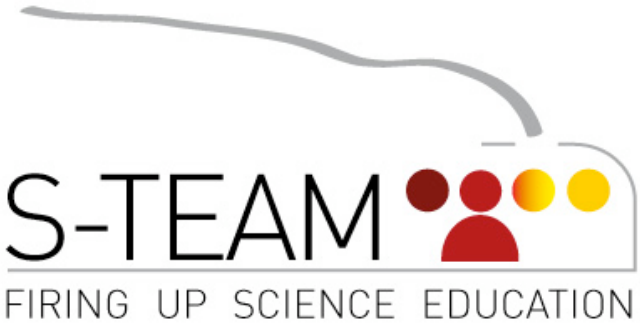
SCIENCE-TEACHER EDUCATION

ADVANCED METHODS

The S-TEAM Project



Part B

A coordination and support action under

FP7, SiS 2008, action 2.2.1.1

Innovative Methods in Science Education

Annex 1

Work Programme topics addressed:

Dissemination and use of inquiry-based methods on a large scale in Europe.

Coordinating person: Professor Geir Karlsen, Norwegian University of Science and Technology, Trondheim, Norway Geir.karlsen@plu.ntnu.no

List of Participants					
Partici-pant no *	**Participant name**	**Participant acronym**	**Country**	**Date enter project****	**Date exit project****
1	**Norwegian University of Science and Technology (coordinator)**	**NTNU**	Norway	M1	M36
2	University of Oslo	UIO	Norway	M 1	M 36
3	Université Pierre Mendes-France	UPMF	France	M1	M36
4	Centre National de la Recherche Scientifique	CNRS	France	M 1	M36
5	University of Bristol	UNIVBRIS	United Kingdom	M 1	M36
6	Kaunas University of Technology	KTU	Lithuania	M1	M36
7	University of South Bohemia	USB	Czech Republic	M1	M36
8	Vilnius Pedagogical University	VPU	Lithuania	M1	M36
9	University of Copenhagen	UCPH	Denmark	M 1	M36
10	University of Leeds	UNIVLEEDS	United Kingdom	M1	M36
11	Friedrich Schiller University of Jena	FSU	Germany	M 1	M36
12	University of Strathclyde	UNIVSTRATH	United Kingdom[1]	M1	M36
13	Leibniz Institute for Science Education at the University of Kiel	IPN	Germany	M 1	M36
14	Universidade de Santiago de Compostela	USC	Spain	M 1	M36
15	Helsinki University	HU	Finland	M1	M36
16	University of Tallinn	TLU	Estonia	M1	M36
17	Technion – Israel Institute of Technology	IIT	Israel	M1	M36
18	Mälardalen University	MDU	Sweden	M1	M36
19	Hacettepe University	HUT	Turkey	M1	M36
20	University of Jyväskylä	JyU	Finland	M1	M36
21	Abo Akademi University	ABO	Finland	M1	M36
22	Gazi University	GU	Turkey	M1	M36
23	Aarhus Universitet	AU	Denmark	M1	M36
24	European University - Cyprus	CYCO	Cyprus	M1	M36
25	Université Rennes 2- Haute Bretagne	UHB	France	M 1	M36

[1] Note: Although Scotland is part of the UK for the purposes of EU membership, we have chosen to treat it as a separate national partner for some purposes, as it has a separate system of educational governance from that of England

List of acronyms

ASE	Association for Science Education
CPD	Continuing Professional Development
ECER	European Conference on Educational Research
ECIP	European Central Information Provider
EERA	European Educational Research Association
ESERA	European Science Education Research Association
IBST/E	Inquiry-Based Science Teaching/Education
IBSTAL	Inquiry-Based Science Teaching And Learning
INQUEST	Inquiry Now! QUality Enhancement in Science Teaching
ITE	Initial Teacher Education
NLP	National Liaison Partner
PISA	Programme for International Student assessment
PM	Person-Month
ROSE	Relevance of Science Education
S-TEAM	Science-Teacher Education Advanced Methods
TIMSS	Trends in International Mathematics & Science Study
WP	Work Package

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Part B

B1. Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan

B.1.1 Concept and project objective(s)

B1.1.0 Background

The SiS Call identifies deficiencies in scientific literacy and STEM[2] career choices, which should be addressed through widespread dissemination of improved methods of science teaching, specifically IBST/E[3]. The underlying problem here is related to the engagement of young people with education in general and science education in particular. Teachers have an important role in shaping young people's perceptions of science, and need to be supported by a wide range of stakeholders in order to this. S-TEAM will mobilise a wide range of resources to provide this support.

The S-TEAM project aims to address the requirements of the Call through combining state-of-the-art knowledge about science education with practical experience in teacher education. Framing the problem at a European level provides an opportunity for national expertise in science education curricula, pedagogy and practice to be shared. S-TEAM involves 25 institutions in 15 countries and provides the widest possible geographical coverage consistent with the available funding.

B1.1.1 Project objectives

The three main objectives of the S-TEAM Project are:

- To improve motivation, learning and pupil attitudes in European science education, resulting in
    - increased scientific literacy and
    - recruitment to science-based careers, by:
- Enabling large numbers of teachers to adopt inquiry-based and other proven methods for more effective science teaching by:
- Supporting teachers by providing training in, and access to, innovative methods and research-based knowledge.

These objectives can be summarised as pupil engagement, teacher empowerment and teacher education. S-TEAM recognises that these objectives cannot be imposed on national systems, which in any case is not part of the EU role, but must be implemented through existing structures, agencies and actors. Consequently, we have allocated staff effort in Work Packages 2 & 3 to identifying the optimum ways in which teacher education for IBST can be implemented in specific national contexts.

Measurement and verification of the objectives

The nature of a support action such as S-TEAM means that measurement and verification of the objectives requires careful consideration. Concepts such as scientific literacy are controversial and therefore any attempt at measurement is itself dependent on agreed definitions. S-TEAM includes a work package (WP9) whose

[2] Science, Technology, Engineering & Mathematics. To avoid excessive use of acronyms we will use the term 'science' to include teaching in these subject areas where appropriate.
[3] Inquiry-based Science Teaching/Education. We use 'teaching' here to include 'learning',

function is to identify suitable indicators, instruments and measurement techniques. A report will be produced by M6 (del. 9.1) which will define the terms of measurement and outline a long-term approach, using existing indicators where possible and appropriate. In the case of the second sub-objective, improving recruitment to science careers, direct measurement would require a time-scale considerably longer than the project duration, and it will be necessary to find proxy measurements e.g. for student career intentions or more general positivity towards science.

There are, however, aspects of the project which can be more easily measured. Although statistics on science teacher numbers are not always reliable or easily found, we estimate that the partner countries between them have approximately 480,000 science teachers (including primary teachers who teach science), whilst the partner institutions produce around 2,700 new science teachers every year[4]. Thus, it is possible to set three functional objectives:

- All science teacher educators in the participating institutions, and all science teacher education departments in participating countries, will be informed about S-TEAM (achieved by M18)
- All new science teachers graduating from participating institutions in the 2009-2010 and 2010-2011 academic years will have been told about S-TEAM and will be able to access information on IBST from either the project itself or the European Central Information Provider (ECIP) (achieved by M30)
- At least 50% of science teachers in the participating countries will have heard about S-TEAM and will be able to access relevant material (achieved by M30)

These objectives will be verified by surveys (as part of WP9), the results of which will appear in management reports. A further set of objectives is created by the nature of the deliverables and products. A significant proportion of these are in the form of training packages which will normally be available either as packs of documentary material or as online resources or both. Training packages, course units or modules are defined as a coherent set of materials, designed for a specific audience and with a specific theme or subject area. A package will have a defined timeframe (e.g. one day, two weeks, over a semester) and will have stated learning outcomes related to some form of measurement or accreditation. In the case of S-TEAM training packages, there will be criteria which each package must fulfil to be accepted as a deliverable, such as:

- It must be piloted, reviewed and approved by practising teachers and/or teacher educators (as appropriate) □
- It must be accessible to its target audience in terms of language and its visual or other forms of presentation □
- It must be directly relevant to science teaching, including the specific methods addressed by the project and specified in the Call □
- It must specify who (in general) will deliver the training, the timescale and the expected learning outcomes for participants

In some cases the introduction of training packages in specific contexts may require training for trainers. In these cases, partners will be expected to develop and provide events for this purpose. Time will be allocated at the beginning of the project for the development of criteria and guidelines for the coherent development of all the training packages. There is, of course, a tension between the need for advance description of activities and the desire to take account of teacher views at

[4] Based on information supplied by partners and subject to differences in classification of teachers.

an early stage, via the national workshops and the reference group. The design of the sub-packages allows sufficient flexibility for the resolution of such tensions.

B1.2 Progress beyond state of the art

It is clear from recent policy reports on science education that the state-of-the-art in implementing IBST/E is highly variable across national contexts. One of the partners sums up the current situation like this:

> There is definitely a certain awareness and interest in IBST among science educators and teacher trainers. The problem is that among teachers in schools, such an awareness is still poorly developed on a general basis.

Widespread implementation of effective inquiry-based science teaching methods requires careful consideration of the national contexts in which science teaching takes place. Some common obstacles, however, are that:

- Science teachers have to follow existing curricula which are not geared towards inquiry
- Assessment systems relying on individual examinations are not supportive of inquiry
- Teachers lack confidence in IBST, either because they have insufficient training in its use or because of difficulties in classroom management
- Stakeholders such as policymakers and parents lack confidence in IBST because it conflicts with perceptions of science teaching as a delivery system for factual knowledge.

S-TEAM will use the ongoing activities of the *Mind the Gap* project as a basis for its approach to policy and practice in science education. This will enable it to focus on the critical aspects of national systems, such as the relationship between assessment systems and teaching methods. It will also draw on the extensive experience of the SINUS project in Germany, which has implemented significant reform in science education through teacher collaboration. Work package 2 will be responsible for liaising with *Mind the Gap* and WP3 will be responsible for liaising with SINUS. Information from these two projects as well as more general input from partners will feed into the preliminary policy report which will outline the state-of-the-art by M9.

Within the consortium, a partner in each country will act as a National Liaison Partner whose function is to establish the state-of-the-art in science teaching at the national level. This information will be collected through national workshops and delivered in the associated reports. The NLP will liaise with key players and will stay abreast of current developments in science education in that country, in consultation with other national partners where necessary.

Progress beyond state of the art (1):

S-TEAM will establish a coherent relationship between national and European policy discourses which will enable wider sharing of knowledge and more efficient use of resources.

Table 1.2.0 List of National Liaison Partners			
Country	**National Liaison Partner**	**Short name**	**No.**
Cyprus	European University-Cyprus	CYCO	24
Czech Republic	University of Southern Bohemia	USB	7
Denmark	University of Copenhagen	UCPH	9
Estonia	University of Tallinn	TLU	16
Finland	Helsinki University	HU	15
France	Université Pierre Mendes-France	UPMF	3
Germany	Leibniz Institute for Science Education at the University of Kiel	IPN	13
Israel	Technion – Israel Institute of Technology	IIT	17
Lithuania	Kaunas University of Technology	KUT	6
Norway	University of Oslo	UIO	2
Spain	Universidade de Santiago de Compostela	USC	14
Sweden	Mälardalen University	MDU	18
Turkey	Hacettepe University	HUT	19
UK - England	University of Bristol	UNIVBRIS	5
UK - Scotland	University of Strathclyde	UNIVSTRATH	12

Baseline data

A certain amount of data regarding the overall situation will be provided by input from Mind the Gap and from the national workshops in WP2. In order to provide internationally comparable baseline data on student attitudes and abilities, we will use indicators and instruments from the PISA 2006 study[5], which focused on science. It is also necessary to create comparable instruments for teacher attitudes, and we have expertise in the project developed within the successful EPL[6] project in Scotland and elsewhere.

It became clear during the preparation of the S-TEAM proposal that there are problems in collecting even relatively uncontroversial data, such as the number of science teachers graduating per year or the total science teacher numbers in

[5] Programme for International Student Assessment: http://www.pisa.oecd.org
[6] Early Professional Learning project: see: http://www.tlrp-archive.org/cgi-bin/search_oai_all.pl?pn=31&no_menu=1&short_menu=1

particular countries. Often this data is not disaggregated from total teacher numbers, especially since in some cases there is no science-specific teacher training. One of the first tasks for the project will therefore be to establish reasonably accurate basic statistics, and to agree on terminology.

Establishing performance criteria and indicators for S-TEAM will follow once these basic data have been acquired and after national differences in terminology have been identified and common meanings agreed. However, it is clear that we will need to have criteria in the following three areas:

- Differences in teacher attitudes towards IBST/E before and after interventions such as training workshops
- Differences in pupil attitudes and performance before and after teachers adopt IBST/E
- Differences in science teacher educators' practices before and after S-TEAM interventions such as the provision of training materials

WP9 has been tasked with creating suitable indicators and we believe that this in itself will constitute an advance on state-of-the-art.

Progress beyond state of the art (2):

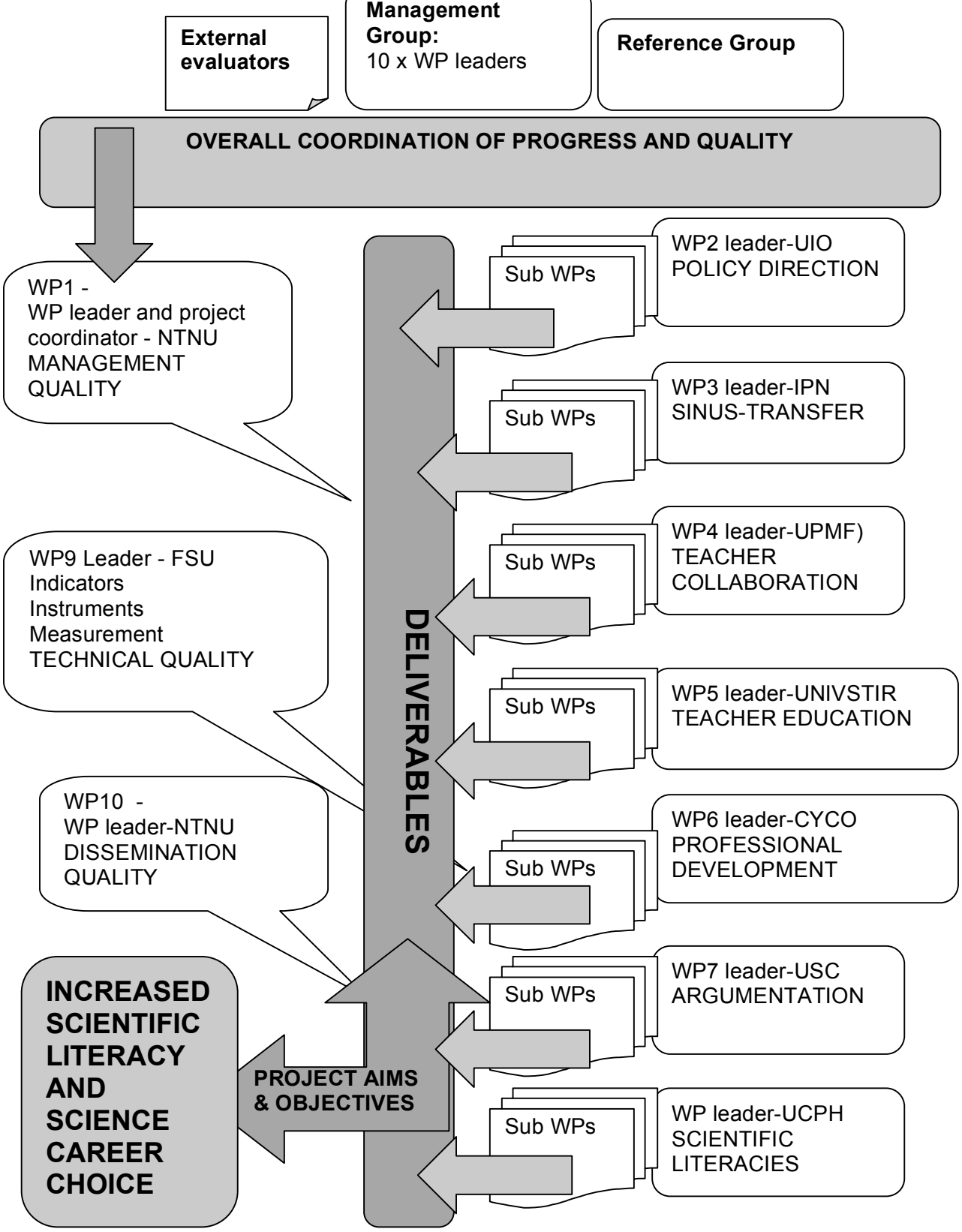
S-TEAM will establish indicators and instruments to measure attitudes towards, and the effectiveness of IBST/E

Impact is dealt with in section B3 of this document. The main task of S-TEAM is the dissemination of IBST/E rather than research into new methods, and therefore we will address the question of impact measurement in that section. To conclude this section, however, we will propose going beyond the state-of-the-art in dissemination:

Progress beyond state of the art (3):

S-TEAM will, to the extent of its resources, remove constraints on the adoption of IBST/E resulting from lack of knowledge or confidence in its use amongst teachers

Table 1.2.iv S-TEAM Components



B1.3 Scientific and Technical methodology and associated work plan

B1.3.1 Overall strategy and general description

The S-TEAM strategy is based on the realities of teaching science in a hugely diverse range of contexts. The barriers to the adoption of inquiry based methods are different across these contexts, and require different solutions. S-TEAM will therefore connect a wide range of actors, with specific areas of expertise to provide a range of solutions and to contribute to the emerging field of science education in Europe. These actors will include science educators, teacher educators and specialists in pedagogy, as well as teachers and policymakers. Students themselves should also be consulted, since it is their perceptions of science and science teaching which are at the centre of the project.

Connecting these actors requires active engagement rather than simply providing textual or other resources, which in any case will be the function of ECIP[7]. Some of this active engagement will be in the form of events such as conferences and workshops but with extensive follow-up activity such as newsletters. It will also involve bringing the project to the attention of the media, for example in national journals for teachers.

The consortium will work at three levels to ensure strategic impact: the policy level, the action level and the teacher education and professional development level.

The policy level

At this level, through WP2, all partners will identify national policies, curricular frameworks and instructional designs which relate to the use of innovative methods in science education. This will provide an overview of European policies and assist the creation of a network of policymakers across the EU to whom we can present our findings and recommendations. We will use the findings of the *Mind the Gap* project as a basis for this overview, extended by the wider range of partners in S-TEAM.

The action level

At this level, through WPs 3, 4, 7, and 8, we will identify how teachers' repertoires of action are affected by the introduction of innovative methods, focusing on specific areas of interest such as scientific literacy and argumentation. We will identify constraints and opportunities in relation to inquiry based science teaching, and produce numerical, textual and visual evidence of our findings.

The teacher education and professional development level

In this third level, we will provide tools to assist teacher education and professional development in reforming science teaching. Reforms implemented in schools will only remain effective if teachers are prepared for the uncertainties and opportunities which accompany them. We therefore see teacher education as the key to making science education reform sustainable, since it is within teacher education that space and time can be given to new ideas, and where these ideas can be circulated and continuously improved through research..
These three levels, when added together, constitute a systemic view of science teaching and teacher education which will have been comprehensively tested and debated within the network. In order to achieve substantial impact, however, the key

[7] European Central Information Provider

players in science teacher education must be involved, and we must reach the maximum possible number of teachers.

Work plan

The project will begin with a start-up meeting in Trondheim on May 7th & 8th 2009. All partners will attend this meeting, which will focus on the coordination of individual contributions to the work packages. This meeting will agree a schedule for the national workshops which will generally be held in September/October 2009 (M5/6) and will also set a date for the international workshop (within M7-9) which will collate the findings from national events. WP2 will report on these findings by M9.

The period immediately following the start-up meeting will be used to put management structures in place, including the reference group and external evaluators. Where possible, one or two national workshops will be held prior to the summer break in order to evaluate formats and materials.

Work package overview

S-TEAM is divided into ten work packages. Achieving the aims of a support project such as S-TEAM requires a large number of individual actions, so the substantive work packages (2-8) will mainly work in parallel, with functional work packages (1, 9, 10) coordinating and evaluating the outputs of WPs 2-8.

Work package (WP) 1 is concerned with the overall management of the project and will run throughout the three-year project period.

WP2 will establish the initial parameters of the project in terms of existing policy. It will liaise with and build upon the work of *Mind the Gap*, but with the participation of a wider range of countries and institutions. It will also run throughout the project but the main focus of its effort will be during the first six months.

WP3 will integrate the work of the German SINUS project into S-TEAM, by holding workshops and adapting existing training modules for other contexts.

WP4 is concerned with the role of teacher collaboration and also has the function of disseminating project outputs in France.

WP5 concentrates on Initial Teacher Education and the preparation of training packages to enable new science teachers to adopt inquiry based methods and to assist teacher educators in this task.

WP6 is concerned with the continuing professional development of science teachers, providing training packages to enable updating of skills or the introduction of innovative methods, for teachers already in schools and

WP7 provides specialist input in the field of argumentation within science teaching, producing teaching sequences which will help science teachers make better use of inquiry to develop scientific concepts and modes of thought in their students.

WP8 provides specialist input in the field of scientific literacy, producing packages designed to stimulate teacher self-efficacy and the use of scientific literacy as a motivating concept.

WP9 is concerned with the development and use of indicators and instruments. These have two main functions. Firstly, they will enable scientific evaluation of the

project's own activities. Secondly, they will be used formatively by teacher educators, science teachers and students.

WP10 will coordinate the project's dissemination activities, including the quality control of project outputs and overall media relations.

B1.3.2 Timing of work packages and their components

Timing of work packages				
	START	END	MAIN EFFORT	
			FROM	TO
WP 1	M1	M36	throughout	
WP2	M1	M33	M1	M18
WP3	M1	M33	M1	M28
WP4	M1	M33	M1	M33
WP5	M1	M33	M1	M24
WP6	M1	M33	M1	M30
WP7	M1	M30	M1	M30
WP8	M1	M30	M1	M30
WP9	M1	M36	M1	M33
WP10	M1	M36	throughout	

Because of the nature of dissemination activities, the key dates are completion of milestones and deliverables rather than start and finish points for work packages. See Milestones Table B1.3.7 and deliverables list B1.3.4a for completion months.

B1.3.3 Work package list/overview

WP no.	WP title	Type	L.B. no	PM	Strt	end
1	S-TEAM Project management	MGT	1	33	1	36
2	Observatory for policy and practice in science teacher education	Supp	2	35	1	33
3	Powerful educational environments for successful science teaching	Supp	13	67	1	33
4	Teacher Collaboration and innovative methods	Supp	3	44.5	1	33
5	Innovative methods, initial teacher education and science	Supp	12	52	1	33
6	Inquiry-based methods and professional development	Supp	24	111	1	33
7	Argumentation for teacher education in science	Supp	14	52	1	30
8	Scientific literacies, motivation and learning	Supp	9	51	1	30
9	Indicators, instruments and measurement for innovative methods in science education	Supp	11	41	1	36
10	Media and dissemination	Supp	1	117	1	36
		Total PM		**603.5**		

Table B1.3.4a Deliverables (listed by work package and delivery date)

(Note: deliverables marked * are aggregates of products as listed in table B1.3.4b. 'Training materials' will include reports where these are primarily designed for use in teacher education)

Work Package	Del. no	Description	Project Month due
1	None		
2	2a	preliminary report	M9
	2b	Final report	M33
3	3a	Preliminary report	M9
	3b*	Suite of Training packages	M30
	3c	Final report	M33
4	4a	Preliminary dissemination report	M12
	4b*	WP4 Training materials Part 1	M12
	4c*	WP4 Training materials Part 2	M18
	4d	Book	M33
5	5a*	WP5 Training materials Part 1	M18
	5b*	WP5 Training materials Part 2	M24
6	6a*	WP6 Training materials Part 1	M12
	6b*	WP6 Training materials Part 2	M18
	6c*	WP6 Training materials Part 3	M24
	6d*	WP6 Training materials Part 4	M30
	6e	Book	M33
7	7a*	WP7 Training materials Part 1	M12
	7b	Report	M18
	7c*	WP7 Training materials Part 2	M24
	7d*	WP7 Training materials Part 3	M30
8	8a	report	M18
	8b*	WP8 Training materials Part 1	M18
	8c*	WP8 Training materials Part 2	M24
9	9a*	Preliminary report and indicators set	M12
	9b*	Definitive indicators set	M24
	9c	Final analysis report	M33
10	10a	Report	M18

Table B1.3.4a Deliverables (listed by work package and delivery date)

(Note: deliverables marked * are aggregates of products as listed in table B1.3.4b. 'Training materials' will include reports where these are primarily designed for use in teacher education)

Work Package	Del. no	Description	Project Month due
	10b	Report on dissemination	M24
	10c	Parents' booklet	M30
	10d*	Conference papers - collected edition	M33

Table B1.3.4a.i Summary of deliverable due dates

Project Month (M1=May 2009)	Deliverables due	Number of deliverables	By Year
M9	2a, 3a	2	7 in Year 1
M12	4a, 4b, 6a, 7a, 9a	5	
M18	4c, 5a, 6b, 7b, 8a, 8b, 10a	7	13 in Year 2
M24	5b, 6c, 7c, 8c, 9b, 10b	6	
M30	3b, 6d, 7d, 10c	4	10 in Year 3
M33	2b, 3c, 4d, 6e, 9c, 10d	6	
	total	30	

Note on relationship of deliverables to products and events

In order to arrive at a manageable number of deliverables, the individual training packages and other materials arising from the project have been described as 'products' and have then been aggregated to form deliverables, as marked with an asterisk in table B1.4.3a. The coordinator and Work Package 10 leader will have the responsibility of assembling the products into a coherent format and providing an overall description of the completed deliverable. In some cases, produced events such as conferences will constitute milestones, and these are shown in table 1.3.7. Individual work package descriptions include references to both deliverables and products.

