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and all the other PROFILES Consortium Partners**

PROFILES
Professional Reflection Oriented
Focus on Inquiry-based Learning
and Education through Science

Summary of the PROFILES Activities within the Project's 1st Period (Status Quo: July 2012)

Abstract: *PROFILES (Professional Reflection-Oriented Focus on Inquiry-based Learning and Education through Science) promotes Inquiry-Based Science Education (IBSE) by supporting science teachers in developing more effective ways to teach students, aided by stakeholders. The project is based on “teacher partnerships” aim at implementing existing, exemplary, context-led, IBSE-focused science teaching materials. Long-term teacher training courses, based on challenges of implementing student relevance, are set to improve skills in developing creative, scientific problem-solving and socio-scientific related learning environments. One central goal is the strong dissemination of evaluated approaches, reactions from different stakeholders and other insights of PROFILES, making use of the Internet, the PROFILES Newsletters and the two International PROFILES Conferences as well as other media.*

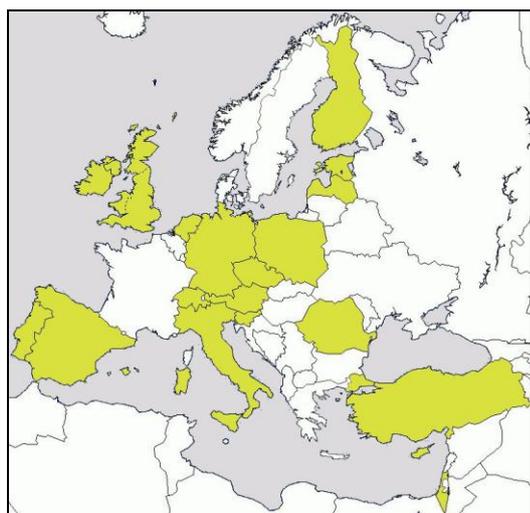


Figure 1. Overview of the countries involved in the PROFILES Project's Consortium*

The PROFILES Consortium consists of: Freie Universität Berlin (Coordinator, Germany); Universität Klagenfurt (Austria); Cyprus University of Technology (Cyprus); Masaryk University Brno (Czech Republic); University of Tartu (Estonia); University of Eastern Finland (Finland); University of Bremen (Germany); University College Cork (Ireland); Weizmann Institute of Science (Israel); Università Politecnica delle Marche (Italy); University of Latvia (Latvia); *Utrecht University (Netherlands)***; University of Maria Curie-Skłodowska (Poland); University of Porto (Portugal); Valahia University Targoviste (Romania); University of Ljubljana (Slovenia); University of Valladolid (Spain); University of Applied Sciences Northwestern Switzerland (Switzerland); Dokuz Eylül University (Turkey); International Council of Associations for Science Education (ICASE, UK).

* *The University of Dundee (UK) has withdrawn from the PROFILES project in June 2011; the PROFILES Steering Committee is still searching for an appropriate partner who is able and willing to take over the University of Dundee's tasks in the project consortium. Negotiations with potential partner institutions have been started.*

* *The Linköping University did not enter the PROFILES project and the PROFILES Consortium and therefore did not sign the Grant Agreement; the part and tasks of the Linköping University will be taken over by the University of Karlstad (Sweden). The PROFILES Steering Committee has agreed to this change. The University of Karlstad is currently awaiting the completion of the negotiations with the EC offices and the amendment process.*

Summary description of the PROFILES project context and objectives

PROFILES (Professional Reflection-Oriented Focus on Inquiry-based Learning and Education through Science) is one of the European FP7-funded projects in the field of “Science in Society”, promoting student motivational, socio-scientific approach to science teaching. The PROFILES Consortium consists of 20 partners from 19 different countries (status quo: May 2012). PROFILES supports Inquiry-based Science Education (IBSE) by raising the self-efficacy of science teachers to take ownership of more student-relevant ways of teaching in consideration of stakeholders’ views. The project is based on ‘teacher partnerships’, implementing existing, exemplary, context-led, IBSE-focussed science teaching materials, guided by long-term teacher training, reflecting on challenges identified by participating teachers to improve their skills in developing creative, scientific problem-solving and socio-scientific related learning environments. PROFILES focuses on students’ intrinsic motivation to learn science and aims at enhancing students’ competencies in scientific inquiry and socio-scientific decision-making. Success can be measured by determining

- (a) the self-efficacy of science teachers in the PROFILES approach and
- (b) attitudinal gains by students towards science and their science education (such as students’ (intrinsic) motivation to learn and their interest in learning science).

