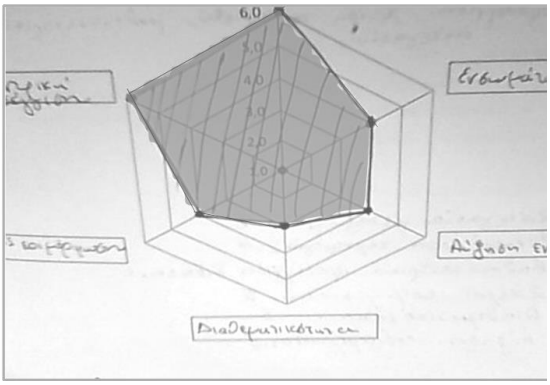



Fig. 7 & 8. Diagrams for evaluating the sense of ownership of science teachers in PROFILES Cyprus © CUT

1.4 The Slovenian PROFILES Model of Science Teachers´ Professional Development

by Iztok Devetak and Janez Vogrinc (University of Ljubljana, Slovenia)

The PROFILES project devotes a great amount of time to teachers´ professional development in the perspective of their long-term education. This means that teachers participate in an in-service education program for at least one school year where they are engaged in acquiring PROFILES ideas for collaborative development of learning materials (PROFILES learning modules) with other teachers and members of the national PROFILES team (consultants). The consultants advise teachers in developing innovative teaching approaches according to the PROFILES philosophy following a bottom-up approach. In the second CPD round, one leading teacher is included in each group of teachers who had already successfully gone through the PROFILES training in the first round. Teachers are grouped according to their professional science orientation. All groups of teachers are assigned to develop or adapt three PROFILES modules which have a specific 3-stage PROFILES structure. The Slovenian project team further upgraded the learning modules for students' independent group work (teachers only guide students in the process of collaborative learning) by following the principals of active learning. This approach was applied in the first round of the PROFILES professional development, but in the second round, teachers had the opportunity to choose and adapt one PARSEL module, one PROFILES module from the first round and to develop one new PROFILES module by themselves (all modules developed in Slovenia can be accessed on-line http://www2.pef.uni-lj.si/kemija/profiles/moduli.htm). Developed modules were then implemented in the school and specific variables regarding students' achievement were measured. Teachers also prepared portfolios where they documented their engagement in the PROFILES project. All teacher activities in the PROFILES project were conducted in the frame of action research, which represented one of the important factors in the teachers' professional development, in particular when designed as a collaborative process involving teachers and researchers. Specific teacher training and implementation of the modules were considered as cycles in the action research model. It was assumed that the effectiveness of teaching in schools would be substantially improved if teaching would be more of a research-based profession and if educational practitioners would play a central role in carrying out educational research. Teachers' involvement in research should also stimulate a sense of ownership of the innovation (PROFILES teaching strategies) because researching his/her own practice can directly influence his/her further work due to direct evidence of students' achievements, which are the fundamental goal of teaching.

As illustrated in Figure 1, PROFILES teachers and consultants (members of the national PROFILES group from university) work in teams to develop an innovating teaching approach following the PROFILES framework. CPD PROFILES program comprises three major activities: (1) lectures where members of the national PROFILES group present the basic aspects of PROFILES, (2) developing PROFILES teaching modules in group work (workshops) and (3) implementing PROFILES modules in science teaching.

The design of each PROFILES module went through several steps. Firstly, an initial draft was created cooperatively by the teachers and the consultants. Each step in the PROFILES