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
1.1	Digital repository	Duration of project	EN	EN	As per content	
2.1	Policy and practice workshops programme, combined national events with WP3 divided into part A (WP2) and part B (SINUS) (M6)	2 day workshop combined with 3.1 c.12-15 attendees, followed by workshop report	EN	EN		National languages used as necessary during workshops
2.2	Preliminary policy report (M9)	20-40 pages	EN	EN		
2.3	International policy conference (M18) in conjunction with ECIP	c.400 attendees	EN	EN + translation FR, DE		
2.4	Final report on policy and practice in science education (M33)	40-60 pages	EN	EN		
3.1	National Workshops for quality development in science education (M6)	As 2.1 above	EN,	EN		National languages used as necessary during workshops
3.2	Training packages x 14 for T.E. in partner countries (from M12)	Written materials with guide for trainers, 1-2 day course	EN or DE as requested by NLPs	Nat'l lang. co-written by partners	As req'd	
3.3	Web based access and feedback system (from M12)	Throughout	EN	EN	DE	
3.4	Preliminary report on results of workshops (M9)	c. 30-50 pages	EN	EN	DE	
3.5	Final report on	c. 40-60 pages	EN	EN	DE	

[8] Due to the various provisions for feedback and consultation, descriptions are subject to revision and continuing improvement.

[9] Note: when two or more languages of production are indicated, this means e.g. that original material may be in one language, with other material in English. Deliverable versions will be edited as required.

[10] The availability of extra versions will be decided on the basis of the needs of the relevant partners and the amount of time available to produce them - they are not additional deliverables.

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
	SINUS-based activities and outomes (M33)					
4.1	Dissemination strategy report for innovative methods in France (FR and EN) (12)	c.20-30 pages	FR	EN FR		Trans. by partners
4.2	Workbook for professional development programmes (12)	c. 40-60 pages, 8 hrs to complete	FR	EN		
4.3	DVD of case study teacher education materials for IBST/E, (24)	Approx. 1 hr overall length	FR	EN Voice-over track on DVD		May be provided as video download or streaming
4.4	Training package for teacher educators and mentors of new science teachers (24)	Pack designed for 1 day event	FR	EN		
4.5	Book on teacher collaboration and enhanced methods (33)	c. 200-250 pages	FR	FR		Related to book 6.15 but for French audience
4.6	Workshop report on teachers as researchers (18)	c.20-30 pages	Norwegian and EN	EN	NOR[11]	
5.1	Set of 3 subject-specific training modules for inquiry-based science teaching (24)	Module comprises pack of materials for use over one term/semester	EN	EN		
5.2	DVD on use of practice placements for skill development in innovative methods (24).	Approx 1 hr total content	EN	EN		May be provided as video download or streaming
5.3	Set of guidelines for teacher education courses in IBST/E (12).	Workbook Inc. lesson -plan scaffolding	EN	EN		
5.4	Training package in cross-disciplinary	Pack of materials inc. formative	EN	EN		

[11] NOR = Nordic languages, since cross-translation between Swedish/Norwegian/Danish can be done within the project.

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
	methods in science education (18).	instruments for self-efficacy				
5.5	Training package on Integrated science & primary/secondary transition (18).	Pack designed for 1 day event	LI	EN	LI	
5.6	Report and training package on problems of IBST/E in multi-lingual contexts (18).	c.20 pages, training package for half-day session or online use	LI, input from all partners	EN	LI	
5.7	EN-language web-based resource for teachers based on Viten project (6-36).	Currently 13 science topics covered	EN	EN	NOR	
6.1	Set of training packages and guide to supporting student inquiry in science (18).	3 packages each with material supporting 4-6 x 3hr meetings	EN	EN	Greek	
6.2	Guide for teacher educators on use of above training packages - supporting student inquiry in science (24)	Length according to teacher-educator feedback during development	EN	EN	Greek	
6.3	Training module for use in professional development on science-centred competition as a motivational tool (24),	Material to support one-day event	CZ/EN	EN	CZ	
6.4	Training package for pre-service teachers, as above (24).	Material to support one-day event	CZ/EN	EN	CZ	
6.5	Training packages x 4 on teachers' use of dialogic inquiry in lower secondary and primary school(24).	Length according to teacher-educator feedback during development	EN	EN	SE, FI	
6.6	Workshop materials and activities for dialogic inquiry in the science classroom (24)	Length according to teacher-educator feedback during development	EN	EN	SE, FI	
6.7	Professional development workbook on cross-curricular science	40-60 pages	EN	EN	NOR	

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
	education (24).					
6.8	Training package on cross-curricular science education (24)	Materials to support teacher educators' use of workbook	EN	EN	NOR	
6,9	Professional development training package on improving teachers' capacities to motivate students (24)	Materials to support 5 sessions of 2-3hrs each	EN/DK	EN	NOR	
6.10	Training package on use of open investigations and Vee-heuristics within science education (12)	Materials support face-to-face or web-based delivery, over one semester or as req'd	EN/SE	EN	SE, FI	
6.11	Professional development training package for increasing student motivation in science (24).	5 modules, each providing material for one or more sessions	FI/EN	EN (some video sub-titled)	FI	
6.12	Guide to University-school collaboration (12).	20-40 pages	NO EN	EN	NOR	
6.13	Teacher guide and book chapter on using science in design and technology (18).	20-40 pages (guide) 6-8000 words (chapter)	NO EN	EN	NOR	
6.14	Teacher development module for use of interactive ICT animations in science teaching (18).	Materials for 3 hr training session or 2-3 hr online course	TR/EN	EN	TR	
6.15	Book and DVD on approaches to IBST/E implementation (30)	Book c. 100,000 words + DVD with 1-2 hrs material	EN	EN	FR[12]	May be provided as video download or streaming
7.1	Report on argumentation and	20-60 pages	Castilian Galician	EN	ES	

[12] Some chapters will be translated into French for book del. 4.5

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
	teacher education (18)		EN			
7.2	Set of teaching sequences for argumentation, for use in teacher education (24)	Material supports up to semester length course modules	Castilian Galician EN	EN	ES	
7.3	Set of teaching sequences for argumentation, for use in schools (30)	Material supports up to semester length course modules	CAS/ EN	EN	ES	
7.4	Chapter about argumentation in science teacher education (30)	5-8,000 words	CAS/ EN	EN	ES	
7.5	Guidelines for professional development in argumentation (24)	Video-based resource	FR	EN	FR	Translated by partners
7.6	Training programme in P4CM (18)	1-2 day module inc. materials for schools	CZ/EN	EN	CZ	
7.7	Professional development programme on argumentative competence for new teachers (12)	Action-research based materials for workshops in teacher education	LI/EN	EN	LI	
8.1	Overview report on scientific literacy policy (12)	20-40 pages	EN	EN	DK	
8.2	Training package on competence development through scientific literacy. (18)	Materials to support semester-length programme, inc workshops and video-based material	DK/EN	EN	DK	
8.3	Training package for new science teachers on maximising student interest in biology.(18)	Materials to support workshop, between 4-8 hrs.	HE/EN	EN	HE	
8.4	Training package for new science teachers on the use of drama in scientific literacy (18)	Materials to support workshop, between 4-8 hrs.	HE NOR EN	EN	HE NOR	

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
8.5	Training package on combining arts and science - the Water project (30)	Report, 15-20 pages DVD - up to 1 hr Teaching materials for 3 hr session	NOR EN	EN	NOR	
8.6	Training package for new science teachers on media and the nature of science (24)	Material to support course module - length dependent on consultation	TR/EN	EN	TR	
8.7	Report on dimensions of scientific literacy (24)	30-60 pages	FR/EN	EN	FR	
9.1	Baseline report and indicators review for science teaching methods and attitudes (6)	40-80 pages inc appendices	DE EN	EN		
9.2	Edited set of instruments, indicators and measurement methods for other WPs (12)	Dependent on development process	EN	EN	Nat'l langs. As req'd	Versions created by partners from EN original
9.3	Edited set of formative assessment instruments for teachers and teacher educators including instruments from other WPs (24)	Dependent on development process	EN	EN	As above	
9.4	Statistical report on indicator results (33)	100 pages +	EN	EN		
9.5	Pupil opinion and teacher job satisfaction instruments related to IBST/E (12)	Instruments have between 12-50 items depending on variant	EN	EN		
10.1	Project Website (1) Hosted at NTNU	Duration of project + continuation	EN	EN	Other langua ges as req'd	Translation by partners
10.2	Report on networking tools (18)	20-40 pages				
10.3	TV production outline (24)	In long (c 50 min) and short (c. 30 min) versions,	EN	EN	Sub-titles or alt	Intended to be the basis of a

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
		including teacher interviews, examples of good practice and policy discussion			sound as necessary	production by an established media organization
10.4	Report on collaborative activities with associate partners inc informal learning centres (24)	20-40 pages	EN SE	EN	SE	
10.5	Training package for teachers and parents' booklet (24)	Materials to support half-day workshop Booklet c.20 pages	EN	EN		
10.6	Conference symposium: ECER 2009 (in review Mar 09)	c. 6-8,000 words	EN	EN	Title: *Mirror, signal, manoeuvre: developing indicators and instruments to enhance European science teacher education*	
10.7	Conference symposium: ECER 2010	c. 6-8,000 words	EN	EN		
10.8	Conference symposium: ECER 2011	c. 6-8,000 words	EN	EN		
10.9	Conference symposium: ESERA 2009 (in review Mar 09)	c. 6-8,000 words	EN	EN	Title: *From informing to (reforming) learning: new strategies for European research and dissemination of good methods in Science Education*.	
10.10	Conference symposium: ESERA 2011	c. 6-8,000 words	EN	EN		
10.11	Conference presentation: ASE 2010	c. 6-8,000 words	EN	EN		
10.12	Conference presentation: ASE 2011	c. 6-8,000 words	EN	EN		
10.13	Other conference	c. 6-8,000 words	EN	EN		

Table B1.3.4b Products (listed by WP and language)						
prod. no	**Indicative Description[8]**	**Duration/ Length/ No. participants**	**Lang. prod.[9]**	**Lang. delivery**	**Lang. extra [10]**	**Comments**
	presentation: 2010					
10.14	Other conference presentation: 2011	c. 6-8,000 words				
10.15	End-of-project conference	150-300 participants	EN	EN	FR, NOR	
End of table 1.3.4b						

B1.3.5 Work package descriptions

Note: in order to make the tables easier to read, only beneficiaries who have been allocated person months in the relevant work package are shown in each summary table.

B1.3.5.1 Summary WP1: S-TEAM Project management

Work package no.	1	Start date	M1
WP title	S-TEAM Project management		
Activity type	MGT		
Participant id.	NTNU	No other beneficiaries involved	
Person months	33		

Objectives: The Norwegian University of Science and Technology has responsibility for overall management of the project with the following objectives: □

- To ensure that the S-TEAM project achieves measurable improvements in science teaching, science teacher education and pupil attitudes to science in Europe □
- To ensure overall project quality and adherence to work programme □
- To ensure that this work is completed on time and within the agreed budget

Description of work

WP1 will ensure that the project is coordinated and managed in an efficient and effective way. A full description of management and decision structures is provided in Section B2.1, p.75ff. The management concept complies with all Framework Programme 7 requirements, and provides a strong control mechanism and fast response time to management requests and conflict resolution. All thematic WP leaders will participate in a management board which will meet at regular intervals to monitor progress and to deal with issues arising from the work of all partners. The board will itself report to both the external evaluator(s) and to a reference board which provides a range of stakeholder views and a source of independent expertise regarding the quality and direction of activities.
The tasks of WP1 are to:

- Set up the consortium and develop coherent work packages in line with FP7 requirements and in consultation with partners □
- Lead and monitor the integration of the participating institutions and work packages □
- Produce a work plan setting a timescale for all network activities □
- Set up communication and management structures, including evaluation procedures □
- Ensure achievement of work package objectives in compliance with the work programme □
- Monitor the financial, ethical and scientific aspects of the project, and of its deliverables and other outputs □
- Establish appropriate procedures for reporting to the consortium and to the European Commission, including financial reporting and external evaluation

procedures □

- Implement systems and guidelines to ensure appropriate communication and collaboration within the project

Sub-packages:

WP1a: Communication with, and technical support for, the external evaluator(s)
WP1b: Liaison with external projects and organisations in similar areas of expertise to avoid overlaps and to share information where appropriate
WP1c: Establish and maintain a digital repository with the purpose of providing searchable access to the outputs of the consortium as they become available and as a source of materials for the proposed European Central Information Provider (ECIP - SiS 2.2.1.2).
(Note: the repository and website will be operational by May 1st 2009).
WP1c will also be responsible for liaison with ECIP at a management level and will look for opportunities for synergy including joint events, cross-links on websites and the provision of foreground and briefing reports where appropriate.

Deliverables WP1: (excluding mandatory management reports)

There are no deliverable items from WP1
Product no. 1.1 Digital repository (to run for the duration of the project and as required after the end date) is a milestone at M1 along with the project website.

B1.3.5.2 Summary WP2: Observatory for policy and practice in science teacher education

Work package no.	2		Start date		M1		
WP title	Observatory for policy and practice in science teacher education						
Activity type	Support						
	Note: NLPs are allocated 3PM each in WP3 for combined activity: shown here to indicate participation only						
Participant id.	**UiO**	UPMF	UNIVBRIS	KUT	USB	UCPH	UNIV STRATH	IPN
Person months	**35**	0	0	0	0	0	0	0
	USC	HU	TLU	IIT	MDU	HUT	CYCO	Total
	0	0	0	0	0	0	0	35

Objectives □

- To produce systematic overviews of the European policy and practice environment regarding science teacher education and the application of innovative methods in science education □
- To create a policy network in this field in order to promote and sustain the adoption of the most efficient and effective methods in science education throughout Europe and beyond

Description of work

Work Package 2, led by the University of Oslo (UIO), will be responsible for collecting and analysing data on policy and practice in order to produce an overview of the current and emerging situation regarding teacher education, science teaching and innovative methods. This overview, produced in the form of two reports together with pages on the project website, will detail the complex interaction of policy, research and practice in this area, using data from the consortium's National Liaison Partners (NLP) and from contact with key actors in the policy community.

WP2 will promote the development of a new network connecting teacher education policy with science education policy. Its initial task will be to collect evidence about national policy and practice through a series of workshops in each of the consortium countries, attended by staff members from WP2 and WP3.
All national liaison partners will provide a description of the policy situation and the state-of-the-art in science teacher education in their own countries. **These descriptions will be discussed during workshops which will be held in conjunction with the workshops for the consideration of SINUS modules in WP3, in order to avoid excessive travel.** The workshops will involve the national liaison partners (NLP) and key actors in science education. **NLPs have each been allocated 3PM in WP3 to cover the tasks of setting up and attending the workshops**.

WP2's preliminary report will incorporate findings from the ongoing *Mind the Gap*

project, and will provide state-of-the-art knowledge of IBST/E and its effectiveness.

An international policy workshop will be held within the first nine months of the project to bring together the key players in European science education and teacher education. WP2 will also be responsible for input to a major conference, probably in conjunction with the ECIP launch event, in late 2010. These activities will be designed to create a community of policymakers and academics which will be responsive both to research findings and to teachers' practical situations.
The work will be performed by a researcher based at UIO, under the direction of Prof. Doris Jorde with the assistance of Prof.Kirsti Klette. Additionally, key players may be interviewed by the assistant or by national partners to clarify areas of particular importance. The impact of WP2 will be achieved through the broad reach of the consortium, which provides the most authoritative network of science and teacher educators in Europe. It will also work through existing research networks, such as EERA, ASE and ESERA.

Deliverables WP2:[13]

2a Preliminary report (M9)
2b Final report (M33)

Products and events:

2.1 Policy and practice workshops programme, combined national events x 15 with WP3 divided into part A (WP2) and part B (SINUS) (M6)
2.2 Preliminary policy report (M9)
2.3 International policy conference (M18)
2.4 Final report on policy and practice in science education (M33)

[13] `The collection of video evidence at policy level and the previous product 2.3 have been replaced by a policy focus in product 10.3 (TV production outline). Original product 2.5, overview report on scientific literacy, has been moved to WP8 and renumbered as 8.1

B1.3.5.3 Summary WP3: Powerful educational environments for successful science teaching

Work package no.	3		Start date		M1			
WP title	Powerful educational environments for successful science teaching							
Activity type	Support							
Participant id.	**IPN**	UIO	UPMF	UNIVBRIS	KUT	USB	UCPH	Univstrath
Person months	**28**	0[14]	3	3	3	3	3	3
Participant id.	USC	HU	TLU	IIT	MDU	HUT	CYCO	
Person months	3	3	3	3	3	3	3	
Total PM **67**								

Objectives

The objectives of WP3 are: □

- to repeat the success of the German SINUS & SINUS-Transfer programmes in all the national education contexts represented in S-TEAM
- To disseminate, test and develop SINUS modules and materials for these contexts

WP3 has three phases linked to the above objectives. The first phase will consist of a programme of workshops designed to introduce the SINUS programme to other national contexts, to discuss the implementation issues in these contexts and to decide on the best way to move forward with SINUS.
The second phase will consist of the training package development process, described in more detail below. This phase will produce training packages tailored to the needs of the 14 national contexts (excl.Germany).
The third phase will consist of the dissemination of these packages in the partner countries, with provision for formative assessment of their effectiveness.

[14] UIO PM allocation for this purpose is in WP2

WP3: Description of work

Work package 3 will be led by the Leibniz Institute for Science Education at the University of Kiel (IPN) with participation from all national liaison partners, who will evaluate "SINUS modules" with their respective teacher education institutions. For the SINUS programme, IPN has developed 11 modules for science teacher professional development that have been used in networks of teachers from 1800 schools in Germany. IPN also has access to science teaching approaches from the large scale programmes "Biology in Context", Chemistry in Context" and "Physics in Context". SINUS thus enables teachers to be supported in collaboratively reflecting upon, developing and evaluating their own instruction using the modules, guidelines, experience from SINUS and other programmes as a basis for further development.

1. Background

The sustainable impact of problem-based and inquiry-based science teaching techniques depends on various aspects of science learning environments within schools. Teachers trying to systematically foster the development of scientific understanding and literacy need to know the basic principles of powerful learning environments. In particular, they have to take into account the recent challenges or problem areas of science teaching that have been identified in large scale assessments like TIMSS or PISA, and which have also been observed in video studies.
Drawing on these research findings, IPN has elaborated 11 modules for science teacher professional development that have been used in networks of teachers from 1800 schools. The modules focus on e.g. the use of experiments, argumentation and communication in science instruction, cooperation of students, and students' autonomy and responsibility for their learning.

2. Outcomes

The training packages (14 will be produced) will be designed to promote co-operation between teachers in order to implement innovative approaches at school level. Teachers will be supported to reflect upon, develop and evaluate their own instruction. The training units, which can be combined with packages from other WPs, enables teachers to design learning environments that focus on students' learning and develop their interest in science and technology.

3. Pilot studies and evidence

The training packages of WP3 are based on products, experiences and outcomes of large scale approaches to implementing and disseminating innovative science teaching approaches in schools in the well known SINUS and SINUS-transfer programs, been designed and coordinated by IPN (Principal Investigator: Manfred Prenzel). Additionally, we can draw on evidence from other programs led by IPN showing the importance of meaningful contexts for science teaching. All approaches are well accepted by teachers and systematic evaluation indicates evidence for effects on students, teachers and schools.

4. Outline of activity / material

The training packages will be used by groups of teachers, ideally comprising all the science teachers from a particular school. Exchanging and sharing results between teacher groups from neighboring schools will add to the implementation of innovative methods.
The training packages provide background knowledge of the particular topic to allow the teachers a common understanding of the problem to be tackled. An input on a

new teaching approach or teaching example is followed by small-group work to develop a lesson plan. The teachers try out the plans and present their experiences with the new material in the following session and discuss them for further development.
The teacher groups should meet on a regular basis (e.g. once a month) over a period of at least one year in order to develop routines with the new approach and to implement quality development at their school.

Reports on WP3 activities

The report will sum up the results of the workshops (relevant problem areas, possible starting points for disseminating quality in science teacher education) and activities in the partner countries to implement principles of science education mentioned in the call. The report will be delivered in two parts: one in M9 with a description of the respective situations in the countries and first steps to implement quality science education and a second towards the end of the project (M33) with a closer look at activities and outcomes.

Deliverables WP3:

(Delivery date in brackets)

3a Preliminary report (M9)
3b Suite of training packages (M30)
3c Final report (M33)

Products and events

3.1 National Workshops for quality development in science education (M6)
3.2 Training packages x 14 for teacher education institutions in partner countries other than Germany, where SINUS has already been extensively implemented (from M12)
3.3 Web based access and feedback system (from M12)
3.4 Preliminary report on results of workshops (M9)
3.5 Final report on SINUS-based activities and outcomes (M33)

B1.3.5.4 Summary WP4: Teacher Collaboration and innovative methods

Work package no.	4		Start date		M1	
WP title	Teacher Collaboration and innovative methods					
Activity type	Support					
Participant id.	**UPMF**	NTNU	CNRS	UNIVSTRATH	UHB	
Person months	**28.5**	1	4	3	8	
Total PM **44.5**						

Objectives

the objectives of WP4 are:

- to use existing empirical research on teachers' collective work as a basis for the systematic deployment of teacher collaboration in support of innovative methods in science teaching.
- To use teacher collaboration as a means of promoting equity and working with diversity in science classrooms

Description of work

WP 4 is led by Université Pierre Mendes-France (UPMF), WP4 is concerned with the role of teacher collaboration in the deployment of innovative methods, promotion of equity and working with diversity in science teaching.
WP4 is about enhancing teacher collaboration and collective work, since inquiry-based methods introduce student cooperation, collaborative activities and uncertainty into classroom environments and teacher practices. Teachers need to work together to overcome this uncertainty and to develop new skills and practices. It is also important for teachers to collaborate in order to address issues of diversity and gender in the classroom, which have been identified as constraints on pupil attitudes to scientific literacy and science careers. Finally, projects such as SINUS have already succeeded on the basis of teacher collaboration, so there is an evidence base and a strong argument to pursue actions which encourage and support collaborative working. UPMF will liaise with IPN in WP3 regarding the collaborative aspects of SINUS.

WP4 will promote the role of teacher collaboration and collective work[15] in implementing science education reform through teacher education. The four partners within WP4 all have proven expertise in teacher collaboration and will hold a thematic WP meeting within the start-up conference. Drawing on its proven expertise and existing theoretical frameworks, Université Pierre Mendes-France (UPMF) as WP4 leader will work with UHB, CYCO (in WP6) and UnivStrath to produce models for the implementation of collaborative approaches, using video-aided reflection and other innovative methods.

Sub packages

[15] See Grangeat & Gray 2007; 2008 for discussion of teacher collaboration

WP4a Dissemination strategy for inquiry-based methods in France

As national liaison partner, UPMF will lead the production of a dissemination strategy for France, in cooperation with CNRS and UHB. This is necessary to enable large-scale dissemination within the French teacher education system which is currently transforming towards a model compatible with other European countries. In France, science teacher education is currently in transition from a quasi-centralized system (i.e. *Institut Universitaires de Formation des Maitres* - IUFM) to a distributed organization involving numerous universities. This situation requires a renewed articulation between teacher educators, schools and local authorities. Such a situation provides good opportunities for the dissemination of new practices amongst the actors of the science education system. Contacts have been established with other research teams (e.g. *Sciences Techniques Education Formation* STEF-ENS-Cachan) or institutions (e.g. *Institut National de Recherche Pedagogique* - INRP) which are well known for the efficacy of their dissemination strategies. A French group start-up conference is planned for M2 in Grenoble; pre-existing conferences will be used in M12 and M24 for dissemination in specific areas, (e.g. mathematics, biology, etc.) and in M33 a final French national meeting will be held.
The subpackage will consist of a report which will be provided for M12. (product 4.1)

WP4b: Teacher Collaboration guidelines: workbook for professional development programmes

A workbook is planned for M12. It aims to support collective reflection during workshops about the ways in which teacher collaboration could reinforce IBST, encourage positive consideration of learner's diversity and enhance pupils' learning outcomes (scientific knowledge, motivation, self-esteem, metacognition). A specific chapter will tackle teacher engagement/commitment and its effects on teaching approaches and practices.
(product 4.2)

WP4c: DVD of case study materials on teacher collaboration in IBST/E

This sub-package is led by CNRS and UPMF. The DVD is planned for M18. It addresses the interactions amongst teachers & between new teachers, mentors and teacher educators. The material will be collected in science teacher education sequences and in school during pre-service placements & the induction year. The intended audience is new teachers, mentors, teacher educators and local authorities. The language used by the DVD is French. (product 4.3)
The DVD will include video material from Pairform@nce[16]

WP4d: Report on IBST and the Pairform@nce project: creating training paths

Pairform@nce is a national teacher training project in France. It proposes training packages (called training paths), providing resources for the organization of blended teachers training sessions, using a distant platform. The training follows a principle of collective elaboration of lessons, which permits the emergence of teachers' communities, sharing a repertoire of resources (Gueudet & Trouche 2008, Gueudet 2008). The implementation by the teachers of collectively designed lessons permits the development of innovative teaching practices.
In this report we present the Pairform@nce project through an analysis of two IBST-oriented training paths. The first one, called "Inquiry in mathematics with dynamic

[16] www.pairformance.education.fr/
[17] l'Institut National de Recherche Pédagogique
[18] http://www.sesamath.net/

geometry systems" proposes training for mathematics teachers working with classes from grade 6 to 9. The second, called "Virtual globes", proposes a training for science teachers about the classroom use of virtual globes (teachers working with classes from grade 6 to 12). In both cases, teams of teachers collectively elaborate lessons. These lessons are IBST oriented, and integrate ICT. One teacher of the team implements the lessons designed in class; the implementation is observed by other members of the team, which leads to modifications, and to testing of the modified lesson.
The report also includes the analysis of a training package, drawing on the Geometry Path. This report is addressed to teacher trainers and policy makers.
and is planned for M18. (product 4.4)

WP4e: Book on Teacher Collaboration and enhanced methods in science teaching (In French)

This book in French extends the French network about dissemination of IBST and science teacher education beyond the three S-TEAM teams. Contacts with INRP[17] will guarantee publication. It will include chapters from other European research contexts, translated from the book planned for WP6 in order to open up the French science teaching landscape.
It includes specific contributions about teachers collaboration, in Pairform@nce and in teachers associations in France, Sésamath[18] in particular, with a perspective of collaboration enhanced by digital means (by Ghislaine Gueudet). Delivery is planned for M33. (product 4.5)

WP4f (NTNU): Working with teachers as researchers

The *Lade-project* was conducted by using the R&D work method (research and development work). This means that the researchers' task was to develop the teaching processes together with the teachers at the same time as the processes were researched. The outcome of the package will be a workshop and associated report about how researchers, in their dual role, conduct research in, on and with teachers. (product 4.6)

Deliverables WP4:

(delivery month in brackets)

4a Preliminary dissemination report (M12)
4b WP4 Training materials Part 1 (M12)
4c WP4 Training materials Part 2 (M18)
4d Book (M33)

Products and events

4.1 Dissemination strategy report for innovative methods in France (French and English) (12)
4.2 workbook for professional development programmes (12)
4.3 DVD of case study teacher education materials for IBST/E, including results from the Pairform@nce 42 project, (18)
4.4 Training package for teacher educators and mentors of new science teachers (24)

4.5	Book on teacher collaboration and enhanced methods (in French) (33)
4.6	Workshop report on teachers as researchers (18)

B1.3.5.5 Summary WP5: Innovative methods, initial teacher education and science

Work package no.	5			Start date		M1	
WP title	Innovative methods, initial teacher education and science						
Activity type	Support						
Participant id.	**UNIVSTRATH**	NTNU	UIO	KTU	VPU	UCPH	
Person months	**28**	3	6	6	6	3	
Total PM **52**							

Objective

The objective of WP5, led by the University of Strathclyde (UNIVSTRATH), is to support the incorporation of innovative teaching and learning practices, including inquiry-based science teaching methods, into initial teacher education (ITE).