A further key target of the project is the dissemination of PROFILES approaches, reactions from a variety of stakeholders and insights from associated research and evaluation. The intended outcome of PROFILES is to make science education more meaningful for students, more closely related to 21st-century science, more associated with general education and especially to promote and enhance IBSE in school science. In short, the ultimate PROFILES goal is to raise teachers’ continuous professional development and students’ scientific literacy.

The PROFILES educational philosophy is introduced to central stakeholders within the education system of each consortium member’s country via eight inter-dependent work packages:

WP1: Management and evaluation,	WP4: Learning Environment,
WP2: Partner co-operation and professional support,	WP5: Teacher Training and Intervention,
WP3: Stakeholder involvement and interaction,	WP6: Teacher Ownership,
	WP7: Student Gains,
	WP8: Dissemination and Networking.

PROFILES aims at the following objectives in general:

- **Establishing close cooperation and networking of the consortium with stakeholders** (WP2 ‘Support and Co-operation’ and WP3 ‘Stakeholder Views’) which strongly supports teachers in removing possible obstacles and building up confidence that the disseminated materials, conceptions and programmes are implemented, bearing in mind stakeholders’ views and recommendations.
- **Providing teacher training and innovative inquiry-based teaching approaches** to introduce methods of, and teaching modules for, learning and teaching IBSE-inspired science, which include specifically relevance-identified modules (WP4 ‘Learning Environments’), and training programmes linked to classroom intervention support. Another intention is to introduce PROFILES ideas into pre-service student teacher programmes by enhancing science educators’ awareness and interest in following PROFILES recommendations (WP5 ‘Teacher Training’).
- **Developing strong(er) teacher professionalization and enhancing teachers’ self-efficacy** (WP5) and **encouraging teachers to take ownership of more innovative practices** (WP6) through an intervention, guiding teachers in reflective processes and in initiating

use-inspired research accomplishments. Additionally, professionalization is enhanced through teacher ownership (WP6) and enacted through adaptation of state-of-the-art teaching modules related to cultural pre-conditions and gender factors (WP4), as well as reflective portfolios and action research projects.

- **Evaluating the outcomes of the intervention-linked training regarding student gains (WP7)** with respect to their attitudes towards the teaching approaches and their perception and interest in science-related learning and careers in the sciences.
- **Disseminating the PROFILES ideas, materials and outcomes** and their potential for greater adoption by establishing teacher networks and interacting with other regional and national networks, as well as networking with other innovative IBSE projects (WP8).