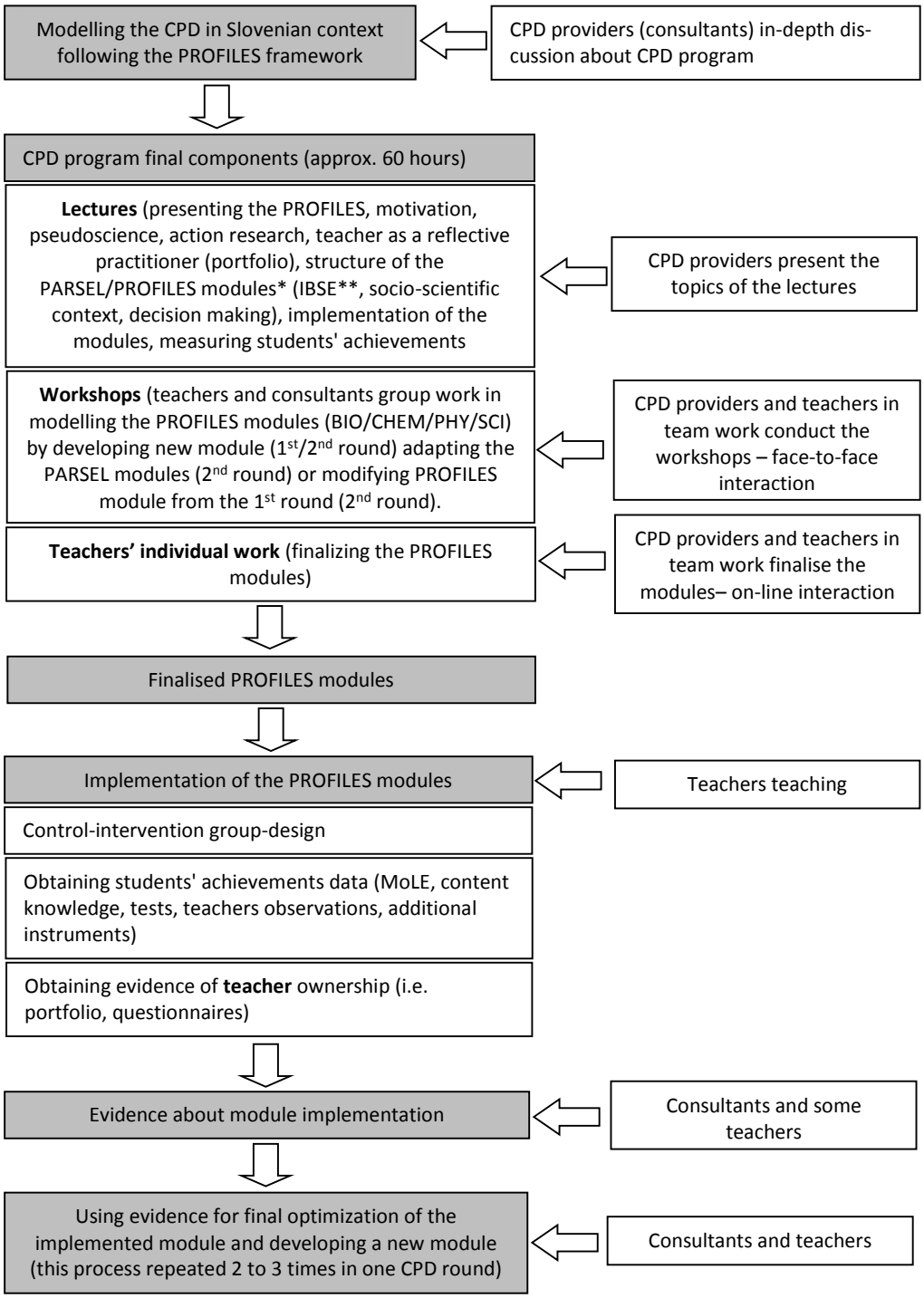


Fig. 1. Structure of the CPD PROFILES program in Slovenia; *PARSEL module »No smoke without a fire – (Un)Desirable combustion« and PROFILES module »How to prevent car accidents in winter?« developed in Slovenia were used for presenting the structure of the modules to the teachers; **IBSE – Inquiry-based Science Education

Picture 1. Teachers participating in lectures given by Prof. Dr. M. Juriševič (member of the PROFILES national team) about motivational aspects of PROFILES modules for learning science.

Picture 2. Dr. K. S. Wissiak Grm (member of the PROFILES national team) working with the group of teachers in modules development.

Picture 3. Teacher presenting her groups' impressions after the first PROFILES module implementation in round 1 CPD programme.

Picture 4. Teacher presenting her groups' students' gains after the last PROFILES module implementation in round 2 CPD programme. © Iztok Devetak

module construction by the group of teachers was revised by the consultant.

The leading teachers instructed the novice teachers (those who were involved in the PROFILES CPD for the first time) and helped them in designing and implementing modules in the classroom environment. The consultants revised all PROFILES modules giving the teachers adequate feedback where necessary, focusing on both the content and the teaching methods included in the module. Specific focus was given to the 3-stage PROFILES model (socio-scientific context, IBSE, and decision making). In the process of module optimization, each teacher in the group had an opportunity to take part in a common discussion. After the optimization process teachers tried out the developed modules in their school. Teachers came to the CPD meetings reflecting on their observations and views about implementation of the modules in the classroom settings. They also suggested to other teachers what was good and gave their opinions on what went wrong during the first module implementation in the science class. See Pictures 1–4.