Description of work

WP5 will produce knowledge, practices and tools to help teacher educators and pre-service teachers overcome constraints on the implementation of innovative methods in science education. This will involve adopting these innovative methods and principles in science teacher education itself, e.g. the use of group work and problem-based learning, dialogical learning and the acceptance of uncertainty within scientific inquiry. Their common theme is that they are based in existing teacher education institutions or systems, and that they address problems raised by teachers in applying innovative methods in science.

Sub-packages:

WP5a (UNIVSTRATH) will produce a set of 3 subject-specific training modules for inquiry based science teaching based on collaboration between teachers at different stages in their careers and directed at overcoming uncertainty and lack of confidence in new teachers (at student level or within first or second years of service) regarding inquiry-based methods (del.5.1).
These will comprise:
a) overview statement that covers the educational case for inquiry-based science and the challenges it poses, especially for new teachers (ITE programmes and early years/induction)
b) a general description of theoretically grounded pedagogy
c) scenarios and examples based on realistic classroom situations, for each of the three main scientific disciplines and for interdisciplinary work
d) DVD or web video of discussions with practicing teachers, supported by commentary (in English and also in languages other than English)
e) DVD of lessons with actual inquiry-based learning activities, supported by commentary
f) reading of selected articles with a review and questions for discussion, linking experience and theory

g) evidence from a children's view indicator (with DVD interview extracts, subject to permission

Conceptual rationale:

This Work Package Deliverable addresses teacher education practice in relation to science education, from initial teacher education into the early years of teaching. teachers and teacher educators. The aim is to provide an ambitious but realistic pedagogy for beginning teachers of science that blends the best of what is practised by accomplished science teachers with an action-oriented disposition to intervention in early professional leaning, informed by a critical evaluation of the literature. Challenges of teaching in an open inquiry-based manner will not be evaded but discussed and conceptualized in a way that accommodates the realities of teaching science.

Concern with maintaining the attainment of pupils in science will be recognized and linked to the features of a practice that can actually improve teaching performance through increased pupil enthusiasm and understanding in a science classroom that encourages and supports creativity through inquiry. Examples of inquiry-based learning experiences in science will be presented and supported with a warrant for theory and practice that will assist new science teachers in becoming effective..

Design and Methods:

There will be interviews with experienced teachers, covering the life span of teachers. Data will be collected on the perceived abilities and qualities of participating teachers from interviews with them and their colleagues (and pupils, subject to permission) as well as through the use of research-proven indicators of children's views and inquiry-based science teaching practices.

The team has experience in deploying these methods, notably in the recent project (http://www.ioe.stir.ac.uk/research/projects/epl/index.php) on Early Professional Learning in which a unique instrument of five indicators, including one for children's views, was developed and used to provide statistical evidence and triangulation in warranting our claims. Another feature of the EPL Project was the innovative use of practitioners in a multi-disciplinary team. Building on the long experience of collaboration with practising science teachers (e.g. McNally 1997), and because of the need to ensure adequate focus on the context of science and science teaching, experienced science teachers will be deployed in the delivery, and fully engaged in consultation, negotiation of access, dissemination and evaluation. Joint seminars will be organized in which beginners will make connection with a select group of more experienced teachers, tease out the implicit in teachers theorizing, including their tacit knowledge of the nature of science, and generally acquire a richer discourse about becoming and learning.

The following methods will be deployed to support and enhance delivery:

- individual and group interviews – all participating teachers + colleagues for narrative profiling
- group interviews – sample of children in classes taught
- purpose-specific indicators – collect views of all children in classes taught (+ control group)
- semi-structured classroom observation – all participating teachers
- systematic literature review – selected range of journals and books, relevant curriculum docs
- school data – pupil attainment measures, numbers opting to study science,

career/HE choice

Deliverable 5.1 - format and contents

5.1a) overview statement that covers the educational case for inquiry-based science and the challenges it poses, especially for new teachers (ITE programmes and early years/induction)
5.1b) a general description of theoretically grounded pedagogy
5.1c) scenarios and examples based on realistic classroom situations, for each of the three main scientific disciplines and for interdisciplinary work
5.1d) DVD/video resource of discussions with practicing teachers, supported by commentary (in English and also in languages other than English)
5.1e) DVD/video resource of lessons with actual inquiry-based learning activities, supported by commentary
5.1f) reading of selected articles with a review and questions for discussion, linking experience and theory
5.1g) evidence from a children's view indicator (with DVD interview extracts, subject to permission)
Delivery planned for M24
Project Team: Prof J McNally, A. Blake & Dr C Smith + 3 science education lecturers and a technician.

WP5b: Practice placements for the development of new methods in science education

WP5b (NTNU) will develop the use of practice placements in ITE as an integrating learning arena for the development of new methods in science education. This will be implemented through a DVD (in collaboration with UnivStrath & UPMF) as a tool for reflection in ITE focusing on student teachers working with innovative methods in science and mathematics education during teaching practice. The video sequences will be used as a basis for discussing relationships between teaching method and learning outcome in order to make explicit the learning processes of student teachers (product 5.2).

WP5c: workbook and training package for science methods courses

WP5c (UCPH) will produce succinct guidelines, in the form of a workbook and training package, for science methods courses for pre-service teachers at primary and secondary school levels. These will not only will introduce candidates to innovative methods, such as cross-disciplinary strategies, but also equip them with the personal capability, beliefs and strategies to apply those methods when they begin to teach, with particular emphasis on self-efficacy. The guidelines will include lesson-plan scaffolding to help new teachers incorporate innovative methods into their teaching.
The guidelines are planned for delivery in M18.
(Workbook is del.5.3; training package is product 5.4).

WP5d: Integrated science and primary/secondary transition

WP5d (VPU) will produce training packages for ITE based on the use of integrated science to overcome primary/secondary transition problems in science.
Intended outcomes:
a) overview of the analysis of integral relationships of didactic modules of science subjects taught at the university level;
b) the analysis of contents of science subjects taught at primary and secondary

school;
c) possibilities of parallel integration of science subjects and mathematics at secondary school;
d) the analysis of integration of science subjects on the basis of concepts and phenomena;
e) training package for teaching of integrated science subjects at general education school.

The training package (del.5.5) for teaching of integrated science subjects is intended for teacher educators, preservice teachers, beginning teachers. It will consist of:
1. A didactic module of teaching of integrated science subjects as a composite part of a didactic program of Natural Sciences. It will include the guidelines for the preparation of teachers in relation to the practical usage of integration in educational practice.
2. Guidelines for teaching of integrated science subjects on the basis of concepts.
3. Guidelines for teaching of integrated science subjects on the basis of phenomena.
4. Guidelines for parallel integration of mathematics and science subjects.
VPU have also been allocate 3PM in WP6 to contribute a chapter to the book on implementing inquiry (product 6.15).

WP5e: IBST/E - implications of linguistic and cultural differences for science teachers

WP5e (KTU) will produce a report and teaching package regarding the problems of implementing inquiry-based methods using additional languages. This is a situation which arises in several EU countries where minority languages are an issue or where English is extensively used as a medium of instruction (product 5.6). (see appendix 1 for more details of languages involved).

WP5f: ICT and inquiry: a resource for teachers

This contribution from UIO, based on the Viten project (http://viten.no), will develop an English-language web-based resource for teachers, designed to help them understand how the changing role of the curriculum, teacher and student affects the use of ICT in the science classroom. The English platform for Viten will be further developed to disseminate Viten teaching programmes throughout Europe. Guides for teachers are an integral part of each Viten programme, providing information on how to effectivly use ICT in science teaching based in best practice observations. All Viten programmes may be used in teacher education as well as in-service professional development courses for teachers (product 5.7).

Deliverables WP5:

(delivery month in brackets)

5a WP5 Training materials part 1 (M18)
5b WP5 Training materials part 2 (M24)

Products and events

(range shows period of operation or staggered delivery)

5.1 Set of 3 subject-specific training modules for inquiry based science teaching (24)
5.2 DVD on use of practice placements for skill development in innovative methods (24).
5.3 Set of guidelines for teacher education courses in IBST/E (12).
5.4 Training package in cross-disciplinary methods in science education (18).
5.5 Training package on Integrated science and primary/secondary transition (18).
5.6 Report and training package on problems of IBST/E in multi-lingual contexts (18). 5.7 English-language web-based resource for teachers based on Viten project (6-36).

B1.3.5.6 Summary WP6: Inquiry-based methods and professional development

Work package no.	6			Start date		M1	
WP title	Inquiry-based methods and professional development						
Activity type	Support						
Participant id.	**CYCO**	NTNU	USB	VPU	UCPH	Univleeds	HU
Person months	**36**	8	6	3	3	6	6
Participant id.	MDU	JyU	ABO	GU	AU		
Person months	12	6	7	9	9		
Total PM **111**							

Objectives
The objective of WP6 is to incorporate state-of-the-art knowledge about inquiry-based methods in science into effective professional development programmes for teachers, in order to improve attitudes, motivation and career choice disposition towards science for pupils in the partner countries and elsewhere.

Description of work

WP6 will be led by the European University of Cyprus. It will be closely aligned with the activities of WP5 through regular meetings and the exchange of materials, in order to achieve coherence between the activities of the project in professional development and in Initial Teacher Education. The co-ordination effort by CYCO will concentrate on facilitating coherence and uniform interpretations of inquiry-oriented teaching and learning as well as safeguarding a minimum level of enrichment of the different deliverables with case studies and other supporting examples that will be useful for teachers in diverse contexts. This will be achieved through a participative process relying on structured face-to-face meetings and regular online communication.

The tasks of WP6

WP6 will produce training packages linked to a book and accompanying DVD using case study approaches to the implementation of IBST/E and other innovative methods product 6.1). Its sub-packages cover a wide range of possible approaches, all of which function as training actions but also contribute to the book/DVD. All WP6 participants will contribute a chapter to the book, based on their sub-package contribution. There will also be chapters from WPs 4, 5, 7 and 8.

Sub-packages

WP6a: Supporting student inquiry in science

CYCO will produce three separate small-scale [by small scale we mean 4-6 3-hour meetings] training packages on helping teachers to develop teaching strategies that can support student abilities for scientific inquiry. The training packages will seek in particular to develop teachers' abilities to identify, interpret, and appropriately respond to their in-class students' scientific thinking. The first training package will

focus on kindergarten science education, the second on elementary science education and the third on computer-supported modeling-based learning in science.

Rationale
Assessing student thinking is challenging work, whether during class by "instinct" because there is little time for more, or after class when there is more time for explicit reflection. In very few professional development programs is there any specific preparation for this, but the needs are clearly great. Teachers need to develop their in-class "instincts," what they can see and respond to with little reflection, which can only happen by practicing and developing perception in deliberate, explicit reflection. More generally, they need to develop a stance of inquiry toward their students' understanding, both in class and out, developing their perceptions and intentions as they gain new insights and revise old ones.

To be sure, developing these abilities depends largely on the teachers' preparation and later professional development in teaching science. Teachers who are not themselves comfortable reasoning about scientific ideas would not be in a position to reason substantively about their students' scientific ideas. One obvious difficulty with this is the risk that such teachers may affirm students' statements that sound correct but do not necessarily reflect good understanding, or that they may contradict students' productive ideas they do not recognize as valid because the students express them in their own language.

That is to say, the need for teachers to develop diagnostic abilities suggests an additional pressure on the need for professional development. In particular, it is not sufficient that teachers acquire an understanding of a particular body of knowledge, because their students will present them with ideas not covered in their undergraduate courses. They need to be able to reason about their students' ideas, to reflect from the students' perspective on the ideas' merits and liabilities, and to give substantive responses.

Even teachers who are themselves capable and competent as scientists may not be prepared to diagnose their students' reasoning, especially with respect to its merits as inquiry. For teachers familiar with established ideas, the errors and vaguenesses of student thinking are most salient, judged against the accepted ideas.

Along with the three small-scale training packages, WP6 will also produce a trainer guide that will discuss issues related on how to use and implement each of the training packages, their rational, purposes and explanation of the range of activities included in the training packages. (Deliverables 6.1 packages; 6.2 guide)

WP6b: science-centred competitions to improve student motivation in science

WP6b (USB) will produce two training modules on science-centred competitions as a way to improve and understand student motivation in science (products 6.3; 6.4).
Description 6.3; 6.4:
1) Brief background
Science centred competitions have a long tradition in the Europe. For example in the Czech Republic these activities started 43 years ago (Farkac & Bozkova 2006). USB is actively involved (working on the concept, preparation of tasks and organisation of the competition) from the 1970s. This expertise as well as long term research on pupil motivation carried out by USB staff initiated the question of how to use such competitions for empowerment of the students' motivation to study science. Recent advances in motivational research (Elliot & Dweck, 2005) show that personally meaningful, appropriately challenging tasks are not enough for development of an

encouraging motivational climate in the classroom, The sense of control and autonomy (Deci & Ryan, 2002), socially valued outcomes and focusing on mastery rather than on performance are essential. Upward comparison can improve the level of accomplishments (Collins, 2000). These attributes are especially fostered by the competition tasks and the inquiry centred competition context.

Main objectives of 6.3; 6.4 are as follows:

a) Heuristic context (objectives based on IBSTAL):

- to analyze the motivation to study science of students participating in science centred competitions (understanding intrinsic motivation)
- to analyze series of available tasks used in science centred competitions from the motivational point of view (understanding extrinsic motivation)

b) Motivational tools context:

- to prepare training module/package (workshop, textbook and workbook respectively) for the teachers to help them improve ther abilities to motivate students for science

2) Intended learning outcomes:
Improvement of teachers' ability and skills to motivate students to understand and study science, and to use new a motivational tool - science centred competition.

3) Detail of pilot studies
The competition tasks with the optimal solutions have been sampled for more than 5 years. The most frequent mistakes and problems were inferred. These analyses will be used in the training module.

4) Outline of activity 6.3.
workshop (one day event) for in-service teachers focussed on
(i) the analysis of students' motivation to learn and work in the science area;
(ii) training based on a treatment of selected highly stimulating science tasks;
(iii) training dealing with the technology of education – how to present the tasks and how to help the students to cope with problems in solving them

a) settings
first steps of dissemination (workshop and training package) – regional level (USB, schools in the SB region); later also national level (particularly Faculties of Education at different Universities in the Czech Republic, schools).

b) schedule
one day workshop –

- 2 hrs presentation of the data on competition power for enlargement of student motivation, followed by:
- 2 hrs small group work on the competition tasks / to understand the motivational peculiarities of the task structure, problems which the students encounter and effective ways how to help them to cope
- 2 hrs discussion of prospective ways of implementation of the competition components in regular classrooms

Product 6.4 is a pre-service training package/module: the same content as workshop but it will be structured into 14 lessons realized during one term

Outline of activity 6.4.
(i) report on students' motivation in relation to design and tasks format of science competition
(ii) workshop, training package and first version of workbook preparation and publication;
(iii) assessment of the effectiveness of the workshop
(iv) final report and dissemination of the results to teacher educators.

Dissemination of the WP 6.3 & 6.4 results and outputs will be realized especially by:
(1) workshops for teachers of primary schools and pre graduate students – pre-service teachers;
(2) published workbook to the training module for the target audience (see above)
(3) report on results of WP and selected results publication (paper, monograph) and presentations within scientific conferences,
(4) cooperating teachers educators in a network of Faculties of Education at different Universities in the Czech Republic
(5) cooperation with recently developing regional centres of ESF Czech national project supporting studies of science and technology. (Products 6.3; 6.4)

WP 6c & 6d: dialogic inquiry in science classrooms

Work packages 6c and 6d constitute two complementary parts of an overall product designed to encourage and support teachers in engaging students in dialogic inquiry in science classrooms.

The concept of 'dialogic inquiry' follows from research work into characterizing the talk of science classrooms and, in particular, making the distinction between authoritative talk, where the focus is on the scientific point of view, and dialogic talk where the classroom interactions are open to all points of view, with those of the students made prominent (see: Mortimer and Scott, 2003). The approach taken in these work packages is that in learning science, both authoritative and dialogic approaches are essential as teaching and learning progress, at times closing in on the accepted science point of view, at other times opening up for debate and discussion (see: Scott et al, 2006). This is in contrast to much existing science teaching which follows a strictly transmissive, authoritative route, excluding the student's voice As such we see close links between this work on dialogic inquiry and inquiry-based science teaching and learning (IBSTAL), with the key common purpose of engaging students in real dialogue and thinking about science content and other scientific issues. Furthermore, we see this kind of engagement as being of fundamental importance in motivating students to take a personal interest, and to participate, in science.

The team working on this theme of dialogic inquiry has been instrumental in developing the basic ideas involved in the field and as such is ideally placed to take a lead. For example: Scott and Ametller (2006) have recently completed a UK Research Council (ESRC) project on Dialogic Teaching; Enghag's (2007) dissertation about Student Ownership of Learning, addresses student empowerment and motivation and how student ideas as the driving force in classroom discourse challenge traditional teaching (see: Enghag and Niedderer, 2007) ; Sund's (2008) dissertation concerns socializing content for Education for Sustainable Development; Viiri and his colleagues have developed various dialogic teaching sequences, e.g. Savinainen et al. (2005), and they have experience in training student teachers in dialogic teaching approaches (Viiri & Saari, 2006).

Work package 6c will involve collaborative work between science teachers in primary and secondary schools and university-based science educators. The focus of this collaboration will be on jointly developing four short teaching sequences (6/7 hours duration) aimed at lower secondary/primary school which are based on the principles of dialogic inquiry and which are well tuned to the demands of real classrooms. The sequences can either be used as complete entities, or specific 'dialogic activities' can be taken from them to be integrated with schools' existing teaching schemes. Through this work two significant outcomes are anticipated. Firstly, the participating teachers will be exposed to the thinking and practices of dialogic inquiry, thereby widening their teaching repertoires. Secondly, four dialogic inquiry teaching sequences (and the constituent 'dialogic activities') will be developed and trialed. It is anticipated that these sequences will be based in the physical sciences and the field of sustainable development (see WP 6d below). The process of trialing and review of the sequences will be a key part of their development: a 'one-shot' curriculum development approach will not be taken. The project team already has some experience in developing 'effective practice' teaching sequences, with evidence of a positive impact on student learning and a positive response from teachers (Leach et al, 2006).

Work package 6d will complement the activity of WP 6c by developing workshop materials and activities focusing on the general theme of dialogic inquiry and how this might appear in the science classroom. The materials and activities will be designed for use in a range of contexts: initial teacher training; school-based teacher development; wider teacher development events. They will include simple tools for analysing classroom talk (see Mortimer and Scott, 2003) with the aim of getting teachers to a point where they can reflect on their own teaching practices and see how these might be refined to include more dialogic interaction with students.

The team has significant experience of working with teachers on dialogic inquiry in both pre-service and in-service training contexts. For example, pilot work on dialogic inquiry in the context of pre-service training in Finland has been carried out. This has involved a specific teaching programme about classroom interaction and teacher's talk as an integrated section in the normal curriculum of science teacher training (Lehesvuori et al, in press).

A novel feature of the WP 6d work is that some of the materials will focus on supporting teachers in opening up issues relating to aspects of sustainable development such as economic use of fuels, recycling, technical energy systems and climate change. Teacher education at Mälardalen University includes courses in education for sustainable development. The educational approach itself needs to be changed to offer students of all ages better opportunities to critically discern the surrounding world in a more fruitful way, according to their own interests, and in all school subjects (Sund & Wickman, 2008). It is not difficult to see how dialogic inquiry approaches, focusing on the student voice and other perspectives, will be key to working in this field.

Dissemination WP6c and 6d

The teachers involved in the work of 6c will be exposed to the materials developed in 6d as part of their activity in developing teaching sequences. Conversely, the teaching sequences developed through 6c will be referred to as exemplary materials in working through the workshop materials developed in WP 6d. Video and power-point materials presented on a DVD platform will be used to capture and exemplify key aspects of the ways in which teachers launch and sustain dialogic inquiry in the science classroom.
Dissemination activities will take place in England, Finland and Sweden in the first instance (products 6.5 and 6.6)

WP6e: Cross-curricular & interdisciplinary approaches to science education. WP6e (UCPH) will produce succinct guidelines, in the form of a workbook and training package, for science methods courses for in-service teachers at primary and secondary school levels. These will not only will introduce candidates to innovative methods, such as cross-disciplinary strategies, but also equip them with the personal capability, beliefs and strategies to apply those methods when they begin to teach, with particular emphasis on self-efficacy. The guidelines will include lesson-plan scaffolding to help new teachers incorporate innovative methods into their teaching. The guidelines are planned for delivery in M18.
(Workbook is product.6.7; training package is product 6.8).
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WP6f: Improving teachers' capacities to motivate students –

introducing motivational theory to in-service-training of teachers.

The work-package from Aarhus University (AU) in many aspects parallels the work on motivation in WP6h and is linked to work-packages WP6c/d through an emphasis on dialogic influences on motivation.

The aim of the project is to provide a professional development package (deliverable 6.9) that facilitates teachers' acquisition and transformation of motivational theory into practice. The package will be targeted towards in-service training of upper secondary science teachers in Denmark.

Theoretically the work will be based on contemporary motivational theory, first of all the seminal work of A. Bandura (e.g. Bandura (1997)) on motivational aspects of expectancies, particularly the notion of Self-Efficacy. Research has established Efficacy-beliefs and science Self-Concept as the most important drives and influences on students' attitudes towards science (e.g. Krogh et al (2005)). Bandura originally emphasized enactive experiences, vicarious experiences, and verbal persuasion as sources of efficacy. We extend his notion of "persuasion" to include the extremely important effects of feedback (e.g. Butler (1987)), by emphasising how teachers' dialogic practices (e.g. Mortimer et al 2003)) and ways of responding to students, can facilitate or destroy efficacy and motivation.

The professional development package is intended to span 5 teacher training sessions, and will be structured around a number (est. 10) of reflective and practical activities. The package will be tried out and evaluated in collaboration with Danish science teachers. Session materials and video-clips of participating teachers' motivational practices will be included in the training package. (product 6.9)

WP6g: the use of open investigations and Vee-heuristics within science education

ABO will produce a book chapter and a web-based course package for their Resource Centre in Chemistry Didactics on the use of open investigations and Vee-heuristics within science education. This will include guidelines on how the learning of both content and language of students from non-mainstream backgrounds can be supported in this work process. The development of the material will primarily be based on work by Kurtén-Finnäs (2008). For the work with the linguistic and cultural dimension, Forsman has experiences e.g. through ongoing research in multilingual settings in Swedish-medium schools in Finland (see description of research, so far

only in Swedish, on http://www.vasa.abo.fi/pf/flis/).

An open investigation can be defined according to the degree of openness and the demand for inquiry skills (see e.g. Hegarty-Hazel, 1990, p. 375). Open investigations are characterized by the following features: 1) the educational process is less teacher directed, 2) more planning takes place in the classroom, 3) more focus is placed on the scientific process, 4) there are more topical discussions between students in the classroom, and 5) the students themselves are more active and initiate more ideas of their own (Tamir, 1991, p. 17). When the students conduct investigations that have been planned by themselves, they can both make use of and further develop their conceptual knowledge as well as their knowledge of how investigations are conducted (Duggan & Gott, 1995).

Gowin's knowledge-V (V diagram or Vee-heuristics) is a tool for problem solving, where the activities and different steps integral to all types of research are made visible, also the type of research that constitutes an open investigation (Novak & Gowin, 1984; Gowin & Alvarez, 2005). V diagrams were originally developed in order for students and teachers to develop a better understanding of what takes place during investigations in the science classroom. The structure of the V diagram mirrors human thinking and how humans develop new knowledge and understanding (Novak, 1998, pp. 80-82).

2) The material is to be used as a starting point for classroom work within teacher education and continuous professional development with the aim of increasing understanding of how open investigations and V-heuristics can be used within science education, including how the learning of students from non-mainstream backgrounds can be supported.

Work with open investigations in combination with V-heuristics has the possibility of affecting the students' interest and self-image in a positive direction. Students working in groups with problem solving can develop their understanding in dialogue with their peers and with the teacher (Kurtén-Finnäs, 2008). The students can experience the thinking process as a positive part of the investigation, and their own planning can contribute to a feeling of ownership and agency.