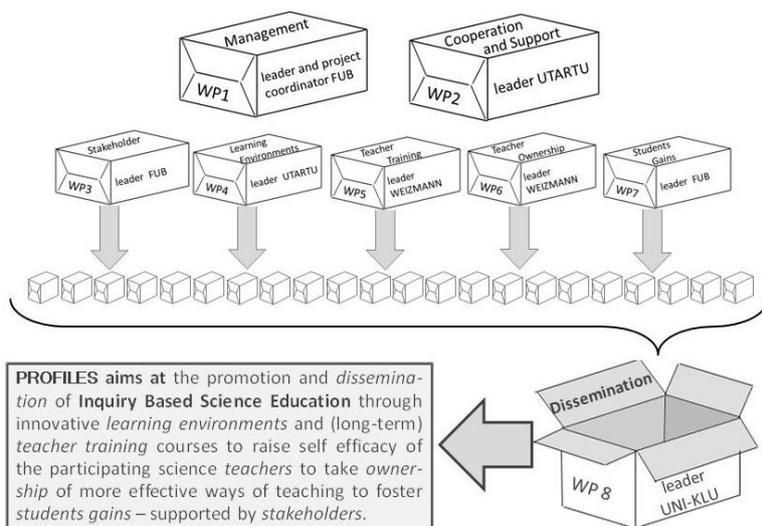


Figure 1. PROFILES Project’s Work packages and Aims

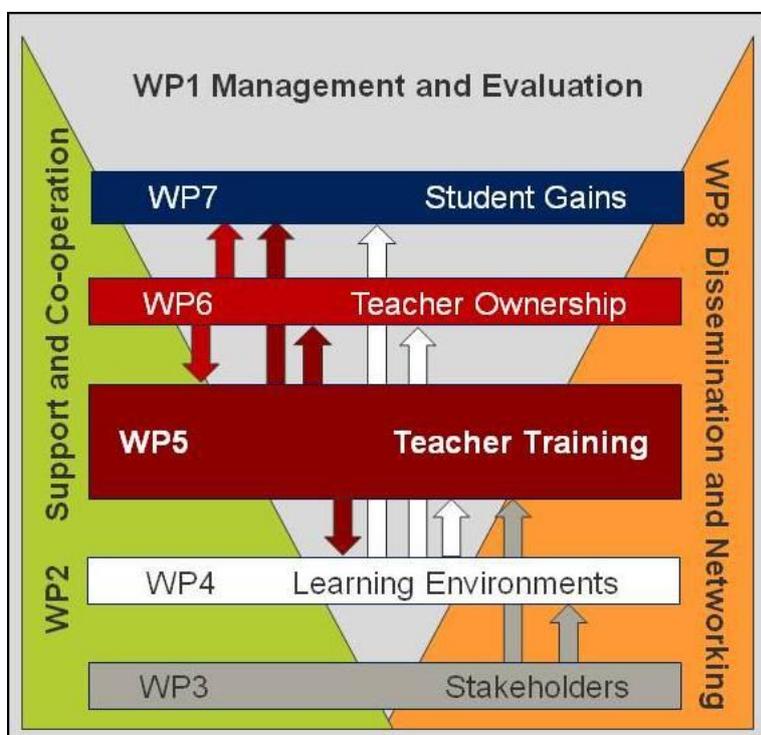


Figure 2. Interdependencies of the PROFILES Project’s Work packages

A further intended outcome of the project is to create interactive local, regional, national and Europe-wide teacher networks which positively influence teachers’ competence and confidence in promoting IBSE-related science teaching and hence raise their self-efficacy to teach innovatively – more student-centred, context-led IBSE – through continuous professional development (CPD) of science teachers, as well as teachers’ appreciation of use-inspired research ideas. To what extent PROFILES reaches its objectives will be evaluated by means of systematic, statistically-based methods, case studies and action research.

WP1 Management and evaluation

Since the initiation of the project in December 2010, the PROFILES Consortium has emphasised cooperation and networking between the consortium partners. Products of the project (e.g. materials and modules for IBSE), experiences and evidence-based outcomes of the project are disseminated through specific national PROFILES websites at each consortium partner’s institution in each partner’s local language and through the

international PROFILES platform (see www.profiles-project.eu). However, realising that dissemination by partners alone is insufficient, the PROFILES Consortium makes further efforts to encourage teachers and stakeholders in general to appreciate the project and its developments (e.g. by strengthening teacher networks and their networking; cf. WP8 or by means of the PROFILES Curricular Delphi Study on Science Education; cf. WP3). Therefore, further steps in disseminating PROFILES ideas and in building networks have been taken (e.g. at the three PROFILES consortium meetings). Currently, the consortium as a whole and the team of the WP1 leader are planning and organising the next key event – the 1st International PROFILES Conference on Stakeholders Views – which will take place in Berlin, Germany from the 24th to 26th September 2012. At this conference, teachers and stakeholders as well as colleagues from other EC-funded projects will meet and interact with the PROFILES project and its consortium members. For more information visit the PROFILES website: www.profiles-project.eu.

WP2 Partner co-operation and professional support

In addition to the first three PROFILES consortium meetings (in Berlin, Germany, Dec. 2010, in Tartu, Estonia, May 2011 and in Ein Gedi, Israel, Feb. 2012) where the leaders of the eight work packages offered coordinating and supporting actions, the leader of WP 2 maintained regular contact with the through progress reports and responses to specific questions raised by the partners. All WP2 objectives have been part of PROFILES during the first 18 month period, and the degree to which they were being achieved was assessed by periodically (every 4 months) solicited responses from partners. A major feature was responses by the work package leaders to specific partner questions, partly related to project philosophy and partly evoked by operational concerns.