The phase of implementation of the PROFILES modules and gathering the data about students' achievements and teachers´ observations about students using the modules can be understood as a form of practitioner research that can also be identified as action research. The Slovenian PROFILES team decided to engage teachers in the action research during their CPD PROFILES program. According to the action research characteristics described above, it was decided that Slovenian science teachers would benefit most from the PROFILES CPD program if they were actively engaged into their professional development. Fig. 2 shows the model of the Slovenian action research in the context of the CPD program followed by the teachers and consultants. Each group of teachers followed the model according to their ability to engage in conducting research. It is important to emphasise that the majority of PROFILES teachers in both rounds were not familiar with action research, so they needed to learn to undertake teaching, researching and following their students' work. It is also important to emphasise that Slovenian science teachers are quite familiar with the term IBSE used in the context in science education for initially boosting student interest, and this helped them to design the modules more easily. The teachers faced difficulties with the last stage of the 3-stage PROFILES module, because they usually did not include decision making in science education, especially because they are usually focused heavily on content knowledge and not so much on wider educational components of school science (i.e. education through science as an important aspect of PROFILES).

Fig. 2. A model of CPD program implemented in the PROFILES framework in Slovenia in the first and second round of the project (Juriševič, Devetak & Vogrinc, 2012).

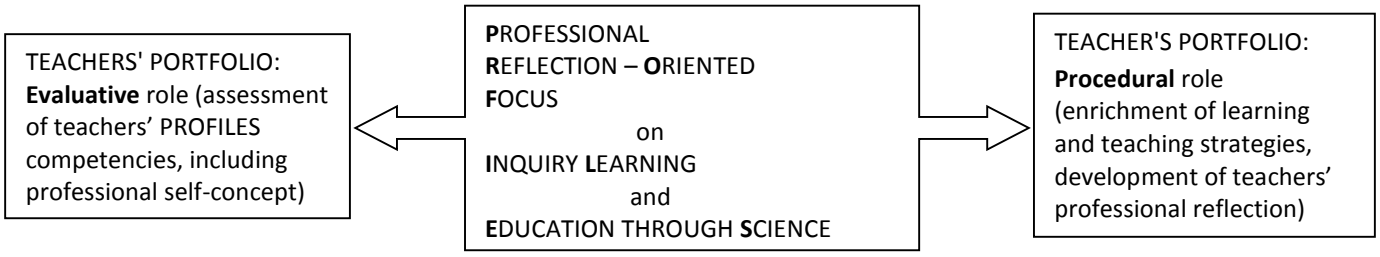
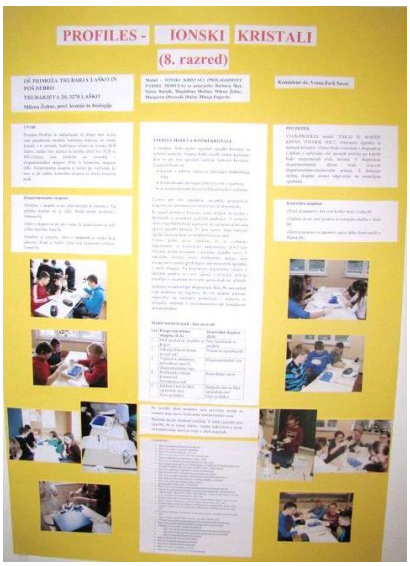


Fig. 3. Identifying teachers' ownership by using portfolio in the CPD PROFILES program in Slovenia (Juriševič et al., 2012).

Action research strategies used in the CPD program was seen to encourage teachers to more efficiently develop their sense of ownership about PROFILES innovative teaching and learning science. Also portfolios could be used as a tool to follow teachers' professional development during the PROFILES CPD. Thus teachers made written records of their specific observation, perception, hesitations, positive experiences or conclusion about different phases of the project. The portfolios served two purposes (Fig. 3): The first was procedural, developing science teachers' reflection, encouraging their professional development and self-concept, and improving the quality of learning and teaching. The second was evaluative, with the portfolio functioning as a tool for science teachers to present their pedagogical competences and gain knowledge of the new professional experiences related to the project goals, through a process of action research following the main principles of the PROFILES approach (Devetak, Ferk Savec, Glažar, Juriševič, Metljak, Kralj, et al., 2012).