Also for students with a non-mainstream background, there are learning benefits both regarding language and content development connected to work processes that integrate abstract conceptualization with concrete actions through being more experiential, and that provides the students with more opportunities for discussion and multiple sources of knowledge through being more dialogical and less teacher directed (see e.g. Carrasquillo & Rodríguez, 2002; Coelho, 1998; Cummins, 2000; Hajer, 2000). The use of V diagrams during investigations can support the learning of all students due to its clear graphical structure, which serves as a guiding light throughout the investigations. Through the course package, teachers can also learn how to take further steps when introducing new topics, terminology and text to ensure that the pre-understanding of all students is taken into consideration.

4) Both on line and face-to-face applications are possible, but we see the most sustainable development possibilities in more extended classroom work with teachers through supervision/ mentoring activities that use the course package as a starting point.
Web-based material (in Swedish, to be translated into English) will be used both within teacher education and continuous professional development for science teachers; web-based text material (both theory and practical applications) also to be integrated and rewritten into book chapter within WP6.

Contents of training package:

1. What is a V diagram?/What are Vee-heuristics?
a. Theoretical background: PowerPoint presentation.
b. How can Vee-heuristics be used in the classroom? Description of practical teaching examples.
2. What is an open investigation?. Text. Examples.
3. How can open investigations and Vee-heuristics be used in the classroom? Approx. 20-minute DVD and/or protected web-material showing classroom work (in Swedish, with subtitles in English).
4. How can open investigations and Vee-heuristics be used in the classroom? Text.
5. Guidelines on how the learning of both content and language of students from non-mainstream backgrounds can be supported. Text on-line, including comments on recorded material, as well as integrated in the book chapter. (product 6.10)

WP6h: Professional development for increasing student motivation in science[19]

University of Helsinki (HU) will produce a professional development package for science teachers (deliverable 6.11). Design will be based on their previous analysis of nation-wide data from the ROSE project[20] and from the PISA 2006 Scientific Literacy Assessment.
The professional development package for science teachers in pre- and in-service training will enable them to integrate motivational and interest features to science activities in order to increase students' motivation, through support for student autonomy, competency, social relatedness, interest, and feeling of relevance of science studies. In the interdisciplinary perspective, the classroom instruction will also include material for developing student awareness of the nature of careers in Science, Technology, Engineering and Mathematics (STEM).

Contents of training package 6.11:

The package will consist of 5 modules. Each module will contain some video clips captured from real classroom situations (subtitled in English) and guiding themes for discussion in a teacher training session which carried out face-to face or in a virtual space. There is an introduction and background information as well as examples of relevant learning activities in each module. Finally each module has some tasks for teachers. These modules will be evaluated in real classroom situations. The modules of the professional development package for science teachers are designed as follows:
Module 1. Learning science through reading and writing activities
Module 2. Narratives in science
Module 3. Use of graphical network presentations (GNP) in science learning
Module 4. Science inquiry activities
Module 5. Industry site visit as an out-of-school activity
The development of the professional development package for science teachers will start in M2. First version of the package will be available by M8. The package will be published on the S-TEAM website, and the embedded video clips will be installed in a streaming server. (Product 6.11)

[19] See Appendix 3 for an extended description of the theoretical background to this package.
[20] Relevance Of Science Education: see www.ils.uio.no/english/rose/

WP6i (NTNU): School-University collaboration in science education

Both teachers in MST[21] and scientists will benefit from a more systematic approach to communication between scientists and teachers or non-scientists. At NTNU, efforts have been made during the past ten years to approach this matter in a more systematic way (Fan et al 2006).
The Norwegian University of Science and Technology's Resource Centre for Mathematics, Science and Technology Education is situated at the crossroads between professional teaching practice in schools and research in science and technology, and forms a meeting place for science teachers and scientists at university. The Resource Centre's key target has been to improve teaching practice in MST in primary and secondary education. In particular, the Resource Centre makes use of two approaches:
(1) Raise the MST qualification of teachers in schools through in-service training, and
(2) Improve the quality of teaching in MST by development and dissemination of new teaching materials and good teaching practices.
The Resource Centre combines new knowledge from current development in science and technology with modern teaching approaches, in particular inquiry-based science teaching approaches (IBSTAL).
The work in WP 6i will include an in depth analysis of challenges related to the interaction between scientists on one hand and science teachers on the other hand. The challenges at NTNU, and the Resource Centre in particular, will serve as the case in this study. A preliminary presentation will be given in a two day workshop with partner institutions and experiences from these partner institutions will be collected.
On the basis of this workshop, we will develop **a guide for school-university interaction/collaboration models** in the field of in-service training and other activities aiming at improving the quality of MST teaching in schools. (product 6.12)

WP6j: Using science in design and technology

A **book chapter** and a **guide for teachers** will be produced. These will be built on theoretical perspectives on learning as situated, the relationship between science and technology and the use of knowledge in action (see for example Layton, 1991). These perspectives address the tension between on the one hand that science constitutes an important component of modern technology and, on the other hand, that technology as a form of knowledge (see Mitcham, 1994) is highly situated in practical contexts. Therefore, science knowledge cannot be used in a straightforward way in practical technological contexts. Following these perspectives, the material will build on the conception of technology as not simply 'applied science', nor a motivational tool for science learning, but as a knowledge domain in itself. Still, science is a relevant knowledge component in this highly dynamic domain of knowledge and activity, and the material will attend to the challenges of reconstructing science knowledge into practical action. Due to the practical, problem-solving nature of technology, inquiry constitutes a natural part of technological activity. Some effort will also be put into elaborating on how this form of inquiry can be considered, and used in teaching, in terms of the concept of inquiry learning in science.

The relationship between science and technology as knowledge domains in the school curriculum differs a lot between countries in Europe (and elsewhere). While design and technology in Norway is incorporated in the curriculum for several

[21] MST: Mathematics Science & Technology

subjects, providing for cross-curricular teaching, some countries, like UK and Sweden, have (design &) technology as an independent subject in their curricula. Other countries have no technology teaching in their curriculum for all pupils, or it may form part of the science curriculum in the sense of applications of science. The different organizations do of course carry different expectations and traditions for how technology as a field of activity is framed within schools. The material produced in S-TEAM will attempt an approach that may be of use for teachers and science educators working within this variety. This means that specific connections to subjects and curriculum goals must be avoided. Still the material needs to be specific enough to be of use for teachers. This can be solved by presenting case studies from different contexts.

Bungum (2006), from research on teachers and technology teaching, demonstrates how curriculum ideas are heavily influences by the national and cultural context when transferred from one country to another and realized by teachers in their classrooms. Teachers tend to have strong professional frames (Barnes, 1992), that inform their teaching practice in terms of aims and objectives, heavily situated in the school culture they form part of. They do, however express a great need for curricular knowledge (Shulman, 1986) in terms of concrete, practical ideas in order to realize these aims and objectives. For technology teaching, this involves detailed knowledge on useful 'nuts and bolts' and all the tedious, but important, pragmatics on where these can be purchased and what they cost (this of course is somewhat challenging in trying to reach teachers all over Europe!).

The material for S-TEAM will operationalise the above perspectives in two steps. **Step 1: WP6j.1** constitutes production of a book chapter intended for science and technology educators, for teacher training and for teacher practitioners who want to go into some depth in the issues concerning the use of science in technological settings. It will bring in some theoretical perspectives and treat the issues on an analytical level, but makes strong links to the various practical approaches to the teaching of science and technology, in order to avoid an over-academic approach. It will focus on the challenges of learning and applying theories and concepts from science in technological contexts. Inquiry learning will be addressed in showing how technological settings allow for scientific inquiry in a creative way, and what this require in terms of time, resources and teacher competence.

Step 2: WP6j.2 will provide a very practical guide for teachers with concrete examples of technology projects that have a potential for learning and using science concepts and relationships, and for scientific inquiry. Concrete ideas for how this potential can be utilised will be provided. (product 6.13)

WP6k: Interactive computer animations in IBST/E

WP6k (GU) will produce a teacher development module on the use of interactive computer animations in IBST/E. The function of these animations is to clarify underlying mechanisms of natural phenomena.
The module will be available online as well as in hardcopy-workbook format and can also be used as the basis of teacher professional development workshops. It will enable teachers to develop content knowledge as well as pedagogical approaches and tools for teaching natural phenomena. It will take approximately 2-3 hrs to complete in the online and hardcopy versions and 3 hrs as a workshop. (product 6.14)

WP6L: Book and DVD on approaches to IBST/E implementation

As a major deliverable from the S-TEAM project, WP6 will produce a book with

chapters drawn from across the S-TEAM work packages, in order to provide a definitive resource on IBST/E implementation for teachers and teacher educators. The book will be accompanied by a DVD with examples of good practice in a variety of teaching situations. (product 6.15)

Deliverables WP6:

(delivery month in brackets)
6a WP6 Training materials Part 1 (M12)
6b WP6 Training materials Part 2 (M18)
6c WP6 Training materials Part 3 (M24)
6d WP6 Training materials Part 4 (M30)
6e Book (M33)

Products and events

6.1 Set of training packages and guide on supporting student inquiry in science (18).
6.2 Guide for teacher educators on use of above training packages - supporting student inquiry in science (24)
6.3 Training module for use in professional development on science centred competition as a motivational tool (24),
6.4 Training package for preservice teachers, as above (24).
6.5 Training packages x 4 on teachers' use of dialogic inquiry in lower secondary/primary (24).
6.6 Workshop materials and activities for dialogic inquiry in the science classroom (24)
6.7 Professional development workbook on cross-curricular science education (24).
6.8 Training package on cross-curricular science education (24)
6,9 Professional development training package on improving teachers' capacities to motivate students (24)
6.10 Training package on use of open investigations and Vee-heuristics within science education (12)
6.11 Professional development training package for increasing student motivation in science (24).
6.12 Guide to University-school collaboration (12).
6.13 Teacher guide and book chapter on using science in design and technology (18).
6.14 Teacher development module for use of interactive ICT animations in science teaching (18).
6.15 Book and DVD on approaches to IBST/E implementation (30)

B1.3.5.7 Summary WP7: Argumentation for teacher education in science

Work package no.	7			Start date		M1	
WP title	Argumentation for teacher education in science						
Activity type	Support						
Participant id.	**USC**	CNRS	UNIVBRIS	KTU	USB	UHB	
Person months	**18**	6	12	6	6	4	
Total PM **52**							

Objective

- to disseminate specialised training resources and related materials to support the teaching and learning of argumentation in science classrooms, as a component of IBST/E.

Description of work

WP7 will be led by Universidade de Santiago de Compostela (USC), in association with the University of Bristol and will provide resources and strategies to help teachers to create learning environments for argumentation and the learning of discursive practices in science. It will extend the professional development agendas from other innovative science education projects including Mind the Gap.
WP7 will disseminate training resources and classroom materials to support the teaching and learning of argumentation in science classrooms and the development of teachers' reasoning about the nature of scientific knowledge. A professional development programme will be designed and implemented to promote coherence and growth in teachers' skills in these aspects. Outcomes in terms of students' argumentation skills will provide proof of the effectiveness of professional development interventions.

Principles:

1. We will use guidelines and design principles for the design of learning environments to support students' argumentation, which are coherent with the design principles for constructivist and inquiry-based classrooms 44.
2. Key features in these guidelines are the evaluation of knowledge claims, and the evaluation of evidence, both of which affect student and teacher roles. Other relevant features are inquiry perspectives in the curriculum, centred on authentic problems, and the dialogic communicative approach.
3. The resources consist of teaching sequences and tasks for use in teacher education, to support the construction of conceptual tools and the development of argumentation competencies; and in the classroom in primary, middle and secondary school.
4. The tasks require students and student teachers to demonstrate the appropriation of discursive practices of science, e.g. writing reports about laboratory inquiry tasks or about decision-making,
including articulating written arguments; presenting oral summaries of the tasks and discussing them with their peers (persuasive dimension of argumentation).

5. To support dialogic communicative approaches in the classroom, WP7 focuses on learning environments and tasks supporting deep-reasoning questions, on the influence of students' 'answering words' on classroom discourse and to the role of questioning in argumentation, e.g. generating deep-reasoning questions; questioning claims on the basis of available evidence; students' spontaneous questions

Deliverables from WP7 will consist of:

A report which will review the state of the art about argumentation in Europe, particularly in the countries involved in the project and to draw on published research to suggest lines of improvement. The report is intended for policymakers and other stakeholders in education. (product 7.1)

A book chapter for the WP6 book on inquiry based methods, intended for teachers

Teaching sequence in Galician / Spanish for use both in initial and in in-service teacher education. (product 7.2a)
teaching sequence in English for use both in initial and in in-service teacher education (product 7.2b)
Two teaching sequences for use in schools including a pilot phase of testing in schools. (product 7.3)

Sub-packages:

WP7a: Argumentation in classroom contexts

WP7a (CNRS-UHB) will focus on the use of argumentation and contexts for the implementation of innovative methods. This sub-package is based on the project PEGASE[22], using short videos illustrating teachers' actions, for example, how to hand over responsibility to students for contributing to the construction of knowledge in the classroom. In this perspective, debate and argumentation play a significant role 47. The sub-package will produce guidelines for professional development in argumentation (product 7.5).

WP7b: the P4CM Programme

WP7b (USB) will prepare training packages for primary school mathematics courses based on the Philosophy for Children (P4C) programme, recognized by UNESCO as an effective way to stimulate critical, ethical and empathic thinking[23]. Philosophy for Children adapted to Mathematics (P4CM) fosters learning of mathematics among pupils 10-12 years of age, and stimulates their dialogical and critical thinking, by assisting them to overcome prejudices and understand mathematical concepts, in dialogue with their peers and through critical thinking.. The objective of this sub-package is to show prospective primary teachers how critical thinking can be fostered in mathematics and in inquiry-based science. Training programmes for initial teacher training and modules for continuing teacher education will cover one P4CM program, and the textbook for children and manuals for teachers will be created and disseminated throughout the consortium.

WP7c (KTU) deals with the development of teachers' argumentative competence. It

[22] see www.pegase.inrp.fr
[23] See Unesco (1998); Goucha (2007); Daniel et al (1999).

will produce a training package based on the extensive experience of KTU in this area, focusing on the results of workshops and action research projects which have enabled KTU to refine its own programmes (product 7.7).

Deliverables WP7

(delivery month in brackets)

7a WP7 Training materials Part 1 (M12)
7b Report (M18)
7c WP7 Training materials Part 2 (M24)
7d WP7 Training materials Part 3 (M30)

Products and events

7.1 Report on argumentation and teacher education (18)
7.2 Set of teaching sequences for argumentation, for use in teacher education (24)
7.3 Set of teaching sequences for argumentation, for use in schools (30)
7.4 Chapter about argumentation in science teacher education (30)
7.5 Guidelines for professional development in argumentation (24)
7.6 Training programme in P4CM (18)
7.7 Professional development programme on argumentative competence for new teachers (12)

B1.3.5.8 Summary WP8: Scientific literacies, motivation and learning

Work package no.	8			Start date		M1	
WP title	Scientific literacies, motivation and learning						
Activity type	Support						
Participant id.	**UCPH**	NTNU	CNRS	IIT	HUT		
Person months	**28**	3	6	8	6		
Total PM **51**							

Objective

- to integrate scientific literacy into teacher education in order to provide teachers at primary and secondary level with the specific competences required to teach it in all its aspects.

Description of work

Led by the University of Copenhagen (UCPH), WP8 addresses scientific literacy in relation to teacher competence. Increasing levels of scientific literacy is one of two main aims within the Call. The various perspectives on the nature of scientific literacy generate uncertainty for teachers, who need new forms of knowledge and competences to develop scientific literacy in learners. Currently there is a lack of agreement as to what these competences are, or how teachers should acquire them. WP8 addresses this through the experience and diverse expertise gained by the WP leader and partners in implementing scientific literacy within teacher education. Since scientific literacy, to be effective, needs to transcend disciplinary differences, a central question for teachers is how to develop pupils' basic scientific knowledge whilst engaging in complex project work which crosses disciplinary boundaries. WP8 will produce training materials targeted both at specific disciplinary areas and at more general teaching problems related to scientific literacies. Additionally, UCPH will produce a report which connects teacher competence development with scientific literacy using examples of such programs around the EU.

Sub-packages:

WP8a: Scientific Literacy and teaching competencies

WP8a (UCPH) will incorporate research and practice based methodologies for achieving scientific literacy teaching competencies into a training package for teacher educators. This package will include annotated DVDs of teaching for scientific literacy. It will be designed to be useable in several ways, including workshops, short courses and on-line.

WP8b (IIT) Developing scientific literacy using student-interest focused biology learning materials and teaching strategies.

Many students find standard science curricula largely out of touch with their personal interests. This factor contributes to the declining number of students who choose to pursue scientific studies and careers. In this workshop teachers will develop, enact

and evaluate teaching materials which are based on students' genuine interests, as reflected by their questions. A comparison of themes emerging from students' questions with the content dictated by the syllabus will be performed in order to identify overlaps between the syllabus requirements and genuine students' interests, as well as missing themes, which are not addressed by the formal syllabus. This way, teachers will be able to harness the individual interests of their students' to create situational interest in their biology teaching. (product 8.3)

WP8c (IIT): Drama and scientific literacy

WP8c (IIT in collaboration with NTNU) will produce a training package on the use of drama to enhance motivation and cognitive processes in relation to scientific literacy. (NTNU's contribution will come from the 4 storylines on water developed in WP8d) The aim of this training package is to construct a workshop enriching the teacher with tools adapted from theatre and drama, with the intention of achieving higher student engagement in science. The project will focus on two main points.

(1) Providing the teacher with presentational tools. The role of the teacher has often been compared to that of an actor, and indeed there is an overlap of many skills such as presentation, presence, the ability to tell a story, etc. Sharpening these tools using techniques drawn from theatre can help teachers when presenting to the class. The first part of the planned workshop will focus on the teacher.

(2) Providing the teacher with theatrical tools to be used by the students. Theatrical tools, such as role-play maybe used to depict scientific concepts making the lesson more exciting and lively. Other tools such as forum theatre can be used to raise moral and ethical issues involving science in an engaging manner. The ability to conduct such discussions is at the foundation of scientific literacy. The second part of the workshop will provide the teacher with different methods of play/drama that can be used as learning activities together with the students. (product 8.4)

WP8d: The water project - connecting art with science and scientific literacy

Aesthetic approaches to learning, connecting art and science, are explored in “Heimdalsprosjektet” from August 2009. In this project, storyline-based work with pupils in grade 9 is one of the repertoires of action which is explored. The pupils will work with the storyline approach for 6 to 8 weeks every term during a period of three years. Teacher-teams are planning and working on cross curriculum research on specific themes in science education. As the Huseby secondary school in Heimdal is a partnership school for Programme for teacher Education (PLU) in Trondheim, teacher students will have practice in this school. The teacher students and the school in question will take part in the “Water-project”. The theme of "water" has a far reaching potential for studies from different point of views regarding science education and ecological awareness.

We will then develop a three day workshop in Trondheim on “Cross curricular work and aesthetic learning processes in teacher education” . The theme elaborated will be “Water” and the workshop will approach the theme from the perspective of science and of art using dramaturgical thinking, applying multimodal theory in an outdoor-education-environment as well as through indoor workshops working in teams with different artistic approaches exploring the theme through key questions.

The project will be run in conjunction with the Mid-Norwegian network for teacher education (MNL)

Products will comprise a report on “Developing Science Education and Science

Literacy through connecting Science to Art" (preliminary title), together with a DVD and teaching material based on the project (deliverable 8.5)

WP8e (HUT) will provide a training package to enhance scientific literacy among student teachers by using research papers and media reports of scientific research which contribute to the development of understanding of the Nature of Science. (product 8.6)

WP8f (CNRS) will provide a report of the dimensions of student scientific literacy, based on their work in France, This report will be based on the relationships between students' scores in the PISA science test 2006 and the student competences required to effectively understand, treat and answer the questions. In addition the report will include some insights about how these competences might be developed at school and how teachers view scientific literacy as proposed in the PISA framework. The audience for this report will be teacher educators. (Product 8.7)

Deliverables WP8

(delivery month in brackets)

8a Report (M18)
8b WP8 Training materials Part 1 (M18)
8c WP8 Training materials Part 2 (M24)

Products and events

8.1 Overview report on scientific literacy policy (12)
8.2 Training package on competence development through scientific literacy. (18)
8.3 Training package for new science teachers on maximising student interest in biology.(18)
8.4 Training package for new science teachers on the use of drama in scientific literacy (18)
8.5 Training package on combining arts and science - the Water project (30)
8.6 Training package for new science teachers on media and the nature of science (24)
8.7 Report on dimensions of scientific literacy (24)

B1.3.5.9 Summary WP9: Indicators, instruments and measurement for innovative methods in science education

Work package no.	9		Start date	M1
WP title	Indicators, instruments and measurement for innovative methods in science education			
Activity type	Support			
Participant id.	**FSU**	UNIVSTRATH		
Person months	**38**	3		
Total PM **41**				

Objective:

- to ensure that all project activities can demonstrate measurable impact on the topics identified by the Call, and to ensure that the instruments and methods employed can be used formatively in science education wherever possible.

Description of work

The aim of WP9, led by Friedrich Schiller University Jena (FSU), is to complement the other WPs by providing instruments, indicators and methods by which the success of the project actions can be measured.
WP9 will:

- Identify indicators for pupil attitudes and motivation in science, and scientific literacy.
- Identify instruments to measure the efficiency and efficacy of existing science teaching practices and of innovative methods, for use by students, teachers and teacher educators
- Carry out surveys and evaluations to monitor the success of project deliverables Promote the formative application of the above indicators and instruments
- Identify ways of measuring collaboration between teachers in science education

WP9 plays an essential role in assuring the scientific and technical quality of the project. Furthermore, WP9 aims to provide knowledge and tools that will be useful to science teachers and teacher educators in the formative assessment of practice, including the perspective of students in science classrooms. In order to accomplish the objectives of WP9, national and international instruments with regard to student, teacher and teacher educator's perspectives on science teaching will be reviewed. Priority will be given to
existing instruments such as PISA 2006 which was focused on science. With instruments from PISA 2006 it will be possible to assess pupil attitudes and interest with regard to science, scientific literacy and science teaching practices and innovative methods. Furthermore, PISA 2006 offers the possibility to compare S-TEAM activities against the baseline of each country. International instruments from PISA 2006 will be complemented by national instruments and instrument targeting

specific foci of S-TEAM.
Questionnaire instruments will be combined with video based documentation of innovative methods in science education

Sub-packages

WP9a: Formative instruments for pupil and teacher views on science education

WP9a (UnivStrath) will collaborate on the dissemination of formative instruments for pupil and teacher views on innovative methods in science. (product 9.5)

Deliverables WP9

(delivery month in brackets)
9a Preliminary report and indicators set (M12)
9b Definitive indicators set (M24)
9c Final analysis report (M33)

Products and events

9.1 Baseline report and indicators review for science teaching methods and attitudes (6)
9.2 Edited set of instruments, indicators and measurement methods for other WPs (12)
9.3 Edited set of formative assessment instruments for teachers and teacher educators including instruments from other WPs (24)
9.4 Statistical report on indicator results (33)
9.5 Pupil opinion and teacher job satisfaction instruments related to IBST/E (12)

B1.3.5.10 Summary WP10: Media and dissemination

Work package no.	10			Start date		M1	
WP title	Media and dissemination						
Activity type	Support						
Participant id.	**NTNU**	UiO	UPMF	CNRS	UNIVBRIS	KTU	USB
Person months	**35**	2	9	2	4	3	3
Participant id.	VPU	UCPH	UNIV LEEDS	FSU	UNIV STRATH	IPN	USC
Person months	3	3	3	0	3	6	3
Participant id.	HU	TLU	IIT	MDU	HUT	JyU	ABO
Person months	3	9	3	3	3	3	2
Participant id.	GU	AU	CYCO	UHB			
Person months	3	3	3	3			
Total PM **117**							

Objectives:

- Lead the dissemination activities of S-TEAM to ensure that its findings and deliverables reach the widest possible audience amongst science teachers, teacher educators and other stakeholders.
- Ensure the design quality, accessibility and consistency of all project deliverables
- Collaborate with media professionals to maximise project media exposure and impact
- Coordinate the presentation of S-TEAM activities at national and international conferences
- Liaise with the proposed European Central Information Provider to ensure smooth transfer of materials and maximum synergy between the two projects.

Description of work

WP10 will be led by the Norwegian University of Science and Technology (NTNU). The primary role of WP10 will be to support the other Work Packages in disseminating their materials, with an emphasis on training packages and other active methods. It will seek opportunities for distributing these to teacher educators and other stakeholders.

It will ensure that the products and deliverables meet recognised standards for accessibility, environmental protection and translation quality, and that, where

necessary, they are in compliance with quality frameworks for national teacher education. This process will include coordinating the development of the project website and visual identity.
WP10 will also collaborate with media professionals at an early stage in order to identify and maximise opportunities for media exposure of project activities. It will seek involvement in at least one television science documentary production, covering the changing nature of school science. This will be done by producing a generic outline which can be used in a number of national contexts. Finally, WP10 will ensure that the project is fully represented at national and international conferences in the fields of science education, teacher education and education policy. It will run the end-of-project conference (M33) which will provide an international platform to sum up the achievements of S-TEAM and to bring its work to a wide audience of policymakers, science educators and teacher educators.
WP10 will involve partners chosen for their expertise in particular areas. IIT has experience in science broadcasting, whilst TLU has specific expertise in web-based content management systems. NTNU itself has links with the Norwegian broadcasting organisation responsible for science content.
All partners have been allocated time within WP10 for dissemination activities at external conferences and internally-organised events. The PM allocation per partner for this purpose reflects the different levels of difficulty or scale of specific national contexts within the overall limitations of the budget. Partners will identify opportunities for disseminating through existing national research conferences, policy networks, national educational websites, etc, and will be supported by the WP leader (NTNU) through the provision of materials such as posters, leaflets and project outputs, as well as the provision of event-specific items such as presentations.