WP3 Stakeholder involvement and interaction

A main issue of PROFILES is the involvement of stakeholders and their interaction (WP3). With this work package, the consortium tries to bridge the gap between science education researchers, teachers, and local actors by supporting stakeholder network and co-operation. A first step towards this aim has been taken by collecting views of stakeholders regarding a desirable inquiry-based science education within the school systems in the partners' countries. The PROFILES consortium has been working on this issue since project month 1 by collecting stakeholders' views and involving them in discussions about IBSE by means of the PROFILES Curricular Delphi Study on Science Education. The PROFILES Delphi Study is designed in three rounds of polling stakeholders and providing them with feedbacks regarding the analysed stakeholders' statements. Currently, most of the PROFILES consortium partners are analysing the data of round 2 and giving feedback about the results to the participating stakeholders. Some partners have already finished this round and started working on the third and final round of the PROFILES Curricula Delphi Study on Science Education. Furthermore, the working group of WP3 is strongly involved in the organisation of the "1st International PROFILES Conference on Stakeholders' Views" (see WP1).

WP4 Learning Environment

WP4 addresses the development of teacher training materials and the identification of innovative IBSE-related teaching modules as well as strategies how to modify these materials and modules based on evaluative feedback so they can be used in the PROFILES teacher training courses and/or in school practice. Approximately 25 teachers per partner country with varying classroom experiences and different science subjects were involved. The PROFILES teachers have different exposure to continuous professional development (CPD), teach different grade levels and work in different types of schools. A range of professional development materials of differing formats have been developed by partners (mainly in the local language to meet teachers' 'needs' to enhance their continuous professional development. These mate-

rials and modules assist in preparing classroom interventions. For this reason, a multitude of PROFILES modules have been used by partners, most of them adaptations (and translations) of modules from a previous project called PARSEL (see www.parsel.eu). Some partners have chosen to create new modules which relate to the PROFILES guidelines associated with the three stage model, thus highlighting a student-motivational teaching approach. In many cases socio-scientific interactions - aiding relevance and 'education through science' goals, as well as promoting inquiry-based science education - are the starting point to raise scientific questions which are to be answered through scientific inquiry.

WP5 Teacher Training and Intervention and WP6 Teacher Ownership

In WP5, partners and professional development providers are trained to implement a three level model for CPD (Continuous Professional Development). They implement the CPD using PARSEL type modules and modules that were developed by groups of science teachers. The CPD in most of the (partners') countries involved around 50-60 hours face-to-face and/or on-line. We have evidence that the teachers had the opportunity to develop self-efficacy related to PROFILES, improve science teaching by the inquiry method, and grasp the importance of relevance. The WP5 leading group (The Weizmann Institute of Science) developed a questionnaire to collect additional evidence about the CPD in each of the partners' country. Reports (filling in the questionnaires) were obtained from 16 partners. These gave us effective fuel for further developments; namely the development of ownership and its related leadership. More specifically, based on the obtained report, we can conclude that most of the partners were able to report that the CPD allowed for development of teachers as learners, as teachers (in their classrooms), and as reflective practitioners. Furthermore, there are indications for initial development of ownership (in some countries).

WP7 Student Gains

The major task of WP7 (Evaluating student gains) is the evaluation of the effectiveness and impact of the PROFILES project in general, the teacher training programmes (WP5) and the resulting teachers' continuous professional development (CPD) effected by this as well as the developed or adapted innovative learning environments (WP4) and the intervention based on the PROFILES approach. Different instruments were introduced to the partners at the PROFILES consortium meeting workshops and adapted for this purpose. The PROFILES steering committee agreed to concentrate on one specific instrument, the "Instrument for Analysing the 'Motivational Learning Environment' (MoLE)". The partners translated this instrument into their local language and started their data collection within the frame of a pre-post-intervention design. The data collected in the "PROFILES (intervention) classes" are currently analysed by means of statistical methods. Reports on the results from the partner countries' evaluation are expected in September 2012.