The last activity in the teachers' action research process was publication of the research results. Some teachers and their consultants participated in the first PROFILES conference in Berlin with their poster presentation (Šket, Petrica Ponikvar, Klopčič, Mesojedec & Ferk Savec, 2012), also at national science and mathematics teachers' conferences where they disseminated their work among other non-PROFILES teachers through oral presentations and workshops (i.e. Šket, Ferk Savec & Devetak, 2012; Devetak, 2013; Devetak & Ferk Savec, 2013) and through poster presentations presented at the National conference (See Picture 5–7).

The PROFILES CPD program undoubtedly contributed to teachers' awareness of the meaning of practitioner research is and how it can be used for their continuous professional development in a scientific and educational way.



Picture 5. Teachers' poster presented at the 1st PROFILES national conference in 2013. © Iztok Devetak

Picture 6. Teachers presented a poster at the PROFILES conference in Berlin 2012. © Iztok Devetak

Picture 7. First page of the teachers' contribution at the National conference Paths to high-quality knowledge of science and mathematics Brdo 2012.

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1.5 The Challenges of Developing Teachers' Sense of PROFILES Ownership in Poland

by Ryszard Maciek Janiuk (University of Maria Curie Sklodowska, Poland)

Helping teachers take ownership of their vision of their professional work is crucial for their effective and continuous professional development. It has a considerable impact on the effects of teachers' work, which is significantly enhanced if they feel their work is meaningful. A sense of ownership also motivates teachers to take further steps in their professional career and has a positive impact on their working environment.

Ownership can refer to a teachers' professional work as a whole, or to particular aspects. Although it would be desirable for most – if not all – teachers to assume ownership of their profession during their careers, this seems an unattainable goal. It is necessary to bear in mind that teachers' ability to take professional ownership depends on several factors, including personality, why they decided to become teachers, how they were prepared for their career and whether or not their conditions of work are conducive to developing a sense of ownership. A key factor which impacts on teachers' sense of ownership of their work are requirements regarding professional development in a given country.

The development of a teachers' sense of ownership is particularly important when reforms are introduced into the education process. In this case, institutions which support the professional development of teachers, including universities, play a particularly important role. Thanks to actively involving teachers in the process of introducing the reform, these institutions can help teachers see how making changes can improve the quality of education and encourage them to participate in this process. When planning actions that would involve teachers in the reform, one has to bear in mind that developing a sense of ownership is a long-term process, in which a number of organisational and financial requirements need to be met.

The Department of Chemistry Education at Maria Curie-Sklodowska University, a partner in the PROFILES project, has been trying for many years to support the teachers with whom it has been cooperating in order to develop a sense of ownership. These particular teachers feel the need to improve their professional skills and have been taking advantage of several opportunities offered by the Department, such as post-graduate studies, courses, regular meetings which include lectures in chemistry and chemistry teaching, seminars and conferences concerning chemistry teaching, national and international projects dedicated to teaching,

Picture 1 & 2. A group of teachers attending the regional meeting on PROFILES © UMCS

Picture 3. Teacher as a learners. Dr Elwira Samonek-Miciuk is conducting the CPD workshop © UMCS

Picture 4. The students' poster on the soil © UMCS

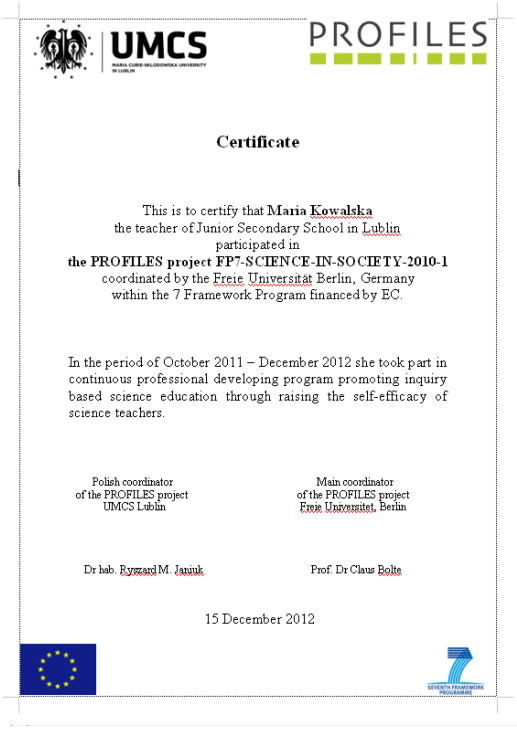
and also research studies conducted by the Department. The fact that the teachers decide to take the opportunities offered by the Department means that they are on track to developing a sense of ownership of innovations within their profession. The Department's activity in this respect can be said to have a positive impact on the level of chemistry education in the region, as well as bringing its staff several benefits. These benefits relate to being able to get in touch with professional chemistry teachers, talk to them about the problems that they encounter in their daily work and helping them resolve their problems. These teachers also host trainees at their schools; the teachers' lessons are recorded and are then discussed during courses which prepare students to become teachers.