Sub-packages

WP10a (TLU) will aim to maximise the use of social networking and other web-based tools in disseminating IBST/E and other innovative methods. It will draw on previous work with the iCamp and LeMill projects. Its deliverable will be a report with recommendations for teacher education, detailing how these tools have been used in dissemination work with teachers. (product 10.2)
WP10b (IIT) will produce a generic outline for a television documentary designed to bring the work of the project to public attention (product 10.3)
WP10c (MDU) will be a collaboration with NTA and NRF (Swedish National Centre for Physics Education) to achieve maximum dissemination to science teachers in Sweden, including the placing of project deliverables on the NTA/NRF websites, and workshop activities designed to evaluate and modify the deliverables for Swedish contexts. This will include consideration and reporting on activities related to informal learning, e.g. in science centres, with the participation of AU (product 10.4)

WP10d (NTNU) will be a training package for teachers and booklet for parents (previously 6.5) explaining IBST/E and suggesting ways of supporting children and young people in science activities, Formerly deliverable 6.5, the training package and booklet for parents will now be produced by WP10, as product 10.5. as the WP10 remit includes dissemination to stakeholders outside teaching. The training package is intended for teachers experiencing resistance to the introduction of IBST/E from parents used to traditional methods, whilst the booklet is intended to provide clear explanations to parents of the purposes and benefits of IBST/E, with suggestions for supporting children and young people involved in science activities. WP10 will collect information from all partners, and other relevant projects, on teachers' experience of resistance to innovative methods and the booklet and training package will be designed as an international resource with the possibility of conversion to web pages for the proposed European Central Information Provider (product 10.4).

Deliverables WP10:

(delivery month in brackets)
10a Report (M18)
10b Report on dissemination (M24)
10c Parents' booklet (M30)
10d Conference papers - collected edition (M33)

Products and events

10.1 Project Website (1)
10.2 Report on networking tools (18)
10.3 TV production outline (24)
10.4 Report on collaborative activities with associate partners (24)
10.5 Training package for teachers and parents' booklet (30)
10.6 Conference symposium: ECER 2009 (5)
10.7 Conference symposium: ESERA 2009 (5)
10.8 Conference symposium: ECER 2010 (17
10.9 Conference symposium: ECER 2011 (29)
10.10 Conference symposium: ESERA 2011 (29)
10.11 Conference presentation: ASE 2010 (9)
10.12 Conference presentation: ASE 2011 (21)
10.13 Other conference presentation: 2010 (TBA)
10.14 Other conference presentation: 2011 (TBA)
10.15 End-of-project conference (33)

Table B1.3.6a Efforts for the full duration of the project											
Beneficiary short name	**WP1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
NTNU	33	0	0	1	3	8	0	3	0	35	83
UiO	0	35	0	0	6	0	0	0	0	2	43
UPMF	0	0	3	28.5	0	0	0	0	0	9	40.5
CNRS	0	0	0	4	0	0	6	6	0	2	18
UNIVBRIS	0	0	3	0	0	0	12	0	0	4	19
KUT	0	0	3	0	6	0	6	0	0	3	18
USB	0	0	3	0	0	6	6	0	0	3	18
VPU	0	0	0	0	6	3	0	0	0	3	12
UCPH	0	0	3	0	3	3	0	28	0	3	40
UNIVLEEDS	0	0	0	0	0	6	0	0	0	3	9
FSU	0	0	0	0	0	0	0	0	38	0	38
UNIVSTRATH	0	0	3	3	28	0	0	0	3	3	40
IPN	0	0	28	0	0	0	0	0	0	6	34
USC	0	0	3	0	0	0	18	0	0	3	24
HU	0	0	3	0	0	6	0	0	0	3	12
TLU	0	0	3	0	0	0	0	0	0	9	12
IIT	0	0	3	0	0	0	0	8	0	3	14
MDU	0	0	3	0	0	12	0	0	0	3	18
HUT	0	0	3	0	0	0	0	6	0	3	12
JyU	0	0	0	0	0	6	0	0	0	3	9
ABO	0	0	0	0	0	7	0	0	0	2	9
GU	0	0	0	0	0	9	0	0	0	3	12
AU	0	0	0	0	0	9	0	0	0	3	12
CYCO	0	0	3	0	0	36	0	0	0	3	42
UHB	0	0	0	8	0	0	4	0	0	3	15
Total per WP	**33**	**35**	**67**	**44.5**	**52**	**111**	**52**	**51**	**41**	**117**	
Total person months - all work packages											**603.5**

Table 1.3.6.a		
Project Effort Form 2: indicative efforts per activity type per beneficiary		
Project Number 234870 (S-TEAM)		
Note: as S-TEAM is a support action, there are **no** activities of type ***RTD/Innovation*** or ***Demonstration***		
Activity Type	**Beneficiary**	
Consortium management activities	**NTNU**	
WP name	**Person months**	No other beneficiaries involved directly in consortium management activities
S-TEAM Project management	33	

Table B1.3.6b: indicative efforts per WP per beneficiary

Activity Type- **Other**	Beneficiaries									
Work package	ntnu	uio	upmf	cnrs	univbris	ktu	usb	vpu	ucph	univ leeds
WP2	0	35	0	0	0	0	0	0	0	0
WP3	0	0	3	0	3	3	3	0	3	0
WP4	1	0	28.5	4	0	0	0	0	0	0
WP5	3	6	0	0	0	6	0	6	3	0
WP6	8	0	0	0	0	0	6	3	3	6
WP7	0	0	0	6	12	6	6	0	0	0
WP8	3	0	0	6	0	0	0	0	28	0
WP9	0	0	0	0	0	0	0	0	0	0
WP10	35	2	9	2	4	3	3	3	3	3
Totals per ben.	**50**	**43**	**40.5**	**18**	**19**	**18**	**18**	**12**	**40**	**9**
	fsu	univstrath	ipn	usc	hu	tlu	iit	mdu	hut	jyu
WP2	0	0	0	0	0	0	0	0	0	0
WP3	0	3	28	3	3	3	3	3	3	0
WP4	0	3	0	0	0	0	0	0	0	0
WP5	0	28	0	0	0	0	0	0	0	0
WP6	0	0	0	0	6	0	0	12	0	6
WP7	0	0	0	18	0	0	0	0	0	0
WP8	0	0	0	0	0	0	8	0	6	0
WP9	38	3	0	0	0	0	0	0	0	0
WP10	0	3	6	3	3	9	3	3	3	3
Totals per ben.	**38**	**40**	**34**	**24**	**12**	**12**	**14**	**18**	**12**	**9**
	abo	gu	au	cyco	uhb	**Total PM per WP - 2-9**				
WP2	0	0	0	0	0		**WP2**	**35**		
WP3	0	0	0	3	0		**WP3**	**67**		
WP4	0	0	0	0	8		**WP4**	**44.5**		
WP5	0	0	0	0	0		**WP5**	**52**		
WP6	7	9	9	36	0		**WP6**	**111**		
WP7	0	0	0	0	4		**WP7**	**52**		
WP8	0	0	0	0	0		**WP8**	**51**		
WP9	0	0	0	0	0		**WP9**	**41**		
WP10	2	3	3	3	3		**WP10**	**117**		
Totals per ben.	**9**	**12**	**12**	**42**	**15**		**Total**	**570.5**		

B1.3.7 List of Milestones and planning of reviews

The list of milestones below (table 1.3.7) indicates the main events and meetings which will drive the S-TEAM project. No single deliverable is crucial to its success and therefore the risk of failure is low. Its objectives are quantifiable and therefore their attainment can be measured, so success will be a question of degree rather than a "yes/no" criterion.
The milestones therefore mainly comprise control points where decisions need to be taken based on previous actions and accumulated knowledge. They have therefore been aligned with management board meetings where the necessary reviews and decisions will take place. Minutes from management board meetings will include reports on milestone achievement. The provisional timing of management board meetings is indicated but in certain cases it may be desirable to hold the meeting following the end of a period or event, e.g. in M13 rather than in M12, depending on timing of other events.
In certain cases where the interval between meetings is extended, interim meetings may be scheduled on an ad hoc basis between board members, and there will be regular electronic communication involving the management board as a whole.

MS1 - start up meeting and first meeting of management board. (M1)

This is a significant milestone even although it will take place almost immediately after the start date. By this point we have a viable visual identity, with the final decision on logos etc to be taken by the general assembly. The S-TEAM website will be open at this point and we will have uploaded current documents to the website and depository, including (e.g.) longer versions of work package descriptions, the combined bibliography from the technical annex and an archive of newsletters and position papers.
A provisional membership list for the reference group will have been put to the meeting together with nominations for external evaluators, and these will be finalised following the meeting.
A meeting report including formal minutes will be circulated and this will be submitted as evidence of milestone achievement. (Note: General assembly and management board first meetings concluded, May 7/8 2009.)

MS2 - second board meeting and completion of national workshops programme (M6)

At this point the national workshop programme will be complete and the various detailed preparations initiated at the startup meeting and completed in the following months will be reviewed. The meeting will set the agenda for the international workshop which will take place before M9. The work on baseline indicators in WP9 will have produced significant results by this time and these will be considered for their implications with regard to the form and timing of deliverables.

MS3 - control point and third management board meeting.

At this point a decision will be taken regarding the form of cooperation with the European Central Information Provider and the arrangements & date for the mid project conference in or around M18. At this point the report from the national and international workshops (del.2.2) will be ready and its recommendations for the direction of IBST/E implementation in national contexts will be considered by the board. The work package leaders will then use these recommendations to optimise

their strategy for the delivery and dissemination of training packages as they become available.

MS4 - fourth management board meeting (M12)

At this point the first wave of deliverables will have been completed and the first annual report will be produced and reviewed by the board in conjunction with reports from the reference group and external evaluators.

MS5 - fifth management board meeting (M15)

This meeting will prepare for the forthcoming technical review by DG in M18 by conducting an internal pre-review process and will take any necessary action to maintain the schedule of deliverables and other actions. The meeting will also approve the mid-project/ECIP conference programme and related events.

MS6 - sixth management board meeting (M18)

This meeting will review the deliverables due in M18 and ensure that all necessary documents have been supplied to the technical reviewers.

MS7 - seventh management board meeting (M21)

This meeting will consider the technical reviewers' report and will take any action resulting from the review.

MS8 - eighth management board meeting (M24)

This meeting will consider the deliverables which will be finalised for M24 and the second annual report. A date will have been set for the final conference and general assembly and this meeting will consider conference arrangements

MS9 - ninth management board meeting (M30)

MS10 - general assembly, management board meeting and end of project conference (M33)

MS11 - final management board meeting (M36)

This meeting will agree the final report to the EC and the other mandatory deliverables including the foreground dissemination strategy and the Gender Issues report.

Table 1.3.7: List and schedule of Milestones

Milestone no.	Milestone name	WP no's	Lead Beneficiary	Del. date	Comments
MS1	Start-up meeting 7/8 May, Trondheim	All	NTNU	M1	Meeting report. Visual identity established
	Management Board (MB) 1 In conjunction with Startup	WP leaders	NTNU	M1	Minutes
	Website/Digital depository			M1	Link available for Cordis etc
MS1a	ESERA 2009				Papers online
MS1b	ECER 2009				papers online
MS2	Completion of national workshops	WP2, 3 and NLPs	UIO	M6	Provisional Schedule available by M3
	MB2	WP leaders	NTNU	M6	Reviews national workshop programme and sets agenda for international workshop
MS2a	International workshop & report	WP2		M9	Provides state-of-art background
MS3	Control point - MB3	WP leaders	NTNU	M9	Decision req'd on merger of 2010 conference with ECIP. Project review on basis of international workshop
MS3a	ASE 2010				Paper online
MS4	MB4			M12	Production of non-mandatory annual report
MS5	MB5			M15	Internal Pre-review
MS5a	ECER 2010				papers online
MS6[24]	MB6			M18	EC Project review and mandatory mid-project report
MS6a	International conference				Report online
MS7	MB7			M21	Consideration of project review
MS8	Completion of WP6 training packages, MB8	WP6	CYCO NTNU	M24	Production of second non-mandatory annual report
MS9	MB9			M30	Consideration of

[24] External conferences after M18 have not been entered as milestones as dates and venues may vary.

					external evaluator 2nd report
MS10	MB10			M31 -33	End of project conference
MS11	MB11			M36	Final meeting and mandatory reports

Table 1.3.8 Tentative schedule of project reviews and reporting cycle

Rev.or report no.	Timing	Nature of management activity	Planned venue (inc. for management board meeting)	Comments & management board (MB) meetings
1	M6	Management Report	Vienna	Initial progress and financial report on basis of 6-month cycle (MB2)
	M9			MB3
2	M12	Management Report	Trondheim	MB4
3	M12	Internal review		Internal reviews held on 12 month cycle.
4	M15	External evaluator report		MB5
5	M18 M18	Management Report and Report to EC	Belgium or TBA	To coincide with ECIP/S-TEAM conference & MB6
6	M18	EC DG Research - technical review	Brussels	As agreed with DG
	M21	Board consideration of technical review		MB7
7	M24	management report and Internal review	TBA	MB8
8	M27	External evaluator report	TBA	Circulated electronically
9	M30	management report	TBA	MB9
10	M33	External evaluator final report	TBA	MB10 (coincides with end-of-project conference)
11	M35	Final management report and final internal review	Trondheim	
12	M36	Final report to EC		

B2 Implementation

B2.1 Management Structure and Procedures

The goal of the project management is to enable scientific, organisational and financial success of **S-TEAM.**

The establishment and running of such a consortium requires efficient organisational and administrative tools to deal with obligatory duties as well as possible issues that might arise, such as the settlement of internal disputes, changes in consortium membership and financial and technical issues.

We have chosen to place the responsibility for organisational and financial coordination and scientific leadership into one organisation, the Norwegian University of Science and Technology, to facilitate good communication and integration between these activities. We plan a work distribution that avoids excessive need for travel, given current price trends and environmental concerns, but at the same time ensures the necessary communication between the partners in the consortium.

The consortium will appoint a full-time project manager working within WP1 and WP10 who will be responsible for internal communication with the consortium as a whole, using the project website and regular e-mail newsletters. The coordinator will also establish external e-mail lists for the circulation of a project newsletter to stakeholders, including to teachers e.g. from established science education networks.

Management Board

In order to have a simple and effective structure, despite the scale and complexity of the project, we will have one collective decision-making body, the management board. This body will deal with strategic aspects of the project. The board will comprise the project leader, overall project coordinator from WP1, the nine other thematic WP leaders, supported by administrative staff as required. The general assembly, however, has overall decision-making powers as per the consortium agreement.

For some purposes such as the compilation of national policy documents and liaison with government departments, we will have designated national liaison partners (NLPs), whose role complements that of the thematic WP leaders. NLPs will have specific tasks in WP2, including the running of early-stage workshops for establishing the national situation with regard to adoption of IBST/E and other methods.

Due to the large number of partners and the need for regular board meetings, partners will form management board clusters, e.g. where there are two or more national partners, so that board attendance duties can be spread across the consortium partners. Participation in board meetings will imply that the attending partners have equivalent decision-making authority.

Reference Group

The board will be advised at least once per year by a reference group comprising:

- One or more experts in science education, including experts from countries outside the consortium
- One or more experts in teacher education, including experts from countries outside the consortium

- At least one media representative (e.g. science journalist)
- Representative(s) of teacher organisations or councils outside the consortium
- Representative(s) of student teachers
- Representative(s) of parent groups
- A minimum of two policymakers or educational policy advisors, each from a different EU country
- One or more industrial partners

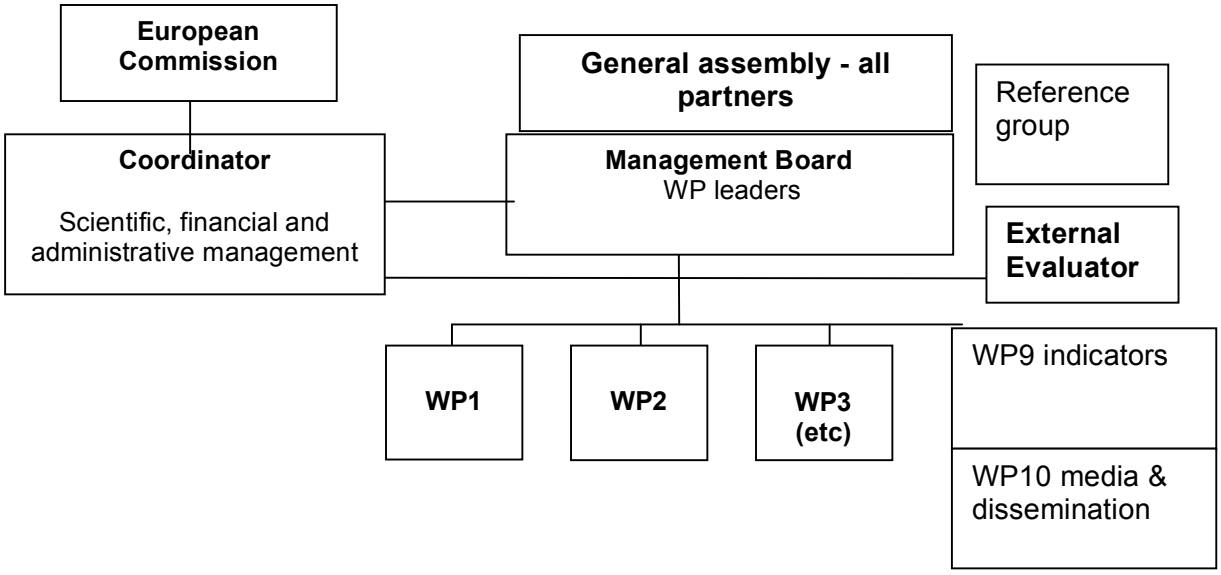
The reference group will have a different role from that of the external evaluators, in that it will provide immediate feedback on specific items of business, either chosen internally or suggested by the Management board. For example, it would be invited to review briefing documents for teachers and to report on their potential impact.

There is also a provision in the consortium agreement for Work Package Committees (WPC), for all WPs except WP1, where the management board incorporates the same function. The WPCs will meet at least twice a year and will provide support and advice for WP leaders. WPCs will be constituted from beneficiaries within individual WPs and with the additional participation of at least one beneficiary from another WP. As with board meetings, minutes will be taken and provided to the Management Board.

Management Structure

The **S-TEAM** management structure has the following purposes:

- to facilitate the integration of the network
- to ensure that all beneficiaries are involved in management decision-making
- to provide an efficient decision-making and communication structure
- to provide management that will keep the project performing with regards to time, quality and budget
- to prevent conflict and provide resolution of disputes
- to communicate with the external evaluator



B2.1.1 Financial control

In terms of financial risk, we have chosen to concentrate resources around the thematic WPs, each of which has an experienced and reputable institution at the centre. The staff employed within the thematic WPs will be able to form supportive relationships with the sub-projects and will be able to resolve local problems which might otherwise result in non-completion of tasks.

Day-to-day financial management will be the responsibility of the partner institutions who will recoup costs from the project coordinator. As will be clear from the cost tables in Section B2.4, the greatest proportion of the total cost is made up of personnel costs, as is consistent with our approach being via people rather than via technology. This means that most of the project costs are easily calculable in advance from existing pay scales, and that cost control is effected by ensuring that person-month allocations are properly monitored.

We will also control travel costs wherever possible by combining different types of meetings into single events, by holding meetings in the most cost-effective locations and by scheduling meetings as far in advance as possible, to obtain best value on flight and hotel costs.

B2.1.2 Managing internal training

In addition to providing a range of training packages for science teachers and teacher educators, the project provides opportunities for internal training. From the wide variety of expertise represented by the partners, the management board will identify and address the training needs of the project in three areas:

- Video production, including digital editing and DVD authoring
- Training and educational material design techniques
- Workshop management and facilitation

The objective of this training will be to maximise the quality and impact of deliverables and other outcomes by ensuring that the staff involved have the necessary skills and state of the art knowledge in the relevant areas.

B 2.2 Beneficiaries

This section has been moved to Appendix 2 (below, pp.101-149)

B 2.3 Consortium as a whole

The consortium includes 15 countries and 25 institutions. It covers a large geographical area from the Arctic ocean to the Mediterranean and from the Atlantic Ocean to the Black Sea. It encompasses a wide range of cultures, education styles and systems. It includes many of the foremost teacher education providers, science education specialists and research institutes in Europe and the Near East. The S-TEAM consortium specifically includes some of the largest European countries (France, Germany, Spain and the UK) which have diverse traditions and cultures of education. We are aware of the particular and very different regional structures in these countries and will ensure that our dissemination strategy is adapted to the relevant national and regional contexts. S-TEAM has a very strong presence in the Nordic and Baltic areas, where there have been rapid technological advances together with a wide range of pedagogical approaches. These countries, however, show considerable divergence in PISA results and other indicators. At the opposite side of Europe, we have partners in the Southern Mediterranean (Cyprus, Israel, Turkey) where considerable advances have been made in science education but whose strong knowledge base is not always appreciated at the European level. In central Europe we also have contributions from the Czech Republic.

Complementarities between beneficiaries

The consortium includes countries with a diverse range of approaches to science education, including their adoption or otherwise of IBST. In Germany, the response to PISA has been to involve secondary school teachers in collaborative curriculum development through the SINUS project, whereas in France the initiative *La main à la pâte* has been implemented in primary education and is now well established. In the UK, there is some divergence between the English and Scottish systems, both of which are represented in S-TEAM. Scotland has recently adopted a new cross-curricular approach in education from 3-18, called *A Curriculum for Excellence* which states:

> practitioners should have the opportunity to engage with young people in purposeful and worthwhile tasks, activities and events that contribute to their personal development and learning[25].

There is thus a focus on pupils and learning outcomes rather than on set curricula. This approach has recently been recommended for adoption in England, at least for primary education. Both countries have a long history of initiatives in science teaching, including variants of IBST and can therefore provide historical perspective.

We also have the experience of the Baltic countries in emerging from the Soviet system, where knowledge was tightly compartmentalised and controlled. These states are now adopting integrated science at various levels and we will use the relatively recent experience to inform the development of a training package on this topic. In Finland, we have chosen to have three partners with specialist expertise, due to the interest in Finnish methods as a result of PISA.

[25] see http://www.ltscotland.org.uk/curriculumforexcellence/outcomes/science/index.asp

The S-TEAM consortium is thus both diverse and extensive. The members of the network all have common interests in science education and in teacher education at all levels. We have close ties to the activities of European science education and teacher education networks (especially through ESERA and EERA). Partners have been involved in most of the current European science initiatives, such as ROSE, PISA and *Mind the Gap*. We are therefore in a strong position to complete the tasks we have set out in this proposal.

B2.3.1 Subcontracting

The scope of subcontracting within S-TEAM is covered by paragraph II.7.3 of the Framework Programme Financial Guide: *Minor Tasks*.
Subcontracting in S-TEAM will only be used where necessary for functional purposes and not for the major purposes of the Project. Sub-contracting will be limited to items which constitute minor services such as photocopying and the provision of catering at meetings.
In all cases appropriate procedures to ensure best value will be followed, according to the statutory procedures of individual institutions, including the use of competitive tendering where required. However, we anticipate that, as the direct cost budget is itself small, such services as are provided will fall below institutional thresholds for competitive tendering procedures.
Table B2.4.1, Section B2.4 and tables B2.4.2 - B2.4.4 on pages 87-93 provide further clarification of detailed allocations regarding subcontracting, other direct costs, consumables, and equipment.

B2.3.2 Third parties

The following third party is linked to Université de Rennes 2 (UHB) concerning the research unit EA 3875 "CREAD", in accordance with the special clause 10 included in the Grant Agreement:
Université de Bretagne Occidentale (UBO)

The only involvement concerning UBO in the S-TEAM project is the provision of personnel resources. All the researchers involved are from UBO but work in the offices of UHB. That means that the third party (UBO) makes personnel resources for an amount of 81273€ (as estimated in the budget) available for the beneficiary. All the other resources are made available by UHB as it is the place in which the project is realized (travel, infrastructure, etc.). CREAD is a Research Unit recognized by the Ministry Of Higher Education and Research.
It was agreed by the ministry that CREAD is under the control of two entities: the main entity is the UHB, the second entity is the UBO. There is an agreement between the ministry and the UHB establishing this.

B 2.4 Resources to be committed

B2.4.1 resource allocation - general

In order to provide the most cost-effective solution to the problem identified by the Call, we have taken a three-tier approach to the allocation of resources, whereby:
1) Essential functions such as management, measurement and dissemination have been funded for the duration of the project.
2) Essential topic areas such as science literacy, teacher education, teacher professional development and teacher collaboration have also received substantial allocations
3) BUT we have also encouraged diversity and wide geographical coverage by allocating smaller amounts of time to a larger number of partners,

Our experience in forming the consortium indicates that a combination of strong central coordination with wide distribution of work tasks is the most effective way of handling a large and complex project such as S-TEAM. Accordingly, we have allocated sufficient funding to the functional packages (1, 9, 10) to maintain a permanent management support team throughout the duration of the project. The work package leaders will also be able to maintain a long-term presence.

In some cases it has proved necessary to have multiple participants in one country in order to provide the necessary internal coverage (e.g. in France and the UK). In other cases (e.g. Norway, Germany) the chosen partners have specific expertise which can be productively combined. For some of the partners, having two institutions provides mutual support for involvement at the European level (e.g. Turkey, Lithuania). All partners will be involved for the duration of the project to maximise opportunities for dissemination and exchanges of knowledge and practices, although some individual work packages will have different start dates and end points.

As will be seen from the budget documentation, the majority of the budget (c.73%) is allocated to personnel costs. The requirement of the Call for widespread dissemination means that there will be a need for extensive personal contact between consortium partners and their respective stakeholders in science education, which in turn involves staff time and effort. Furthermore, there are no significant technological issues in this field, since the project concerns teaching itself rather than any specific medium or system. The project will not, therefore, need to purchase any major equipment or software items. Finally, the imminent creation of the European Central Information Provider will take care of issues regarding long-term web access to materials.