WP8 Dissemination and Networking

Within WP8 PROFILES materials (teaching modules, evidence-based best practice ideas) are disseminated on a national and international level and a PROFILES teachers' network is established which is interrelated with other teachers' networks operating on a local, regional national or Europe-wide scale. A local webpage was set up and a PROFILES Booklet was designed by all partners in their local language and disseminated. Till May 2012, two PROFILES Newsletters were produced within WP8. The partner translated them into their local language and disseminated the local Newsletters among teachers and stakeholders in their countries. Four articles have been published in local and international journals; more are being planned and in progress. Furthermore, PROFILES ideas were circulated at various national and international conferences (e.g. Scientix 2011, Brussels; ESERA 2011, Lyon; GDCP 2011, Oldenburg). The majority of the partner countries are building on already

existing teacher and school networks as well as networks on international level, which are extended through network meetings. It is expected that PROFILES materials will be disseminated via these networks in the national language in a wide range of European countries for use and adaptation by teachers and teacher educators.

Expected results from the PROFILES Project

The expected results from the PROFILES project are:

1. The provision of proven approaches to science teaching which motivate students through the use of specific PROFILES modules adopted and/or developed and optimised within the local language of the 20 PROFILES partners.
2. Well tested teachers continuous professional development (CPD) models, grounded on a three level model identifying teacher needs that are associated with acquiring up-to-date, interdisciplinary related science (level 1: teacher as learner), operational professional content knowledge (PCK) to meet the PROFILES goals (level 2: teacher as teacher) and with teachers reflecting on their practice and networking with other science teachers (level 3: teacher as reflective practitioner). The CPD models are strongly identified with the development of teacher self efficacy in IBSE and motivational science education geared to an 'education through science' philosophy. Its impact is to provide PCK for science teachers to enhance the scientific literacy of students.
3. Raised self efficacy of approx. 50 teachers per partner institution to operationalise PROFILES in a meaningful and effective manner. Its impact is to realise the effectiveness of the CPD programme in addressing teacher needs.
4. The attainment of a high level of teacher ownership of the PROFILES approach by approx. 10 teachers per partner institution, such that these teachers can function as PROFILES lead teachers - thus:
 - (a) providing professional development to others teachers at the school, regional or national level;
 - (b) being capable of undertaking evidence-based actions to show the success of PROFILES taking note of stakeholder views regarding the directions for science education, and
 - (c) promoting PROFILES as an innovative way of IBSE that encompasses the wider social implications of science education and the PROFILES key role in aiding teachers to meet the curriculum intentions.
5. Dissemination of PROFILES teaching models and modules, its evidence-based CPD provision, the impact of the PROFILES approaches on motivational IBSE and the PROFILES success in seeking teacher recognition of curriculum-expected 'education through science' teaching through
 - (a) the PROFILES website, flyers, newsletters and books leading to greater awareness of PROFILES and though
 - (b) national and international conferences; esp. the two PROFILES International Conferences held in Berlin 2012 and 2014.
6. Positive stakeholder reactions to the PROFILES goals and approaches, esp. by means of the International PROFILES Curricular Delphi Study on Science Education.
7. Local, regional, national and international PROFILES teacher network to share materials, modules and model for IBSE best practice examples

Success of the PROFILES project will be determined by:

- (a) the level of self-efficacy of science teachers, educators and CPD providers regarding the goals and approaches PROFILES is aiming at,
- (b) motivational and attitudinal gains by students towards science and science education, such as through students' (intrinsic) motivation to learn science, and
- (c) whether PROFILES plays a positive role in bridging the gap between science education intentions plus stakeholders views and the teacher's actual classroom practice.

The anticipated overall impact of PROFILES and hence its major use is in giving teachers, educators and CPD providers more confidence and a greater awareness of the intentions of science education in a democratic society governed by socio-economic and scientific related factors. PROFILES is anticipated to be a model to guide stakeholders in all fields of (science) education to recognise that science education is more than teaching science contents but a major need to pay strong attention to student centred, cognitive learning through IBSE focusing on science with relevance to everyday life and society values; irrespective of whether students will pursue further studies in the sciences or in other subject areas.

For more and detailed information about PROFILES, its objectives, current activities and outcomes visit the PROFILES websites: www.profiles-project.eu