One example of the Department's actions, aimed at developing a sense of ownership, was organising the post-graduate programme „Developing lower secondary school students' knowledge, skills and attitudes in chemistry education" which has been held twice, financed by a grant from the Polish Ministry of National Education. The programme, offered after a curriculum reform, included substantial changes in education methods. The one-year programme was pursued by chemistry teachers who wished to improve their professional skills in line with the aims of the reform. Making the participants familiar with the reform, and demonstrating its positive results was an important part of the programme, since they needed to feel responsible for the reform and implement it in their everyday work in a convincing way. It was also assumed that after having finished the programme, the participants would undertake creative and innovative activities which would lead to further professional development and improvement of particular skills and competencies.

Another example of the Department's actions in this respect was getting teachers involved in international projects, financed by the European Commission such as SySTEM and CROSSNET as well as a course for chemistry teachers from Central and Eastern Europe organised under the Socrates programme. The actions the participants took under these projects no doubt had an impact on the development of their sense of ownership of the ideas involved. This was indicated not only by their involvement during the sessions but also by their willingness to take part in similar future projects and events organised by the Department, including those which would require the participation of their students. The

teachers disseminated information about their achievements among their colleagues, as well as in publications and during symposia and conferences related to chemistry teaching.

The experience gained by the Department in the area of developing a sense of professional ownership among chemistry teachers was used and broadened during the implementation of the PROFILES project. The four-stage CPD model, proposed for this project, made it possible to adopt a new and more rational attitude towards the development of a sense of ownership among science teachers during the local PROFILES workshops. To generate – to the greatest possible extent – a positive motivation for taking part in the CPD course, a specially revised questionnaire was implemented in order to assess the level of the participants' professional competences and their professional needs . The information obtained was used to develop CPD course in such a way that it would be as highly compatible with the teachers' needs as possible. In the second component of the CPD model (teachers as teachers), when teachers were guided to teach lessons using modules that had been developed, we tried to support them by maintaining contact, organising regular meetings and encouraging them to exchange information with other teachers implementing the same modules. The third stage (teachers as reflective practitioners), which began to develop a sense of ownership, consisted of discussions regarding the implementation of the modules, during which the teachers suggested making certain changes in the existing modules and preparing new modules in line with the aims of the PROFILES project. In the fourth stage (teachers as leaders) the teachers, who had shown the greatest involvement in the previous stages, participated in a conference in Berlin and were invited to take part in the implementation of the second edition of the CPD course which involved a new group of teachers.



UMCS

PROFILES

Certificate

This is to certify that **Maria Kowalska**
the teacher of Junior Secondary School in Lublin
participated in
the PROFILES project FP7-SCIENCE-IN-SOCIETY-2010-1
coordinated by the Freie Universität Berlin, Germany
within the 7 Framework Program financed by EC.

In the period of October 2011 – December 2012 she took part in continuous professional developing program promoting inquiry based science education through raising the self-efficacy of science teachers.

Polish coordinator
of the PROFILES project
UMCS Lublin

Dr hab. Ryszard M. Janiuk

Main coordinator
of the PROFILES project
Freie Universitet, Berlin

Prof. Dr Claus Bolte

15 December 2012

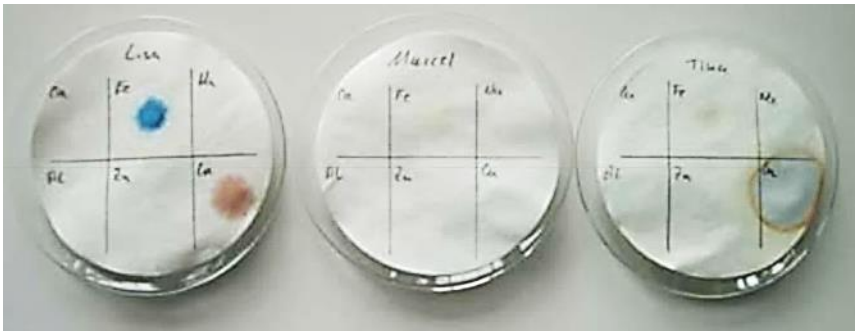
Picture 5. The certificate after the CPD course © UMCS

An analysis of the variables which may indicate the development of a sense of ownership among the teachers involved in PROFILES project shows that a considerable number of them have a good chance of achieving the aims set in this respect. However, only after a certain period of time will it be possible to gain the evidence indicating whether these effects are long-lasting and true ownership has been achieved.