B2.4.2 Travel, Subcontracting and Other Direct Costs: classification and discussion of categories

(see also tables B2.4.1, B2.4.2.- B2.4.4 overleaf and below)

Travel Costs

The percentage of travel costs (c.16%) is also relatively high and reflects the need for personal engagement with other stakeholders, either in the project's own events or at external conferences and seminars. It also arises because of the wide reach of the consortium. Travel costs will, however be closely monitored and wherever possible we will use electronic communication methods such as email and web conferences. Travel has been calculated at a flat rate (currently €900 per person per return journey, exclusive of subsistence, which is set at €250/day) which allows for rising fuel costs and a wide mix of journey distances.
A small proportion of total travel costs will be incurred by the external evaluators and members of the reference group. These should be regarded as eligible travel costs since the functions of both groups were approved in the initial evaluation and are essential to the overall impact and quality of the project.

Travel costs are shown in Tables B2.4.1 and B2.4.2, by WP and by participant. Total project travel cost is €739,150.

Other non-personnel costs

Table B2.4.1 (overleaf) provides a summary of the breakdown between subcontracting and other types of cost, and is followed by explanation of our allocation to categories and other related issues.

Table B2.4.1 Indicative breakdown of non-personnel costs: summary by Work package and cost category

WP	Purpose of subcontract item	subcontracting		Equipment	Consum-ables	Other direct costs
1	N/a	N/a		N/a	N/a	N/a
2	National Workshops	6 000				24000
	Conferences	24 000		N/a		36000
3	N/a	N/a		N/a	N/a	N/a
4	Editing	4 000		1 250	1 250	450
5	DVD	2 000		N/a	N/a	450
6	Editing etc	6 300		9 100	N/a	300
7	Design	1 500		3 500	4 400	N/a
	Design & editing	7 658		N/a	N/a	N/a
8	Translation	1 600		1 000	N/a	N/a
9	printing	7 500		N/a	N/a	7500
10	Training	15 000		N/a	1 800	N/a
	Conference fees	N/a		N/a	N/a	9 000
	Printing/ copying	15 600		N/a	N/a	N/a
	Scriptwriting	4 000		N/a	N/a	N/a
	translation	1 600		N/a	N/a	N/a
	Totals	**96 758**		**14 850**	**7 450**	**77700**

Workshop events and conferences

We anticipate that the majority of workshop events, which will involve between 10-30 participants, will be hosted by partner institutions on university premises and using in-house catering and other facilities, thus reducing the need for external sub-contracting. Events will use a combination of the national language and English, as appropriate, to reduce or avoid translation costs. For the mid-project conference, we will look for synergies with the launch conference for ECIP, whilst for our final conference we will use in-house facilities in one of the partner institutions.

Unit cost for conferences is a composite figure comprising e.g.:

- Venue rental
- Print and consumable costs (conference packs etc)
- Catering (tea/coffee, lunch, dinner)
- Equipment hire (e.g. data projectors etc)
- Transport (e,g local bus hire)

Indicative amounts have been calculated using an estimated percentage split between costs attributed to in-house provision, which is more likely to occur with the national workshops (small groups of less than 20 persons) and costs incurred by external subcontractors, which may be larger in the case of the mid- and end-of-project conferences. In-house provision may or may not constitute sub-contracting

depending on the business models of different institutions. In some cases internal business units will provide services such as catering and room hire, and will thus be technically regarded as subcontracting.

A separate item constituting a direct cost is 'Conference fees', which are charges to participants or presenters in external events such as ECER and ESERA. These charges are raised at the registration stage by the conference organisers to cover costs such as catering, printing of proceedings and room hire. It would be difficult to obtain further breakdowns of these fees in advance since organisers often do not have this data until after the event. These fees will be regarded as 'other direct costs' as agreed by DG Research. Total conference fee allocation is €9000

Photocopying, printing and consumables

Photocopying and printing may be provided via indirect costs (for small amounts), by internal print rooms and by external contractors. As with conference costs, we have had to make estimates of the split between internal and external subcontracting where applicable. In some cases partners will simply pay for the consumables involved such as paper, toner and print cartridges etc. A special case has been made in WP9 where there may be substantial print costs involved in producing questionnaires and other instruments. An estimated 50/50 internal (other costs)/external split has been made after consultation with FSU.

Other elements of subcontracting

We have chosen to maximise the amount of work performed in-house with regards to copy editing, graphic design, video editing and other technical services. We have identified ways of achieving this using advanced software and have also allocated a training budget to enhance internal capacity. However, it may be necessary to allocate small amounts, designated as 'subcontracting' to:

- Final copy editing of the two proposed books (products 4.6 and 6.15)
- Final editing of video material and preparation of DVDs for training purposes once the content has been established using in-house facilities.
- Translation services where other options are not available (see appendix 1 to this document).
- In the case of product 10.3, (TV production outline), the use of a professional scriptwriter.
- Graphic design consultancy for specialised productsf.

Equipment

Due to the increasing desirability of using video material in teacher education, and the related need for considerable amounts of editing and re-recording of material, a small number of beneficiaries may be able to make a case for acquiring additional ICT equipment, particularly in cases where post-doctoral students are employed to fulfil project tasks. The amounts involved are not substantial in relation to the overall size of the project We consider that this avoids the need to sub-contract in most circumstances and is desirable because it maintains a focus on the pedagogical content of material rather than on the technical aspects.

Teacher replacement costs

In certain cases it may be necessary to reimburse the employers of teachers in order to secure their participation in project activities such as the reference group. The

amounts involved are likely to be small (c. €250 per teacher per day). These have been agreed with DG Research as constituting 'other direct costs'. The national workshop events will provide further information on whether these costs are likely to be incurred in specific contexts. At this stage, however, we have not allocated an amount in the budget, although the overall amount will in any case be a small percentage of the total 'other direct costs' figure.

Training

We have provided a training budget in order to maximize the use of internal staff and resources for technical processes such as video editing, and to increase support capacity in partner institutions. Training costs should be regarded as subcontracting. The consortium will decide details of training at a later stage once specific needs and persons have been identified and we have, therefore, allocated this cost to the WP10 leader for the time being. Amount allocated is €15 000.

Resources - work package breakdown

WP1: management

Management costs include the provision of a part time administrator based at NTNU for the duration of the project. This is necessary to ensure the smooth running of a large project such as S-TEAM and an effective management support team has already been formed. NTNU also has a financial and legal team with extensive Framework Programme experience. The staff cost of a full-time project manager, who will lead WP10, will be shared between WP1 and WP10.

WP2: Observatory for Policy and Practice in Science Teacher Education

WP2 has been allocated sufficient PMs at professorial level to allow the participation of Professors Doris Jorde & Kirsti Klette in the national workshops programme which will have a strong influence on the success of the project. Additionally, a staff member at UIO will continue to coordinate incoming information regarding the national and international policy situation for science education. **As noted elsewhere, the 3 PM allocation for NLPs is a combined allocation to cover WP2/3 joint workshops.**

WP3: Powerful educational environments for successful science teaching

WP3 is tasked with providing a senior researcher to coordinate the rolling-out of proven SINUS modules to other national partners. This provides a solid foundation for further dissemination and development activities. The researcher will work for the majority of the project duration.

WP4: Teacher collaboration and innovative methods

WP4 will concentrate on two issues of importance to the project. The first is teacher collaboration which SINUS and other previous projects have demonstrated to be essential to the implementation of change in schools. The second is the issue of dissemination in France which poses particular challenges and which, if successful, will result in a considerable increase in the uptake of inquiry based methods in one of Europe's largest education systems. A small amount (not exceeding €3000) may be allocated to equipment to enable in-house video editing.

WP5: Innovative methods, initial teacher education and science

WP5 will ensure that teacher educators responsible for a new generation of science teachers will have access to materials and methods which are theoretically and practically attuned to the principles of IBST/E or investigative science.
There are no specific resource issues other than provision of staff effort.

WP6: Inquiry based methods and professional development

WP6 is the largest work package in terms of person-months, which reflects both the importance of bringing IBST/E to teachers already in-service, and the wide range of techniques and methods available to overcome problems in applying IBST/E in schools. It will also produce a significant book and accompanying DVD, which will define the start of the art in IBST/E implementation in Europe and beyond.

WP7: Argumentation for teacher education in science

WP7 provides an essential component of S-TEAM in its work with argumentation structures, an understanding of which is essential to revitalise science teaching in a changeable and uncertain environment. WP7 will involve video materials and some copying of materials to provide teaching sequences for teacher evaluation.

WP8: Scientific literacies, motivation and learning

WP8 will keep scientific literacy and student/teacher engagement at the centre of S-TEAM, relating these to wider issues of teacher competence and student motivation. Some video work will be done in WP8.

WP9: Indicators, instruments and measurement for innovative methods in science education

WP9 will provide a strong focus on the need for quantitative evidence in the debate about innovative methods, and will ensure that project outputs incorporate measures of their effectiveness where appropriate. The main resource allocation issue here is the availability of sufficient researcher time for the duration of the project, together with a cost allocation for printing/photocopying of questionnaires etc.

WP10: Media and dissemination

WP10 will provide protected time for dissemination activities and will ensure that all products and deliverables are of high quality. The allocation of PM to WP10 reflects the need for partners to search for dissemination opportunities in their own national contexts rather than to produce unnecessary material outputs. WP10 has a budget for media production which will cover the proposed TV outline (del. 10.3) and the printing or photocopying of sample training packages etc for dissemination purposes. It is anticipated that the majority of video outputs will be made available online., but there is provision for the production of hardcopy DVDs if necessary.

The following tables, B2.4.2, B2.4.3, B2.4.4 (overleaf) provide details of budget allocation figures:

Table B2.4.2 Indicative effort and EC contribution- totals by work package[26]

	WP 1	WP 2	WP 3	WP 4	WP 5
Activity category	**Management**	**Support**	**Support**	**Support**	**Support**
Person months	33.0	35.0	67.0	44.5	52.0
Personnel costs	**272,500**	**311,000**	**364,422**	**205,439**	**279,481**
Travel	193,050	104,750	34,500	18,400	27,600
Equipment				1,250	
Consumables				1,250	
Other costs, excl. subcontr.		60,000		450	450
Non-personnel costs	**193,050**	**164,750**	**34,500**	**21,350**	**28,050**
Direct eligible costs, excl. subcontr.	**465,550**	**475,750**	**398,922**	**226,789**	**307,531**
Indirect costs	32,589	33,303	27,925	15,875	21,527
Eligible costs, excl. subcontr.	**498,139**	**509,053**	**426,847**	**242,664**	**329,058**
Audit	25,000				
Subcontracting		30,000		4,000	2,000
Requested funding	**523,139**	**539,053**	**426,847**	**246,664**	**331,058**

	WP 6	WP 7	WP 8	WP 9	WP 10	Project totals
Activity category	**Support**	**Support**	**Support**	**Support**	**Support**	
Person months	111.0	52.0	51.0	41.0	117.0	603.5
Personnel costs	**597,380**	**221,198**	**290,783**	**172,908**	**724,411**	**3,439,522**
Travel	50,600	27,600	23,000		259,650	739,150
Equipment	9,100	3,500	1,000			14,850
Consumables		4,400			1,800	7,450
Other costs, excl. subcontr.	300			7,500	9,000	77,700
Non-personnel costs	**60,000**	**35,500**	**24,000**	**7,500**	**270,450**	**839,150**
Direct eligible costs, excl. subcontr.	**657,380**	**256,698**	**314,783**	**180,408**	**994,861**	**4,278,672**
Indirect costs	46,017	17,969	22,035	12,629	69,640	299,507
Eligible costs, excl. subcontr.	**703,397**	**274,667**	**336,818**	**193,036**	**1,064,501**	**4,578,179**
Audit						25,000
Subcontracting	6,300	9,158	1,600	7,500	36,200	96,758
Requested funding	**709,697**	**283,825**	**338,418**	**200,536**	**1,100,701**	**4,699,928**

[26] Total eligible costs-requested funding figures aligned with NEF to account for rounding-off.

Table B2.4.3 Indicative effort, costs and EC contribution – by participants

	Particip. 1	Particip. 2	Particip. 3	Particip. 4	Particip. 5	Particip. 6	Particip. 7	Particip. 8
Participant shortname	**NTNU**	**UiO**	**UPMF**	**CNRS**	**UNIVBRIS**	**KUT**	**USB**	**VPU**
Person months	83.0	43.0	40.5	18.0	19.0	18.0	18.0	12.0
Personnel costs	**712000**	**376.600**	**183.257**	**93.712**	**115.463**	**94.392**	**52.900**	**64.100**
Travel	160000	118.350	26.100	22.700	13.500	18.100	18.100	13.500
Equipment			1.250	1.000	2.500			
Consumables	1800		1.250					
Other costs, excl. subcontr.	10600	36.000	1.750	150	1.600	1.750	1.600	150
Non-personnel costs	**172400**	**154.350**	**30.350**	**23.850**	**17.600**	**19.850**	**19.700**	**13.650**
Direct eligible costs, excl. subcontr.	**884400**	**530.950**	**213.607**	**117.562**	**133.063**	**114.242**	**72.600**	**77.750**
Indirect costs	**176880**	**106190**	**25632,8**	**23512,4**	**26612,6**	**22848,4**	**14520**	**15550**
Max reimbursement indirect costs	**61908**	**37.167**	**14.952**	**8.229**	**9.314**	**7.997**	**5.082**	**5.443**
Eligible costs, excl. subcontr.	**946308**	**568.117**	**228.559**	**125.791**	**142.377**	**122.239**	**77.682**	**83.193**
Audit	1000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Subcontracting	16000	25.000	5.400	0	9.058	1.400	5.200	0
total costs	**1078280**	**663140**	**245639,8**	**142074,4**	**169733,6**	**139490,4**	**93320**	**94300**
Requested funding	**963308**	**594116,5**	**234959**	**126791**	**152435**	**124638,94**	**83882**	**84192,5**
Requested rounded	**963308**	**594116**	**234959**	**126791**	**152435**	**124638**	**83882**	**84192**

	Particip. 9	Particip. 10	Particip. 11	Particip. 12	Particip. 13	Particip. 14	Particip. 15	Particip. 16
Participant shortname	**UCPH**	**UNIVLEEDS**	**FSU**	**UNIVSTRATH**	**IPN**	**USC**	**HU**	**TLU**
Person months	40.0	9.0	38.0	40.0	34.0	24.0	12.0	12.0
Personnel costs	**261.320**	**77.625**	**158.600**	**175.144**	**194.395**	**86.100**	**66.408**	**27.900**
Travel	35.300	13.500	21.500	35.300	56.000	26.100	13.500	8.900
Equipment								
Consumables						4.400		
Other costs, excl. subcontr.	1.600		7.500	1.750	1.600	1.600	1.600	1.600
Non-personnel costs	**36.900**	**13.500**	**29.000**	**37.050**	**57.600**	**32.100**	**15.100**	**10.500**
Direct eligible costs, excl. subcontr.	**298.220**	**91.125**	**187.600**	**212.194**	**251.995**	**118.200**	**81.508**	**38.400**
Indirect costs	**59644**	**18225**	**37520**	**42438,8**	**50399**	**23640**	**16301,6**	**7680**
Max reimbursement indirect costs	**20.875**	**6.378**	**13.132**	**14.854**	**17.640**	**8.274**	**5.706**	**2.688**
Eligible costs, excl. subcontr.	**319.095**	**97.504**	**200.732**	**227.048**	**269.635**	**126.474**	**87.214**	**41.088**
Audit	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Subcontracting	1.400	0	7.500	3.400	1.400	1.400	1.400	1.400
total costs	**360264**	**110350**	**233620**	**259032,8**	**304794**	**144240**	**100209,6**	**48480**
Requested funding	**321495**	**98503**	**209232**	**231447,58**	**272034,65**	**128874**	**89613,56**	**43488**
Requested rounded	**321495**	**98503**	**209232**	**231447**	**272034**	**128874**	**89613**	**43488**

	Particip. 17	Particip. 18	Particip. 19	Particip. 20	Particip.21	Particip. 22	Particip. 23
Participant shortname	**IIT**	**MDU**	**HUT**	**JyU**	**ABO**	**GU**	**AU**
Person months	14.0	18.0	12.0	9.0	9.0	12.0	12.0
Personnel costs	**61.548**	**103.214**	**34.700**	**50.184**	**54.588**	**32.000**	**76.500**
Travel	13.500	13.500	13.500	13.500	13.500	13.500	13.500
Equipment			1.000			3.000	
Consumables							
Other costs, excl. subcontr.	1.600	1.600	1.600			150	
Non-personnel costs	**15.100**	**15.100**	**16.100**	**13.500**	**13.500**	**16.650**	**13.500**
Direct eligible costs, excl. subcontr.	**76.648**	**118.314**	**50.800**	**63.684**	**68.088**	**48.650**	**90.000**
Indirect costs	**15329,6**	**23662,8**	**10160**	**12736,8**	**13617,6**	**9730**	**18000**
Max reimbursement indirect costs	**5.365**	**8.282**	**3.556**	**4.458**	**4.766**	**3.406**	**6.300**
Eligible costs, excl. subcontr.	**82.013**	**126.596**	**54.356**	**68.142**	**72.854**	**52.056**	**96.300**
Audit	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Subcontracting	7.000	1.400	3.000	0		0	0
total costs	**99977,6**	**144376,8**	**64960**	**77420,8**	**82705,6**	**59380**	**109000**
Requested funding	**90013**	**128995,98**	**58356**	**69141,88**	**73854**	**53055,5**	**97300**
Requested rounded	**90013**	**128995**	**58356**	**69141**	**73854**	**53055**	**97300**

	Particip. 24	Particip. 25	Project totals
Participant shortname	**CYCO**	**UHB**	
Person months	42.0	15.0	603.5
Personnel costs	**205.600**	**81.273**	**3.439.522**
Travel	26.100	18.100	739.150
Equipment	6.100		14.850
Consumables			7.450
Other costs, excl. subcontr.	1.750	150	77.700
Non-personnel costs	**33.950**	**18.250**	**839.150**
Direct eligible costs, excl. subcontr.	**239.550**	**99.523**	**4.278.672**
Indirect costs	**47910**	**19904,6**	**838,646**
Max reimbursement indirect costs	**16.768**	**6.967**	**299.507**
Eligible costs, excl. subcontr.	**256.318**	**106.490**	**4.578.179**
Audit	1.000	1.000	25.000
Subcontracting	5.400	0	96.758
total costs	**293860**	**120427,6**	**5, 239 077**
Requested funding	**262718**	**107489,61**	**4, 699 937**
Requested rounded	**262718**	**107489**	**4, 699 928**

Table B2.4.4 Indicative description of non-personnel costs: subcontracting, consumables, equipment and other direct costs by work package.

This table provides further information regarding the items in tables B2.3.1 and B2.4.1 in relation to products or deliverables and activities. All amounts are in € and are indicative based on nearest credible estimates.			
WP	**Activity**	**Amount**	Costs made up of:
WP1	management	N/a	WP1 has personnel and travel costs only.
WP2	International Policy conference (mid-project)	60 000	Unit cost per person=500 x 120 persons. We have split this into subcontracting and internal costs at 60/40. For the International conference, venue and transport costs (other costs) = 36 000. Catering and Printing (subcontract) = 24 000
WP2 cont'd	National workshops (by M6).The national workshops are being run jointly by WP2 and WP3. PM costs are allocated to participants within WP3	30 000	Unit cost of workshop=2000x15 persons - as above. For the workshops, an 80/20 split gives: hosting costs (other costs) = 24 000, printing and catering (subcontract) = 6 000
WP3	SINUS dissemination	N/a	Travel costs only, other costs allocated in WP2
WP4	Equipment related to dels..4.3 and 5.2	1 250	IT equipment for post-doc staff to perform video editing tasks
	video editing software	450	As above. We have identified this separately as in some cases it will be purchased for use on existing computers
	Consumables	1 250	Related to training packages
	Copy editing	2 000	Del. 4.5
	DVD production	2 000	Del, 4.3
WP5	Video editing software	450	related to del..5.2

This table provides further information regarding the items in tables B2.3.1 and B2.4.1 in relation to products or deliverables and activities. All amounts are in € and are indicative based on nearest credible estimates.

WP	Activity	Amount	Costs made up of:
WP5 cont'd	DVD production (subcontract)	2 000	Final authoring of DVD for del. 5.2
WP6	Equipment related to del. 6.14 and 6.15 Video editing software re above	9 100 300	Equipment comprising computers and video equipment for post-docs to perform computer animation development (3 000) and for video editing tasks (6 100)
WP6 cont'd	Copy editing and typesetting for del. 6.15 DVD production Graphic design 6.3 and 6.4 Specialist translation	2 000 2 000 1 500 800	All the costs in this section are subcontracting (sub-total 6 300)
WP7	IT equipment IT equipment Video/audio recording equipment	1 000 1 500 1 000	Equipment is for video recording and editing by post-docs employed in WP7 related to dels 7.2 and 7.3
	Consumables	4 400	Recording media, paper, print cartridges and other stationery items related to provision of training packages and teaching sequences
WP7 cont'd	Graphic design del 7.6 (subcontracting)	1 500 7 658	
WP8	Equipment	1 000	IT equipment for video editing by post-doc staff,
	Translation of specialized materials	1 600	Del. 8.6 (to/from Turkish)

This table provides further information regarding the items in tables B2.3.1 and B2.4.1 in relation to products or deliverables and activities. All amounts are in € and are indicative based on nearest credible estimates.

WP	Activity	Amount	Costs made up of:
WP9	Documentation (printing or photocopying of questionnaires etc):	7 500	It is expected that some of the necessary questionnaires etc will be produced internally by WP9, in order to ensure consistency etc. Nominally 50% is therefore likely to be spent internally within FSU.
	Subcontract printing and copying	7 500	The remaining 50% will be treated as subcontracting in case commercial print facilities are used.
WP10	Conference fees	9 000	
	Consumables: specialized display equipment	1 800	Display panels and other materials for use at conferences and other events
	training	15 000	
WP10 cont'd	Scriptwriter for product 10.3	4 000	Subcontracting to specialist in field (through IIT)
	Training packages: Printing and photocopying of sample copies for promotional purposes	8 600	Subcontracting of print costs. These print costs are allocated to the WP10 project leader to facilitate uniform quality control of completed deliverables.
	Reports: Printing and photocopying of sample copies for limited distribution	7 000	Subcontracting of print costs, remarks as above.

This table provides further information regarding the items in tables B2.3.1 and B2.4.1 in relation to products or deliverables and activities. All amounts are in € and are indicative based on nearest credible estimates.

WP	Activity	Amount	Costs made up of:
	Translation of specialist material	1 600	Subcontracting to professional translator (Hebrew)

B3. Impact

B3.1 Strategic impact

The substantial task of altering attitudes to science and increasing science recruitment can only be undertaken successfully within schools, working in partnership with parents, universities, the media and the private sector. It requires a European approach for the following reasons:

- Working at the European level adds value to small-scale or national projects which have already been successful in their own contexts but which do not have the resources to transfer their learning across national boundaries.
- Accumulated evidence at the European level of the widespread effectiveness of innovative methods is more convincing to policymakers than small-scale local studies.
- The scientific robustness of results is increased by their replication in different settings.
- There are trends towards European standards, e.g. for teacher competence, qualification levels and overall student outcomes, which need to be addressed by equivalent European actions.

These actions depend on a level of shared understanding of the issues which can only be achieved at the European level. The network formed by the consortium within teacher education and science education has the geographical reach and depth of knowledge required to coordinate this task. The strategic impact of the project will result from:

- The number, quality and diversity of its partners
- Its relationships with key stakeholders in education
- Its internal structure and quality assurance mechanisms
- The design and quality of its deliverables

The potential reach of the consortium across its national partners exceeds 25 million primary and secondary pupils. These can be influenced directly by their teachers and parents. The S-TEAM project, through its partners in teacher education, will be able to disseminate the ideas of inquiry-based science teaching and education to a high proportion of these pupils, given that many of those pupils will be taught by teachers who are currently entering teacher education. Furthermore, those teachers currently employed in schools can only be meaningfully engaged in innovative pedagogical methods if they are provided with appropriate and adequate training. S-TEAM will provide and disseminate high-quality training packages to engage current teachers in professional development, moving towards the goal of a European science education system where all teachers are able to deploy state-of-the art methods. The consortium will work at three levels to ensure strategic impact: the policy level, the action level and the teacher education and professional development level.

The policy level

At this level, through WP2, all partners will identify national policies, curricular frameworks and instructional designs which relate to teacher education for innovative methods in science education. This will provide an overview of European policies and enable the creation of a network of policymakers across the EU to whom we can present our findings and recommendations.

The action level

At this level, through WPs 3, 4, 7, and 8, we will identify how teachers' repertoires of action are affected by the introduction of innovative methods, focusing on specific areas of interest such as scientific literacy and argumentation. We will identify constraints and opportunities, and produce numerical, textual and visual evidence of our findings.

The teacher education and professional development level

In this third level of investigation, we look at how teacher education and professional development are implicated in science education reform. Reforms implemented in schools will only remain effective if teachers are prepared for the uncertainties and opportunities which accompany them. We therefore see teacher education as the key to making science education reform sustainable, since it is within teacher education that space and time can be given to new ideas, and where these ideas can be circulated and continuously improved through research. Teacher education research is a growing field and the project will contribute to its expansion and quality. These three levels, when added together, constitute a systemic view of science teaching and teacher education which will have been comprehensively tested and debated within the network. In order to achieve substantial impact, however, the key players in science teacher education must be involved, and we must reach the maximum possible number of teachers.

B3.1.1 Including the key stakeholders

The S-TEAM network considers a range of key stakeholders in education. Policy and curriculum designers, teacher educators, educational researchers, science education researchers, practitioners, teachers' unions, parents and national science centres are all key stakeholders in this network. The network will listen to all of these actors, either through its reference group or through its listening activities. In the early months of the project, national actors will be brought together in workshops to discuss their activities. This will be followed by comparisons and exchanges of practice between countries and institutional partners. Finally we will undertake large-scale dissemination. In this way we are able to focus on issues of exportability and up-scaling from local and national projects to European projects with cross-national impact.

We recognise the differences between educational systems within Europe, but it is possible to transfer good teaching practice across cultural boundaries if we make small adjustments based on knowledge of local educational settings. S-TEAM will take good ideas and translate them into other cultural settings and nationalities in order to multiply their effect. This translation, however, can only be accomplished if the key players in each setting have the opportunity to share ideas and to develop shared understandings of the meaning of those ideas. The project will make this happen through its workshop programme, through cross-partner and cross-border conferences and through the process of developing the training packages and other materials which it is committed to delivering.