2 Example Module: Screening in Medicine

by Halldis Alxneit, Marc Stuckey and Ingo Eilks (University of Bremen, Germany)

Screening in medicine: How to diagnose an allergy or disease?



This module for Science Instruction, especially in Biology and Chemistry, for 8th to 10th grade was developed by Halldis Alxneit, Marc Stuckey and Ingo Eilks and describes a chemical model experiment for screening in medicine. Screening tests are a widely applied testing method in medicine, environmental analysis, or product controls. A cooperative learning scenario is discussed where both types of screenings – screening for individuals within a population and screening individuals for their reaction to different treatments – can jointly be modelled and understood in the classroom by an inquiry activity.

Learning outcomes:	Planning and realisation of investigations, scientific inquiry, cooperative learning
Curriculum content	Screening in medicine, environmental or chemical analytics
Anticipated time	2 lesson periods of 45 minutes for the example
Initiating the teaching	Students receive a text on *Screening Tests in medicine and beyond* and what it is used for. The focus lies on the so called prick tests for allergies, to find out, which is the allergic substance the allergic person reacts to.
The specific tasks for students are:	Inquiring, laboratory activity, group activities, internet research etc.
Download the modules:	http://134.102.186.148/chemiedidaktik/profiles_zusatz/Deliverables/PROFILES-LE_UniHB01-Screening-Full.pdf

3 Report on Conferences and Meetings

PROFILES Consortium Meeting, Baião, Portugal

The 6th meeting of the PROFILES consortium members took place in Baião at the Douro River, an inspiring region of Portugal, from 24th to 27th October 2013. During the meeting current issues and further project steps were discussed among the 34 participants. Each partner gave a short presentation on the status-quo of PROFILES in her/his country. Afterwards partners discussed in groups about current topics and their next steps related to relevant work packages: PROFILES teaching modules, Student's gains, and Continuous Professional Development and PROFILES Ownership. These opportunities for partner exchange were regarded as being very useful. The major task facing PROFILES in its final year is dissemination. While partners gave ample evidence of dissemination at a local and regional level, dissemination at a European and even international level is also needed. Opportunities for international dissemination of project results were discussed among partners, by publishing in various journals as well by the establishment of a summer school for teachers. Furthermore the second and third PROFILES-books as well as the final PROFILES conference in August 2014, were discussed in detail. Between the sessions, PROFILES work package leaders gathered to discuss the achievement of project objectives, the current status of PROFILES deliverables and further steps to be undertaken in order to lead the project to success.

Picture 1. Group photo of the 6th PROFILES Consortium Meeting in Porto © Bulent Cavas

Picture 2-5. Impressions of the 6th PROFILES Consortium Meeting in Portugal: Vivid discussions, Faro at the port wine cellars of CÁLEM and the Ribeira do Porto © Mira Dulle

PROFILES Symposia at the ESERA Conference, Nicosia, Cyprus

From 2nd to 7th September 2013 the 10th biannual Conference of the European Science Education Research Association (ESERA) took place in Nicosia (Cyprus). The theme of this ESERA conference was "Science Education Research for Evidence-based Teaching and Coherent Learning". PROFILES Consortium Partners organised two symposia:

Promoting Motivational Science Education for 21st Century Scientific Literacy

(Jack Holbrook, Miia Rannikmae & Ana Valdmann, Estonia / Eva Trnova & Josef Trna, Czech Rep. / Kari Sormunen &Tuula Keinonen, Finland / Franz Rauch & Mira Dulle, Austria)

Abstract: The PROFILES project (professional reflection oriented focus on inquiry learning and education through science) is concerned with, particularly at an adolescent level, the perceived irrelevance of the current science learning provision, noting its lack of student interest, abstractedness of the learning and hence its boring nature in the eyes of students (Osborne et al, 2003). To address these concerns PROFILES introduces a three stage model which emphasises the promotion of student intrinsic motivation (Deci and Ryan, 1985) as a prelude to initating inquiry-based science education (IBSE) and consolidating the science conceptual learning through transference to socio-scientific situations requiring reasoning and argumentation skills to reach relevant decisions. This symposium reflects on this approach with respect to teacher ownership of motivational science education, supported by teachers' continuous professional development enhancing the classroom environment, based on teaching/learning modules. While the frame for the project is student-centred learning within an IBSE setting, this symposium reports on research into identifying science teacher in-service needs, matching these perceived needs with self-evaluated teacher competence, evaluating teacher reactions to the use of the three stage model guiding the teaching approach and the role of networking to support teachers in operationalising the project.

This symposium encompasses 4 presentations: the first is a the philosophical base for the project, indicating the underlying ideas and outlining the various constructs involved; the second research area is reflecting on teacher's self-efficacy through teachers' self-evaluated competencies and their in-service needs before and after professional development showing differences between these aspects; the third, outcomes of identifying teacher views based on clasroom teaching modules developed on the theoretical 3-stage model, and finally the role of networking in promoting project operation.

References

Deci, E. L. and Ryan, R. M. (1985), *Intrinsic motivation and self-determination in human behavior*, New York: Plenum.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: a review of the literature and its implications. *International Journal of Science Education,* 25(9), 1049–1079.

See also: http://www.esera2013.org.cy/programme/detailed-programme/parallel-sessions/?session=15 (No 10)

The PROFILES international curricular Delphi study on science education

(Claus Bolte & Theresa Schulte, Germany / Tuula Keinonen, Finland / Marika Kapanadze, Georgia)

Abstract: The PROFILES project is a FP7-fundend European project involving 22 Consortium partners from 21 different countries. The objectives of PROFILES are to disseminate a modern understanding of scientific literacy, encourage new approaches into the practice of science teaching and facilitate an uptake of inquiry-based science education (IBSE). Embedded in this project is the PROFILES International Curricular Delphi Study on Science Education. It aims at identifying desirable aspects and shortcomings of modern science education with regard to scientific literacy. Each of the 22 PROFILES partners agreed to carry out a Curricular Delphi Study on Science Education in their respective country. By applying the Delphi method, these studies systematically collect and analyze the views and opinions of different stakeholders in three consecutive rounds. Relevant stakeholders included in this study are groups that are involved with science and science education, such as students, pre- and in-service science teachers, science education researchers and scientists. This study has involved more than 2500 stakeholders from 21 different countries and provides valuable insights about their views on desirable science education.

The first contribution of this symposium focuses on the method of the International PROFILES Curricular Delphi Study on Science Education and presents results from the first round of this international survey. The following contribution presents results from the second round of the PROFILES Delphi Study by taking an exemplary look at the results from the University of Eastern Finland. The third contribution provides insightful results from a comparison between the results of the second round in Germany, Finland, Romania, Spain and Georgia. In the fourth presentation we introduce three different concepts of science education identified by means of cluster analyses and the stakeholders' assessments of these concepts within the third round of the PROFILES Delphi Study in Germany.

See also: http://www.esera2013.org.cy/programme/detailed-programme/parallel-sessions/?session=1 (No 10)

IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020, Antalya, Turkey

From 30th October till 1st November 2013 the IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020 took place in Antalya, Turkey. More than 70 educators, teachers, researchers, and policy makers from 22 different countries attended to the symposium. The aim of the brokerage event was to provide information about Horizon 2020 calls for proposals related to science, technology, engineering and mathematics (STEM) education and bring all stakeholders together (universities, research institutions, civil society organisations, SMEs, public bodies, science centres etc.) to promote partnerships among potential coordinators and partners in a fruitful networking environment. PROFILES partners from Czech Republic, Turkey, Estonia and Germany held the following presentations:

- The Effects of PROFILES Modules on Student Motivation *(Bulent Cavas, Yasemin Özdem, Pinar Cavas, Jack Holbrook, Cagla Bulut, Simge Akpullukcu / Turkey)*
- IBSE and Gifted Students *(Josef Trna & Eva Trnova / Czech Republic)*
- PROFILES - Promoting Inquiry-based Science Education in Europe and abroad *(Claus Bolte and the PROFILES Consortium)*
- IBSE and Creativity Development *(Eva Trnova / Czech Republic)*
- PROFILES at Freie Universität Berlin *(C. Bolte, M. Albertus, K. Scheurer, V. Schneider, T. Schulte, & S. Streller / Germany)*