B3.1.2 Project outcomes

The overall aims of S-TEAM will be met by outcomes which enable science teachers to address their individual needs by drawing on experience, materials and research from the widest possible range of sources. The outcomes should also enable policymakers to adapt science education to the most effective and efficacious methods, as supported by reliable evidence.

The broad outcomes of the S-TEAM project will be:

- Networks for the dissemination and exchange of innovative methods, including IBST/E, in science education and in teacher education for science, across institutional and national boundaries
- Research-based knowledge, practices and tools for innovative science teacher education, in a wide range of languages
- Indicators and instruments for measuring changes in pupil and teacher attitudes as a result of innovations in science education
- Identification of critical areas for future research and policy actions within science teacher education

The theory and practice of networks, however, suggests that there will be connections within the network which will produce unforeseen but valuable results. There will thus be two parallel sets of outcomes:

- Planned and executed activities with deliverable outcomes as per this proposal
- Unexpected outcomes ranging from individual ideas to further deliverables

Although these unexpected outcomes cannot be predicted, their value will be recognised and there will be mechanisms in place for 'capturing' and codifying them. These mechanisms will include careful archiving and analysis of, for example, meeting transcripts in order to extract knowledge which would otherwise be lost. This will be an important function of the digital repository (WP1c) which will use D-space[27] or an equivalent technology in order to make all documents searchable within the repository.

B3.1.3 Timeline and coordination of activities

The network is designed to function for three years (2009-2012). The coordination activities of the network are located at the Norwegian University of Science and Technology (NTNU) and will include the establishment of a website for internal communication within the network (closed access) as well as open access to teacher resources created by the network. The project leader and scientific coordinator (Prof. Geir Karlsen) at the NTNU, and the project manager and support team will be responsible for cross-consortium distribution of deliverables from the individual work packages to other work packages, as well as to the EU. The full network will meet at least three times during the three year period. We will invite all members of the network to a "start-up" conference in order to establish relationships and to finalise detailed planning. This will be held in Trondheim, on May 7th & 8th, 2009.

Our second network meeting will be scheduled for year two when we will meet to focus on findings from our initial overview research on teacher education for science in Europe, in conjunction with the major policy and practice conference also scheduled for mid-project, and probably in conjunction with the launch conference for the proposed European Central Information Provider. We will also have a presence at ECER and ESERA 2009 and 2010. Finally, we will schedule a summation meeting towards the end of year three to share the finding and products of the

[27] D-Space is an open source data management system: see: http://www.dspace.org/

network and determine how to continue this dissemination activity. Individual work packages will hold thematic exchange meetings at regular intervals. The members of the network will have direct liaison with science teacher organisations in their respective countries to share ideas from the S-TEAM network. Liaison with European science teachers will be a continuous activity throughout the project as members of the consortium work directly with science teachers to disseminate and improve teacher resources. This will also involve interactive workshops where science teachers from throughout Europe will be asked to provide feedback on teacher resources to enable any necessary modifications to be made.

B 3.2 Plan for the dissemination and use of foreground

B3.2.1 The management of knowledge and Intellectual property

The Call requires materials and other outputs from the S-TEAM project to be placed in the public domain. Special Clause 39 has thus been applied in connection with the Grant Agreement. There is the potential for training materials, produced by S-TEAM, to be taken up by commercial training providers but it is not the intention of the project to engage in any commercial activity and to charge for its materials would defeat its own objectives.
S-TEAM will liaise extensively with the selected contractor for the European Central Information Provider (ECIP) project in order to ensure smooth transfer of materials and maximise synergy between the two projects. This provides the possibility of translating S-TEAM materials into additional languages.

B3.2.2 Plan for the use of results

The intention of S-TEAM in producing training and support materials is that these will be embedded in teacher education courses and professional development programmes. They will thus continue to be used and developed by teacher educators, many of whom will be involved in networks, such as TERN[28] and TEPN, specifically designed to increase the circulation of such materials.

As indicated above, no commercial application of S-TEAM work is anticipated. There will be close liaison with the emerging ECIP and it is expected that this will be the main way in which project materials will continue to be available. The digital depository and project website hosted by NTNU will also be kept online for at least two years after the end of the project. Additionally, academic papers and articles will continue to be published after the end date, and these will continue many of the themes of S-TEAM.

Given the strength of the consortium and the high levels of goodwill amongst the partners, it is likely that many of its members will take part in future proposals in this area as and when they arise. A related proposal (INQUEST) was submitted for evaluation in Jan. 2009 and if successful this will continue and extend the work of S-TEAM. The consortium will be kept informed of new funding opportunities as they arise.

Contribution to standards

There is an emerging trend towards the creation of standards in education systems, including standards for teaching competence and for pupil learning outcomes. S-TEAM will accumulate considerable experience of the problems associated with the implementation of IBST and will be well placed to advise policymakers and others of the issues involved in standards and benchmarking for IBST and other innovative methods.

Contribution to policy developments

The S-TEAM project will contribute to an emerging European field of shared educational experiences at a systemic level. In other words, national systems will no longer develop pedagogical and curricular innovations in isolation, but will collaborate in developing the best possible repertoires of action for teaching and learning.

[28] TERN=Teacher Education Research Network, Network 10 of the European Educational Research Association. TEPN = Teacher Education Policy Network

Risk assessment and related communication strategy

The S-TEAM project poses no abnormal risks to either society or citizens associated with the project,

B3.3 Spreading excellence, exploiting results, disseminating knowledge

B3.3.1 Dissemination strategy

The S-TEAM dissemination strategy is based on the following principles:

- Teacher confidence is crucial to the acceptance of new methods
- Teachers have limited time and opportunities for acquiring new skills and knowledge, therefore dissemination has to be fitted into existing structures and networks, rather than becoming an added burden.
- Multiplier effects are the only way to reach large numbers of teachers, i.e. one teacher educator can reach many student teachers, or one well-informed teacher can reach many colleagues.

The dissemination strategy therefore focuses on high-quality interaction between S-TEAM and teachers or other stakeholders as potential 'ambassadors' for its findings and recommendations. This is a strategy which has worked successfully in other projects such as POLLEN[29] , and is of course sustainable since it does not depend exclusively on continuing intervention or the provision of resources. In order to facilitate such interactions, we will prioritise active communication such as face-to-face meetings and email newsletters, rather than rely on methods such as the provision of web-based discussion groups. It is, therefore, important that all S-TEAM participants are fully informed about all aspects of the project and are able to answer a wide range of questions about its activities. The project coordinator in WP1 will have the responsibility of ensuring a high level of knowledge through regular briefings and the issue of information packs to all partners and colleagues.

B3.3.2 The nature of the deliverables

The S-TEAM project will produce four main sets of deliverables:

- Training packages, course units, teacher education modules
- Video-based resources, either in DVD form or as web-based content
- Workshops, seminars and conferences
- Books, articles and reports

All of these have the purpose of helping teachers, teacher educators and other stakeholders to use different and more effective methods, based on previous research or other activities carried out by the partners. In some cases the deliverable will function by providing both information and opportunities for increased self-understanding. In all cases the emphasis with training packages will be on achieving the maximum impact by tailoring the package to the needs of teachers.

[29] see: http://www.pollen-europa.net/?page=WkdXK8w8jtI%3D

Training packages

We define a training package, course unit or module as a coherent set of materials, designed for a specific audience and with a specific theme or subject area. A package will have a defined timeframe (e.g. one day, two weeks, over a semester) and will have stated learning outcomes related to some form of measurement or accreditation. In the case of S-TEAM training packages, there will be criteria which each package must fulfil to be accepted as a deliverable, such as:

- Must be piloted or reviewed and approved by practising teachers and/or teacher educators (as appropriate)
- Must be accessible to its target audience in terms of language and its visual or other forms of presentation
- Must be directly relevant to science and/or mathematics teaching, including the specific methods addressed by the project and specified in the Call
- Must specify who will deliver the training, the timescale and the expected learning outcomes for participants

In some cases the introduction of training packages in specific contexts may require training for trainers. In these cases, partners will be expected to develop and provide events for this purpose. Time will be allocated at the beginning of the project for the development of criteria and guidelines for the coherent development of the wide range of training packages proposed within thematic work packages. There is, of course, a tension within the proposal between the need for advance description of activities and the desire to take account of teacher views at an early stage, via the national workshops and other sources. The design of the sub-packages allows sufficient flexibility for the resolution of such tensions.

Video-based resources

There is much interest in the use of video both to provide examples of classroom practice and as a tool for self-analysis of teaching practices. Both of these will be featured in the project and we have several partners (including CYCO, HU, TLU and UHB) with established expertise in this area. Where necessary, we will use professional production facilities to ensure that the deliverables of this type are as effective as possible. We will also provide training as necessary to ensure that internal productions are of high quality (see B2.2.2 below). We will use web-based video streaming technology where this is ethically appropriate and where it can provide benefits in terms of flexibility and ease of updating over 'hardcopy' formats such as DVD.

Workshops, Seminars and Conferences

We propose to define these as follows:
Workshops are themed events of a half-day or more, involving fewer than 30 people on average, with a high degree of interactivity in relation to the time allowed. Workshops will have an aim such as information-gathering or development of materials. This would generally entail small-group working, the use of visual aids such as flipcharts, whiteboards or idons and the intention that information should flow freely between participants. In S-TEAM, all workshops will be expected to produce reports outlining the learning and dissemination benefits from the event as well as participant evaluations (which will feed into WP9).
Seminars are events of one day or less, generally with 20-50 participants. The aim of a seminar is to impart information about a particular topic but with extensive opportunities for discussion between all participants, normally in plenary session. In S-TEAM, a seminar will be expected to produce one or more presentations, to be available on the project website, with supporting papers or other documents and a

discussion report detailing the learning from the event. In some cases this may include video or audio recordings.
Conferences are events of one day or more with more than 30 participants, from a range of stakeholders and with multiple contributions from both internal and external contributors. In addition to our start-up conference, we will hold a major conference mid-way through the project to report findings, and to connect policy and practice in the field of science and teacher education for innovative methods. We will also hold a final conference to sum-up the results of the project.

There will be sets of proceedings from all conferences, detailing the contributions and providing papers or transcriptions. Presentations will be available on the website and we will prepare overall conference reports summing up the contributions and the learning from the event. Inevitably, much of the learning which takes place at workshops, seminars and conferences is informal, unpredictable and difficult to capture, but we will take all possible steps to ensure maximum learning benefits from all events, including the provision of adequate amounts of unstructured talk-time, an aspect of events which is often neglected.

B3.3.3 Reaching S-TEAM stakeholders

The Work Packages are designed to bring together expertise from all relevant fields and to disseminate the work of the project to stakeholders at international and national levels. Relevant stakeholders for this project include science teachers, primary teachers with science responsibilities, school managers and governors, teacher educators, science education researchers, students, parents, the general public, curriculum developers and policy-makers. Methods of dissemination will be tailored to the needs of specific groups. Through the reference group, and other forms of consultation, we will ensure that our dissemination activities are at an appropriate level and conform to high standards of accessibility and clarity. Through WP10, we will put in place a quality-assurance system with specified and published criteria for all materials and events. All dissemination activities will also be internally evaluated using instruments developed in WP9, in addition to any external evaluation. Internal evaluations will be reviewed by the Management Board and will be available to the external evaluator and to the reference group. The format of deliverables for dissemination will be closely tailored to their specific target audiences, since we are aware that teachers, teacher educators, parents, policy makers and researchers all speak different professional languages, in addition to any national language considerations. Thus we will provide:

Practical materials for teachers, focusing on the reality of science education in schools. Reflective materials for teacher educators, focusing on increased awareness of the implications of innovative methods for new and experienced teachers.

Accessible materials for parents, taking account of diversity and the multiple demands of parenting.

Evidence-based but concise briefings for policy makers.

Theoretically-informed and empirically-researched articles for academics and researchers

Fig.2 below illustrates the dissemination target groups for each work package. WP5 and 6 play an important role in the dissemination model, since they target teachers, and thereby the classrooms, directly through teacher education and professional development programmes. Furthermore, all WPs will work with national teacher organisations to disseminate the results of the project.

Parents as stakeholders

Parents are an undervalued group in education policy[30] Although there are some signs that parental involvement in schools is being taken more seriously, parental involvement is not yet seen as a crucial part of education. This is unfortunate, especially when, as in this project, the overall aim is attitudinal change. It is especially important in innovative science education where parents will, in most cases, not have had direct experience of investigative or other innovative methods. The underlying qualities which we are trying to foster through innovative, inquiry-based methods are curiosity, cooperation, reasoned argumentation, intellectual independence and scientific literacy. Inevitably, these are affected by what happens at home.

Parental involvement is also important for the practical implementation of innovative methods, since the nature of investigative science means that additional time may be required for homework or research, parental support may be needed for school excursions to science centres or that different forms of assessment need to be discussed with parents. Our strategy for engaging parents is threefold. Firstly, in accordance with the overall aims of the project, work in teacher education will generate new ideas in relation to parental engagement and involvement, and disseminate these ideas to teachers. Secondly, we will use the combined knowledge of innovative methods generated by the project to produce resources for parents, such as a book(let) designed to inform parents about the implications of innovative methods for the way their children learn (product 10.5). Thirdly, we will talk to parents, through the reference group, workshops organised in partnership schools, and indirectly through our media partners within WP10.

[30] E.g. Walker 1998. in the UK: DCSF 2007a; DCSF 2007b

Teachers

The work packages will work directly with teachers in the countries represented in the consortium. In this way, the teacher voice is present in the development of the products developed by the network (video, teaching resources, web-based resources and teacher professional development modules). National and international workshops and a major international conference will be held over the lifespan of the project to interact with science teachers concerning inquiry-based methods and implications for teacher education. Teachers from many countries thus have a forum to discuss the challenges they face in teaching science, and how to implement and sustain these methods in their own schools and countries. The members of the network are members of ESERA (European Science Education Research Association) and EERA (European Educational Research Association). We will use these connections to contact other science teacher organizations. Additional contacts include the Mathematics, Science and Technology cluster (EU DG EAC) and teacher and teacher trainer cluster (EU DG EAC), the Association for Teacher Education in Europe (ATEE), and the European Schoolnet (EUN). Other methods of reaching teachers include science teacher conferences and publications directed towards science teachers.
All countries in the network are committed to presenting findings and conducting workshops for teachers at the national level. We will also present findings and/or running workshops at the ASE (Association for Science Education) conference in Great Britain. We mention this organization particularly since it has become an international conference and will give us the means of reaching teachers from many different countries in Europe.

Science Teacher Educators and researchers

The participants in the S-TEAM consortium are active researchers in the field of science education and many have published internationally in science education. Our work in the network will be reported in international and national journals of science education as well as curriculum and instruction journals. We will publish the deliverables of the network on the web, making them available for any teacher or teacher educator. Marketing a web site and introducing materials via the web will be part of the dissemination strategy.

Policy Makers

Educational policy is directed primarily by individual countries so it will therefore be the responsibility of the individual network members to inform officials about the work of the network.
The ideas represented by the etwork have already become important in many of the participating countries, and policymakers have already shown interest in participation in workshops and other events.

B3.3.3 IPR and exploitation of results

As requested by the call, all documentary and video material will be placed in the public domain, either directly on the project website or via the digital repository, and as such will be available in suitale formats to the proposed European Central Information Provider (call no. SiS 2.2.1.2).

B3.2.4 Video as a tool in teeacher education for innovative methods

A number of WPs will produce video-based materials demonstrating various aspects of inquiry based teaching in science. In certain cases actors may be used to recreate teaching situations where for ethical or content-related reasons it is not possible to use original material. All video-based materials will be made available in multiple language formats (either sub-titled or with alternative soundtracks) where the material has been shown to be useful across national boundaries. We will take all necessary steps to ensure compliance with child-protection and data-protection guidelines for video material, especially where recorded in schools. Written informed consent will be obtained as required.

B3.2.5 Web-based materials

The project website will be maintained on secure servers at NTNU. The website will contain as a minimum:

- Introduction to the S-TEAM project, liaison email and liaison details
- Direct access to full-text deliverables as appropriate (i.e. with the exception of confidential reports or research data).
- Access to current and archived project newsletters
- Password-protected access for authorised researchers to the digital repository
- Discussion forum and project blog(s)
- Video clips illustrating the main principles of inquiry based methods in science and acting as 'trailers' for their related deliverables

The website will conform to FP7 requirements for a distinctive visual identity and with current legal requirements or recommendations for accessibility (e.g. font size, freedom from unnecessary animations etc.)

B3.2.6 Books and DVD for professional development

From the extensive experience of the partners and the opportunities provided by the project for liaison with teachers and teacher-educators, we will produce two edited books (in French and English) which will be the definitive reference for those seeking to implement inquiry-based methods, both in initial teacher education and in professional development situations. The books will have accompanying DVDs which will provide examples of the situations discussed.

B3.2.7 Public debate

WP8 will lead on the promotion of public debate in the field of science education in general and scientific literacy in particular. WP10 is responsible for bringing the project and its findings into the mass media, using collaborations with professional journalists and others in the media. A specific sub-package in WP10 involves the production of an outline script for a possible TV documentary on new methods in science education. This will be led by an experienced ex-television journalist and presenter at IIT who is also an academic and consortium partner, and will be professionally scripted.

B 4 Ethical Issues

B4.1 Ethical overview

Within the S-TEAM project there are no ethical issues involving the use of animals, human embryonic stem cells or other forms of human or animal tissue. Ethical issues arise only in connection with informed consent and data protection, relating to the collection of data, including video recordings, audio recordings, transcriptions of interviews, questionnaires and surveys. This will include both previously-collected data and data gathered in the course of the project. An audit trail will be established to connect data to the relevant consent forms, and this will form part of an ethical guideline document which will be circulated and agreed by all participants, including all those persons designated as researchers. In general, all personal data will be anonymised at the earliest practical stage of collection. Pseudonyms will be allocated where it is necessary to identify individual participants. Electronic data will be held securely on university servers and will be password protected. Documents such as questionnaires will be held securely by partners and will be accessible only by designated persons.

Video recordings of classroom practice form a large part of the deliverables and it is therefore essential to conform to a rigorous set of ethical guidelines In many of the work packages we will be analysing video data on classroom practice for the purpose of collecting good practice examples. Video materials will be used at the teacher professional development seminars. We are aware that some countries (e.g. Norway and Spain) where video has been used for classroom research, will not allow distribution of this material beyond that required for research purposes. Negotiations are on-going to extend the use of research video material to teacher professional development courses. In all cases we will follow the ethical guidelines promoted by national research organisations (e.g. BERA in the UK) regarding the collection, distribution and use of video material involving pupils in particular and individuals generally.

All beneficiaries will follow local and national regulations regarding data protection and will obtain approval from local/national authority in charge of data protection if applicable

Issue	Yes/No	Remarks
Informed consent:		
Does the proposal involve children?	Yes	See notes above
Does the proposal involve patients or persons not able to give consent?	No	
Does the proposal involve healthy adult volunteers?	No	Not for medical purposes
Does the proposal involve Human Genetic Material?	No	
Does the proposal involve Human Biological Samples?	No	
Does the proposal involve Human Data Collection?	Yes	Interviews/questionnaires only
Research on Human Embryo/Foetus		
Does the proposal involve Human Embryos?	No	
Does the proposal involve Human Foetal Tissue/Cells?	No	
Does the proposal involve Human embryonic Stem Cells?	No	
Privacy		
Does the proposal involve processing of genetic information?	No	
Does the proposal involve processing of personal information, e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction?	No	
Does the proposal involve tracking the location or observation of people?	Yes	In video recordings with informed consent only.
Research on animals		
Does the proposal involve research on animals?	No	
Research involving Developing countries	Not applicable	
Dual use and potential for terrorist abuse		
Research having direct military application	Not applicable	
Research having potential for terrorist abuse	Not applicable	
I confirm that none of the above issues apply to my proposal except as noted.		

B 5 Gender aspects

B 5.1 Gender aspects within the project

The staff male/female ratio within the project is almost evenly balanced, with 42 female and 45 male staff as of Feb 2009. Measures currently in place to address gender issues, and to improve work/life balance include:

- The creation of a support group for families of project staff, which will provide a voice for those affected by partners' project-related travel away from home.
- The appointment of a gender adviser, Professor Aldona Augustiniene who is director of the Centre for Gender Studies, Kaunas University of Technology, Lithuania

B 5.2 Gender dimension of research content

The ROSE project[31] has shown that attitudes to science vary dramatically across cultures, with the most positive attitudes being found amongst pupils in the developing world, thus alerting us to the possibility that student attitudes towards science are culturally mediated. European student populations are becoming increasingly diverse and there is a need to attract a balanced mix of students to science education and careers in science. Science teaching should therefore be sensitive to gender, ethnicity, language and other differentiating factors, and their effects on learning in science. Initial discussions within the project suggest that there are wide variations across Europe in how these differences are experienced by teachers and pupils. As part of its overall approach to diversity, S-TEAM will be careful to adjust its approaches to the prevailing gender balance within science education in the partner countries, with the overall aim of enabling teachers to involve girls more fully in science.

[31] Relevance of Science education: www.ils.uio.no/english/rose/

Appendix 1: Note on translation and language issues

The nature of a collaborative support action such as S-TEAM raises questions about the languages used and how materials will be translated. The following table summarises the situation:

Country	Main language	Other significant language(s)
Cyprus	Greek	Turkish
Czech Republic	Czech	
Denmark	Danish	
Estonia	Estonian	
Finland	Finnish	Swedish
France	French	
Germany	German	
Israel	Hebrew	Arabic, English
Lithuania	Lithuanian	
Norway	Norwegian	
Spain	Spanish (Castilian)	Galician, Catalan, Basque
Sweden	Swedish	
Turkey	Turkish	
United Kingdom	English	

The majority of training packages will be produced in the national language in the first instance. This enables these packages to be used immediately in the relevant national context, and to be shared across partners within the same country where appropriate.
In some cases these packages will need to be fully translated into English to form the basis of a definitive set of deliverables. Rather than allow for large expenditure on professional translation, we have opted to concentrate resources on production and dissemination, which makes better use of the expertise available within the consortium.

Where a training package in a particular language is of interest to partners in other national contexts, the normal procedure will be for the originating partner to provide an initial translation using the language skills of project members. One of the roles of WP10 will be to produce a high-quality English version in consultation with the originating partner. In some cases this will involve producing an outline which can be expanded into a full version using recognised terminology from English-language contexts.

We will liaise with the European Central Information Provider in order to provide the optimum mix of languages with resources to be uploaded and translated when this serveice becomes available.

Reports and related documents will normally be produced in English. Where possible, DVDs will have commentaries in alternative languages incorporated in the soundtracks.

Appendix 2 - Individual Beneficiaries, Institutional CVs and indicative person-month allocations

Note: staff names and details were believed to be correct as at March 30th 2009. Given the size of the consortium, it is likely that staff changes will take place from time to time and the management team will take the necessary steps to ensure that tasks continue to be carried out as necessary. In all cases replacement staff will be of suitable grades and levels of experience to ensure that contracted work is carried out as planned.

The "indicative allocation of PM" tables are provided for guidance only and cannot reflect the precise allocation of staff time to tasks, as the nature of the project requires a distributed effort over a large number of small tasks with unpredictable elements.

1. Norwegian University of Science and Technology (NTNU) (Coordinator)

NTNU is the second largest university in Norway with about 20,000 students. The university has participated in 60 R&D projects under FP6, of which 6 are coordinated by NTNU. The university's profile in Science and Technology, along with a wide range of Social sciences and Humanities, provides unique scope for interplay between disciplines. The Programme for Teacher Education (PLU) is one of 12 departments at the Faculty of Social sciences and technology management. PLU is responsible for the following activities:

Teacher Education – educating 340 graduate student teachers per year for the intermediate and secondary school sector (year 5 – year 13) in natural science, mathematics, social science and modern languages, as well as further education and in-service courses for teachers in all these fields.

University Pedagogy – assurance and development of the quality of teaching and learning at NTNU: pedagogical counselling, educational and method courses for new staff, affiliated professors and teaching assistants; pedagogical innovation, research and development; dissemination of experience and development of competence in other faculties.

The University's Resource Centre for Education in Mathematics, Science and Technology – an intermediary between schools, universities, colleges, trade and industry: continuing education and in-service courses in science and technology for teachers at all levels; developing and disseminating new teaching materials and equipment; advising school authorities about science rooms and laboratories; publications on teaching and learning in science and technology; networking between schools, the university and industry; implementing research and development on teaching and learning of science and technology subjects in schools.
In addition to scientific staff, NTNU has a dedicated administrative staff with extensive experience in research management, legal issues and financial management of EU-projects.

Task allocation

Tasks attributed to NTNU include:

- The overall management of the project (WP1) including financial management
- Media and dissemination strategy (WP10)
- Content development in WPs 4, 5, 6 and 8.

Staff members who will be undertaking the work:

Geir Karlsen, Professor, will be the consortium leader. He is deputy head and research leader at the Programme for teacher education at NTNU. His main research areas are philosophy of education, in particular the teachers role in contemporary society. In recent years he has been involved in research strategy and implementation of policy in both national and international contexts. He is currently leading a national work-group connected to changes in teacher education in Norway, and is a member of several international networks, including the organisational board for the successful 2009 annual conference of NERA (Nordic Education Research Association).