Further information can be found under: http://www.ioste2013.org

Picture 5-7. Over 70 participants at the IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020 © Bulent Cavas

Inquiry Day Vienna, Vienna, Austria

On 12th of November 2013 the "Inquiry Day" took place in Vienna. This day was dedicated to inquiry learning, its potentials for teaching and learning processes as well as emerging challenges. For many years, inquiry-based learning has been seen as the way forward in science education. Its adoption has been promoted by many EU projects, and yet it remains on the margins of practice. The reasons for this are well known, but the real potential of inquiry has largely been missed. This potential goes beyond scientific literacy towards a democratic research culture, extending beyond the classroom into real life. Inquiry, if taken seriously, should lead not just to information or explanation, but also to transformation.

Dr. Peter Labudde from PROFILES Switzerland held a presentation on inquiry-based learning, including examples from the PROFILES project.

Dr. Peter Gray from the Norwegian University of Science and Technology showed that, in order to address emerging societal challenges, we need student-led research

Picture 8. The 120 participants of the Inquiry Day were very interested in PROFILES teaching modules. © Andrea Sieber

at the micro-level in order to drive change, locally and globally. The findings from current projects indicate that it is the power to act in the present that motivates students, more than the possibility of future success.
At the following science fair the approximately 120 participants showed great interest in PROFILES and especially the PROFILES modules.

4 Future Events

NARST Pittsburgh, USA

The annual international conference of NARST (National Association for Research in Science Teaching) will take place from 30th March to 2nd April 2014 in Pittsburgh, USA. The PROFILES partners from Israel will attend this conference to present their recent outcomes from the project. Further information can be found via the following link: http://www.narst.org/annualconference/futureconf.cfm

Symposium on Chemistry and Science Education, Bremen, Germany

The 22nd Symposium on Chemistry and Science Education, entitled "Science Education Research and Education for Sustainable Development" will be held from 19th to 21st June 2014 at the University of Bremen. Some PROFILES partners will share their expertise in relation to the focus of this symposium; furthermore the programme will include a poster session. Further information can be found via the following link: http://www.idn.uni-bremen.de/chemiedidaktik/symp2014/index.html

SCITEED 2014, Fethiye, Turkey

From 24th to 27th April 2014 the International Congress and Exhibition on Current Trends on Science and Technology Education will take place in Fethiye – Muğla, Turkey. SCITEED aims to bring together educational scientists, administers, councillors, education experts, teachers, graduate students, civil society organization and representatives to share and to discuss theoretical and practical knowledge in the scientific environment. A special session for PROFILES is being planned, but also keynote speakers. The deadline for abstract submission is 31st January 2014. Further information can be found via the following link: http://www.sciteed.org/

Nordic Research Symposium on Science Education (NFSUN), Helsinki, Finland

From 4th to 6th June 2014 the Nordic Research Symposium on Science Education (NFSUN) will take place at the University of Helsinki. The topic Inquiry-Based Science Education in Technology-Rich Environments will be discussed among researchers, as well as teachers from all levels of education. The symposium functions as a meeting point and a platform for establishing networks within science education research. PROFILES partners from Finland and Sweden will present the project. The deadline for abstract submission is 31st January 2014. Further information can be found via the following link: http://www.helsinki.fi/luma/nfsun2014/

Second International PROFILES Conference, Berlin, Germany

The PROFILES Consortium would like to invite all interested colleagues to the "Second PROFILES International Conference on enhancing IBSE and Scientific Literacy in Europe." This Conference will take place in Berlin from 25th to 27th August 2014. Outcomes and results of the PROFILES Project as well as of other project will be presented to stakeholders and to other invited guests from schools and other educational practices. Colleagues from other FP7 projects and/or from other projects related to the Conference's topic are especially invited to share their experiences. And all are invited to submit a brief proposal for the foreseen "Science Education Fair" at the PROFILES conference. Further information regarding the current status of the Second PROFILES Conference is available via http://www.profiles-project.eu/.

The PROFILES Newsletters as well as other publications and PROFILES materials can be downloaded at the PROFILES website: http://www.profiles-project.eu/Dissemination/index.html, as well as at the homepages of the PROFILES Consortium members who provide information about the PROFILES Project in the local language of the PROFILES partners.

SEVENTH FRAMEWORK PROGRAMME – 5.2.2.1 – SiS-2010-2.2.1
Supporting and coordinating actions on innovative methods in science education:
teacher training on inquiry based teaching methods on a large scale in Europe
Grant agreement no.: 266589