Peter van Marion, Professor in Science Education. His main interests are in outdoor work in biology, practical work in science and environmental education. He is

the author of text books in Science for grade 12. Currently he is the Director of the University's Resource Centre for Mathematics, Science and Technology Education.
Alex Strømme, Professor in Science Education, works with teacher training in biology. He has worked for many years with ICT in schools and universities. He has developed, and carried out research on, web-based programmes in science. He is also involved in implementing information technology in university teaching and learning.
Berit Bungum, Associate Professor, works with teacher training and research in science and technology education. She has many years experience with curriculum development and in-service education for teachers. She is also one of the editors of the Nordic journal for science education research, NorDiNa.
Peter Gray (Dr) has been involved with the development of S-TEAM since 2007. He was formerly research fellow for the Early Professional Learning Project at the University of Stirling, Scotland. His first degree was in Film & Media Studies and his doctorate concerned the use of space in nursing education. He has been involved in European collaborative projects and teacher education since 2002 and is co-convenor of the Teacher Education Research Network of EERA and a reviewer for *Journal of Education for Teaching*. Dr Gray will be the project manager and leader of WP10.
Other NTNU staff participating include Prof May-Britt Postholm, Prof. Anna-Lena Østern
Assoc. Profs Marit Honereid Hoveid, Halvor Hoveid, Ove Haugaløkken, Kjersti Wæge,

Indicative Allocation of Person-Months: NTNU		
name	**role**	**PM (total 76)**
Geir Karlsen	Project coordinator	8
Peter Gray	Project manager	34 (FTE for duration of project)
Hilde Roysland	Project administrator	18 (0.5 FTE for duration of project)
Peter van Marion	Production of product 6.11	4
Alex Strømme	Production of 5.2 & 8.4	2
Berit Bungum	Production of 6.12	3
May-Britt Postholm	Production of 4.6	1
Anna-Lena Østern	Production of 8.4	2
Marit Honereid Hoveid	Editing 6.15 in collaboration with CYCO	1
Halvor Hoveid	Production of 6.12	1
Ove Haugaløkken	Production of 5.2	1
Kjersti Wæge	Production of 5.2	1

2. University of Oslo (UiO)

The University of Oslo is Norway's largest and oldest institution of higher education, founded in 1811. Today the University of Oslo has approx. 30,000 students and 4,600 employees. Four Nobel Prize winners indicate the quality of the research at the University. The University of Oslo has been involved in over 50 projects in the 6th FP, with experience in providing the necessary infrastructure to cope with large scale network projects.
With approximately 235 staff members, the Faculty of Education at the University of Oslo is Norway's largest and most progressive institution for the educational sciences in Northern Europe. The faculty was formally constituted on 1 January 1996 and today consists of two departments and one institute: The Institute for Educational Research, The Department of Special Needs Education and The Department of Teacher Education and School Development. In addition, the faculty hosts two centres: InterMedia and the Network for IT-Research and Competence in Education (ITU). InterMedia is an interdisciplinary centre at the University of Oslo, currently participating in the EU project “Science Created by You” (SCY) and has participated in the EU Kaleidoscope network (Technology Enhanced Learning).
Science education at the University of Oslo is a leading area of study in Northern Europe and leads the EU Science in Society project Mind the Gap. Science educators at UiO are responsible for large international projects including PISA, TIMSS and ROSE and have concentrated on modern classroom video studies. The Faculty of Education supports cross disciplinary networking with studies that integrate science and mathematics education together with general studies of teaching and learning. The PISA+ study (project on learning and teaching strategies in schools) and CAMP (Classroom Analyses from Multiple Perspectives) are examples of multidisciplinary and cross-national collaborations at the Faculty of Education which play a dynamic role in the *Mind the Gap* network.
The National Centre for Science Education is located at the University of Oslo and also participates in the Mind the Gap network. The “Viten” project on web-based science curriculum is based at the centre and contributes to understanding how ICT informs IBST/E.

Task allocation

Tasks attributed to UiO in this project will be to lead WP 2, expanding the work done on the *Mind the Gap* project to include science teacher education in a wider range of European countries, and to contribute to WP5 through work related to the VITEN project.

Staff members who will be undertaking the work:

Doris Jorde, Professor, gained her PhD from the University of California, Berkeley, USA in 1984 in Science Education. She is currently a Professor in Science Education at the University of Oslo. Jorde has conducted research in science curriculum development and classroom studies of science teaching. She is the leader of the project Viten.no, and a recipient of numerous awards for communicating science with ICT. Doris Jorde is past president of ESERA, was a member of the EU High Level Group on Science Education led by M. Rocard and contributed to the resulting Expert Group Report. She was also a member of the OECD Global Science Forum. She is currently leader of the SiS project, *Mind the Gap*.

Kirsti Klette is a professor in classroom studies and didactics at the Institute of Educational Research at the Faculty of Education. Her field of research concentrates on classroom studies, instructional design and studies of teaching and learning. Klette is the project director for the cross disciplinary video study PISA+ and is the director of the interdisciplinary research group of classrooms studies (CAMP - Classroom Analyses from Multiple Perspectives) at the Faculty of

Education. Klette is coordinating a work package in the Mind the Gap project. Klette is co-leading the network in Didactics: Teaching and Learning within the European Educational Research Association (EERA).

Indicative Allocation of Person-Months: UIO		
name	**role**	**PM (total 43)**
Doris Jorde	WP2 leader	3
Kirsti Klette	Co-leader, adviser on VITEN project	3
Researcher(s)[32]	Collation of policy information throughout project	37 (FTE plus additional assistance for national workshop programme)

[32] The term 'researcher' is used to indicate staff grade rather than function

3. University Pierre-Mendes-France, Grenoble (UPMF)

UPMF is part of a wider entity (Grenoble University) which includes numerous science and technology institutes. The project itself is led by the Educational Science Laboratory (L.S.E.) which involves members from UPMF and from its Teacher Education Institute (IUFM). This Institute is part of the science and technology university University Joseph-Fourier – UJF.
LSE-UPMF has conducted numerous research projects about the impacts of teaching context on learning outcomes, techniques which stimulate learners' intrinsic motivation and factors which promote teachers' collective work. LSE-UPMF is regularly assessed at level A (the highest in the French assessment system).

Task allocation

The main tasks attributed to UPMF in the S-TEAM project are:
Task 1 related to WP2: As national representative, UPMF will collect data regarding the way science teachers are educated and trained in France.
Task 2 related to WP4: UPMF is the leader of WP4 It will coordinate the actions of the members involved within WP4 and connect to other WPs. UPMF actions will support new secondary science teachers and mentors with the implementation of inquiry-based science teaching techniques. WP4 will also address the need for a dissemination strategy tailored to the French national context.
Task 3 related to WP3: UPMF will connect with the SINUS project in order to provide French science teachers with relevant methods.
Task 4 related to WP9: UPMF will contribute to providing the consortium with relevant indicators and evaluation tools in order to convince science teachers and policymakers of the efficiency and efficacy of inquiry-based methods.

Staff members who will be undertaking the work:

Michel Grangeat, Ass. Prof., (MCU-HDR[33]) leads the UPMF contribution; he is a teacher educator at Grenoble IUFM. His research interests concern teachers' collective work and forms of organization which stimulate teacher collaboration.

Pascal Bressoux, Prof., (PU) leads the UPMF Lab. of Educational Science. He will be involved in supervising the team. His expertise is in the impact of teachers' conceptions on learning outcomes

Pascal Pansu, Prof., (PU) leads a L.S.E-UPMF research team. He will provide the project with relevant evaluation tools, methods and theories which support teachers' involvement.

Eric Triquet, Ass. Prof., (MCU) is teacher educator at Grenoble IUFM where he leads the science teacher education department. His role will consist in managing the part of the project which aims to support mentors and teacher educators towards implementation of problem and inquiry-based science teaching techniques.

Joëlle Aubert, Ass. Prof., (MCU) is member of the IUFM staff. Her role will consist in involving science teacher trainers seeking to gain experience in science education (at a local and national level).

[33] MCU-HDR = Maitre de Conference-Habilitation Directeur de Recherche, PU = Professor Universitaire.

Indicative Allocation of Person-Months: UPMF		
name	**role**	**PM (total 40.5)**
Michel Grangeat	WP4 leader	6.5
Pascal Bressoux	Supervision & Contributor to dissemination strategy	3
Pascal Pansu	Production of 4.1 to 4.5	1
Eric Triquet	Production of 4.1 to 4.5	1
Joëlle Aubert	Production of 4.1 to 4.5	1
Post-doctoral student	Production of 4.1 to 4.5	13
PhD student	Production of 4.1 to 4.5	15

4. Centre National de la Recherche Scientifique (CNRS)

CNRS is a government-funded research organization, under the administrative authority of France's Ministry of Research. It was founded in 1939 by governmental decree.
CNRS evaluates and carries out all research capable of advancing knowledge and bringing social, cultural, and economic benefits to society. It also participates in the analysis of the national and international scientific climate and it defines and develops a national policy for technological and scientific progress.
CNRS has over 32 000 employees of which 26000 are CNRS tenured employees. It has two national institutes, and six departments: (1) Mathematics, Physics, Earth Sciences and Astronomy; (2) Chemistry; (3) Life Sciences; (4) Humanities and Social Sciences; (5) Environmental Sciences and Sustainable Development; (6) Information and Engineering Sciences and Technologies. The CNRS research units are located throughout France, in 19 regional offices, ensuring decentralized direct management of the 1256 units. Ninety percent of these are joint laboratories with universities and industry.
The staff members belong to the research unit ICAR (Interactions, Corpus, Apprentissages, Représentations) (UMR 5191) UMR ICAR Research Unit is devoted to interaction studies with linguists, psychologists, and researchers in science education.

Task allocation

The main tasks attributed to CNRS deal with the implementation and dissemination of training resources and strategies for supporting teaching and learning in science and mathematics involving a variety of discursive practices in classrooms. These tasks are related to teacher professional development particularly through collaboration. The other main tasks attributed to CNRS deal with scientific literacy.

Staff members who will be undertaking the work:

Andrée Tiberghien is senior lecturer (Prof) in Science Education with more than 30 years of experience in research, collaboration with science teachers and production of teaching resources. Currently she studies science classroom practices and particularly discourse practice in relation to taught knowledge. She is a member of the science Expert Group of PISA 2006 and 2009. She has analysed questions related to scientific literacy in relation to current practices.

Sylvie Coppé is an associate professor and has been the coordinator of pre-service mathematics teacher education programme in Institute of Teacher education (IUFM). She is the leader of a research group which collaborates with mathematics teachers to produce teaching resources and to study how these resources could be used by others e.g. teachers who are not in the research group. She is conducting research in algebra teaching in secondary school in relation to teachers' practices and teachers' knowledge.

Florence Le Hebel is an associate professor in Geology at University of Lyon. Most of her teaching activity is related to primary and secondary teachers in the Institute of Teacher Education (IUFM) and in the University of Lyon. She has mainly worked in the field of geology (PhD in France, Post-doctoral position in Sydney University) and now develops new research interests linked to Science education. Her projects focus on students' attitudes and motivations related to science in school and outside school. She developed ROSE (Relevance of Science Education) studies in France, and she is starting (with Pascale Montpied) a research study on 2006

PISA results in France to approach how pupils construct their answers to the questions (units) aimed at testing scientific literacy as defined by PISA experts.

Pascale Montpied is a senior researcher in neurobiology with more than 20 years of experience in this field and has been a researcher in science education for 3 years. She carries out research on motivation in a multi-disciplinary team of secondary school teachers and is currently working on pupils' interests and culture in sciences.

Indicative Allocation of Person-Months: CNRS		
name	**role**	**PM (total 18)**
Andrée Tiberghien	Leader for sub-packages in WP4, WP7	5
Sylvie Coppé	Production in WP4, WP7 and WP8	4
Florence Le Hebel	Production in WP4, WP7 and WP8	4.5
Pascale Montpied	Production in WP4, WP7 and WP8	4.5

5. University of Bristol, Graduate School of Education (UNIVBRIS)

The University of Bristol was founded in 1876. It was the first higher education institution in England to admit women on an equal basis to men. The University organises its academic affairs in 45 departments and 15 research centres that are arranged in six faculties: Arts, Engineering, Medical and Veterinary Sciences, Medicine and Dentistry, Science, and Social Sciences and Law. Currently it is a member of the "Worldwide Universities Network" and of the Russell Group of universities. The academic quality of the University is reflected partly in the Nobel Prizes and Fellowships associated with the University community: 6 Nobel prize winners, fellows of the Academy of Medical Sciences, British Academy, Royal Academy of Engineering and The Royal Society. The Graduate School of Education, GSoE, is an international centre of interdisciplinary educational research and it has received the highest national ranking of 5* in the latest Research Assessment Exercise. The Graduate School of Education is the only UK education department that has this excellence in research as well as an initial teacher training programme for science teaching.

Task allocation

In WP7, UNIVBRIS will extend the research and professional development agendas from a range of projects. It will focus on the dissemination of training resources and classroom materials that support teaching and learning of argumentation in science classrooms. A particular aspect of the proposed project will be the development of teachers' epistemological reasoning about nature of scientific knowledge with an aim towards promoting epistemic practices around argumentation in science classrooms.

Staff members who will be undertaking the work:

Sibel Erduran has been conducting research in argumentation since 1993 having received funding from the Spencer Foundation and the National Science Foundation in the USA. In 2005 she received the best paper award from NARST for her co-authored publication on argumentation. She has extended her research-based work in argumentation to the production of professional development programmes in argumentation supported by the Economic and Social Research Council, Nuffield Foundation and Gatsby Foundation. She is the co-producer of the Nuffield-funded IDEAS pack, a training resource on ideas, evidence and argumentation that has been translated to Chinese, Catalan, German, Italian and French. Sibel Erduran has been coordinating the Argumentation and Communication Work package as part of the Mind the Gap project funded by EU FP7.

Katie Hall has been a part of the evaluation of the new 21st Century Science Course in the UK and produced resources on dialogic teaching in science for the National Strategy. She is the co-ordinator of the pre-service science teacher education programme at University of Bristol.

Indicative Allocation of Person-Months: UNIVBRIS		
name	**role**	**PM (total 19)**
Sibel Erduran	UNIVBRIS leader, NLP for UK, dissemination	8.5

Katie Hall	Production in WP7	6
Post-doctoral researcher (Xiomei Yan)	Production in WP7	4.5

6. Kaunas University of Technology (KTU)

Kaunas University of Technology is the largest technological university in the Baltic States. Globalization and the technological revolution have strongly influenced the nature of studies and research carried out at the University. The principle of "completing one's studies for the rest of one's life" is being gradually substituted by the principle of "life-long learning". Research is becoming a mandatory component of study, as we have an aspiration to maintain the University at the cutting edge, educating professionals to work and make decisions in new settings. The University shares the best traditions of classical Universities, offering almost all fields of technological studies and research. The Social (including Education and Pedagogy) and Physical Sciences are particularly emphasized at the University, as a modern university graduate is expected to have more than just professional knowledge.
The International Studies Centre meets the challenge of the main KTU mission. It is one of the 14 faculties of KTU. A Bachelor's degree programme called "Export Engineering" is given in the main European languages – English, German, French and Russian in order to respond to the needs of a University that is working in the European context. Core subjects of this programme include science, economics and Foreign language subjects. Student and staff exchange activities are highly developed under co-operation agreements with a number of Western partners. Quality research in teaching and learning is among the main research areas of the International Studies Centre. Emphasizing subject and language learning integration, the International Studies Centre seeks to promote an effective learning experience for students. The International Studies Centre is also in close partnership with secondary schools that emphasise Mathematics, IT, Science and Language teaching and works closely with them while establishing the concept of scientific literacy for both students and teachers. The International Studies Centre also works with the University Centre Of Teaching Competence in training Mathematics, Science and Information Technology (IT) teachers. Among many scientific events, the International Studies Centre also hosts the Organizing Committee of the Conference "Global Cooperation in Engineering Education: Innovative Technologies, Studies and Professional Development" that also provides scientific information about Mathematics, Science and IT teaching and learning problems.

Task allocation

In addition to being the NLP for Lithuania, KTU will produce a report on science teacher education in multi-lingual contexts (del 5.6) and a package on the development of argumentative competence in new teachers in WP7. Dr Aldona Augustiniene will be the gender adviser for the project.

Staff members who will be undertaking the work:

Arvydas Palevicius, Prof., is the Director of International Studies Centre, is an expert teacher of IT and has rich experience in participating in the International School quality assurance programmes.

Regita Bendikiene, Assoc Prof., the vice director of International Studies Centre, is responsible for Studies and scientific literacy development.

Nijole Ciuciulkiene, Assoc Prof., and the vice director of International Studies Centre, is responsible for student affairs, cooperation between secondary schools and the International Studies centre. Nijole Ciuciulkiene is the author of teacher qualification programmes on Problem-Based Learning and Development of Argumentative Competence.

Nijole Bankauskiene, Assoc.Prof., the Director of the Teachers' Competence Centre and the supervisor of officially evaluated requalification programme "Pedagogy". Her main research field is the development of teacher's competencies.

She also works in the field of teacher training as the supervisor of final theses, based on Action Research.

Aldona Augustiniene, Lecturer, Dr., is the Director of the Gender Studies Centre. Her main research sphere is the development of career decision-making skills. Dr. Aldona Augustiniene also participates in the teacher training programme "Pedagogy" as the supervisor of final theses, based on Action Research.

Rasa Vitkeviciene, Dr., International Studies centre researcher and senior teacher of IT. Dr.Rasa Vitkeviciene has an experience in preparing Comenius school projects and participates in the development of teachers' scientific literacy.

Dr. Habil. Palmira JUCEVIČIENĖ is the Head of Institute of Educational Studies, Kaunas University of Technology

Research areas:

Development of contemporary educational science in Lithuania (European and world-wide context);

Modernization of higher education and continuing education for the knowledge and information society;

Educational management and modernization of educational system through educational innovation;

Development of a learning organization and competence of an individual through teaching and learning;

Social education for the democratic development of the society and communication for facilitating European integration.

Modernization of Education.

Development of educational research methodology;

Philosophy and systems of higher education and continuing education;

Educational management and modernization of educational system;

Educational innovation and its implementation through action research;

Learning organization and its development;

Development of effective communication in an organization;

Competence on the international level, supported by efficient results of the EU, American, Canadian projects, expertise, and international acknowledgement.

Prof. Dr. Habil. Palmira JUCEVIČIENĖ is involved in:

Designing competence-oriented study programmes.

Research on the university/college and their improvement.

Research on the concepts of the mass higher education and the service university and their implementation in relation to the development of the university/college.

Research on the implementation of empowering study system and its application.

Indicative Allocation of Person-Months: KTU		
name	**role**	**PM (total 18)**
Nijole Ciuciulkiene	KTU leader, NLP and dissemination	4
Arvydas Palevicius	Supervision, dissemination	3
Regita Bendikiene	Production of 5.6 and 7.7	2
Nijole Bankauskiene	Production of 5.6 and 7.7	2
Aldona Augustiniene	Gender adviser to S-TEAM	2

Palmira JUCEVIČIENĖ	Overall advisor	3
Rasa Vitkeviciene	Production of 5.6 and 7.7	2

7. University of South Bohemia (USB)

University of South Bohemia (USB) consists of seven faculties and three associated institutes and has about 14 000 students. Science teachers are prepared mainly at the Pedagogical faculty whose history dates back to 1948. Five departments develop and realise science teacher education: Pedagogy and Psychology, Departments of Biology, Mathematics, Physics, and Department of Applied Chemistry and Chemistry Education. Research in these Departments is oriented both to teacher training and science teacher training. Pedagogical faculty (USB) staff activities include production of primary and secondary school textbooks (especially in biology, mathematics and physics). These activities have also included an international project, creating a textbook of biology for Japanese junior high schools (granted by The Japanese Ministry of Education, Science and Culture) and also the dissemination of new biological knowledge. The Pedagogical faculty of USB also support and organize the science student competitions (regional and national-wide levels), including the preparation of related teacher training courses and coordination of the development of the competition tasks.
Long term research projects of Pedagogical faculty, USB granted by The Ministry of Education of the Czech Republic include the following topics: emotional and motivational factors in education; biodiversity and biology education; reflection on the progress of technical disciplines in the preparation of mathematics teachers; mathematics classroom Culture; development of mathematical literacy in primary education.

Task allocation

The main tasks attributed to USB in S-TEAM are investigation of motivation of students who are active in science competitions via narrative analysis (WP6), development of teacher training courses based on applications of P4CM (WP7) and the SINUS program (WP3), application of collaborative activities of student teachers, their mentors and university science teachers (WP4). USB is also national liaison partner for the Czech Republic.

Staff members who will be undertaking the work:

Iva Stuchlikova, Ph.D., is a professor of educational psychology; Head of Department of Pedagogy and Psychology. Her main research will be concentrated on motivational processes in science education. She has published 2 books and approx. 100 papers, and has been responsible for several national and international projects on emotional and motivational determinants of learning and teaching and teachers' professional identity. She serves as a member responsible for teacher training programmes in the Accreditation Committee for higher education of the Czech Ministry of Education.

Miroslav Papacek, Ph.D., is a professor of zoology and the Head of the Department of Biology. He served 1992-1997 and 2001-2006 as a Dean of the Pedagogical Faculty and has been responsible for development of the science teacher training curriculum. He has coordinated several national and international projects on ecology, biology of water bugs, and biology education, and published or participated in publication of 4 books or monographs, 4 textbooks and 90 original scientific papers. He will concentrate on scientific literacy research and on collaborative activities of teachers.

Lecturer Jan Petr, PhD., participated in several research projects and has published over 20 papers. He will focus his research on student science competitions and on biology teaching methods for primary school teachers. He is chair of the regional committee of Biology Olympiad and member of committee of other biological competitions for students.

Indicative Allocation of Person-Months: USB		
name	**role**	**PM (total 18)**
Iva Stuchlikova	USB Leader, NLP, dissemination	2.5
Miroslav Papacek	Production of 6.3, 6.4	7.0
Jan Petr	Production of 6.3, 6.4	8.5

8. Vilnius Pedagogical University (VPU)

Vilnius Pedagogical University is the largest higher education establishment training teachers for Lithuanian schools. University teaching staff consists of 600 university teachers. The number of students is 12 500. The university aims to carry out scientific research, future teacher training, improving school teachers' qualifications and organizing their re-qualification. The Faculty of Natural Sciences is the biggest in the university and in the whole country, training future teachers of chemistry, biology, natural studies, geography, and technological education. Execution of the programmes is facilitated by close cooperation between the Faculty of Natural Sciences, the Faculty of Physics and Technologies, the Faculty of Mathematics and Informatics, the Faculty of Pedagogy and Psychology, and other faculties. Cooperation is promoted in natural science education programmes, and scientific research. Natural science education problems are analyzed by students developing BA and MA theses, and by those taking up doctorate studies. Students' natural science sophistication is fostered through their participation in experimental work, scientific conferences, and contests. Students are also trained for non-formal education.
University teachers cooperate in the preparation of new teaching methodologies and modules. In 2007-2008 Vilnius Pedagogical University teachers created nine new modules as the result of European Structural Fund Project "Development of University Teachers' Pedagogical Competence" (funding 250 000 €). Integration of consumer culture education into biology, chemistry, geography, and technological education lessons was the final aim of the 2007- 2008 project of the Faculty of Natural Sciences which was also funded by the EU (funding 350 000 €). New teaching aids for secondary schools were created as the result of the project. University teachers are active participants of international lifelong learning programmes, i.e. Leonardo da Vinci, Comenius, Grundtvig, Erasmus, etc. Our teachers issue new natural science and integrated science textbooks for university studies, as well as to basic and secondary schools. Vilnius Pedagogical University has a base secondary school where educational research is carried out, university teachers deliver lectures and university students and young teachers have their teaching practice.

Task allocation

Tasks attributed to VPU comprise the development of training packages for ITE based on the use of integrated science to overcome primary/secondary transition problems in science.

Staff members who will be undertaking the work:

Dalius Dapkus, Dr., will be the institutional leader in the project. He is the vice-dean for studies, having 10 years' experience in teaching biological disciplines.

Manefa Miskiniene, Prof.Habil.Dr., vice-dean for science and international relationships. He is a specialist in the interdisciplinary integration of science subjects.

Palmira Peciuliauskiene, Prof, Dr., specialist of didactics of physics. She works on social-cultural integration in the contents of school tasks in physics, and is the author of textbooks of physics for secondary school.

Almeda Kuriene, Dr., teacher of didactics of chemistry. She studies training methods for students who will teach chemistry at school.

Nijole Cibulskaite, Dr., specialist in didactics of mathematics, and the author of textbooks of mathematics for secondary school.

Kestutis Grinkevicius, M.Sc., lecturer of didactics of biology. His Ph.D. thesis was on the integration of science subjects and methods of teaching, and he is the author of integrated science textbooks for basic school.

Indicative Allocation of Person-Months: VPU		
name	**role**	**PM (total 12)**
Dalius Dapkus	VPU leader, chapter in del. 6.15	4
Manefa Miskiniene	Supervision, dissemination	2
Palmira Peciuliauskiene	Production of 5.5, dissemination	1.5
Almeda Kuriene	Production of 5.5, dissemination	1.5
Nijole Cibulskaite	Production of 5.5, dissemination	1.5
Kestutis Grinkevicius	Production of 5.5, dissemination	1.5

9. Department of Science Education, University of Copenhagen (UCPH)

The Department of Science Education (DSE) is an independent unit of the Faculty of Science at the University of Copenhagen. The Department does research, development work, communication and teaching within the field of science didactics and science education (including mathematics). It has activities on all educational levels, but mainly within upper secondary and tertiary education. With a staff of 10 in June of 2008 DSE is the largest Danish actor in science education research.
Research at DSE is concentrated in three areas:

- Didactical design of science education: Learning theory, design tools, design aspects, educational practices
- Relationships between science as a research profession and a school/university subject: Curriculum development and implementation, approaches to teaching and subjects, epistemological aspects of science education.
- In-service and pre-service teacher education at tertiary and upper secondary level.

Also, the DSE at UCPH is leading the scientific literacy work package for the *Mind the Gap* project, whose results will also be useful to this project.
Teaching at DSE
The Department aims to bringing didactical and pedagogical knowledge to faculty staff and students as well as providing courses for PhD.-students (Introduction to University Pedagogy) within science didactics. In particular, the Department is in charge of the pedagogical training of newly appointed assistant professors (Course in Higher Education Teaching). Furthermore, it provides ad hoc workshops and short courses to a variety of users. Some of these activities are open to students and staff from other universities.

Task allocation

The main task attributed to the DSE at UCPH as leader of S-TEAM WP8 is to produce a report which connects teacher competence development with scientific literacy using examples from such programs around the EU. UCPH will incorporate its numerous existing methodologies for achieving competencies based on the paradigm of scientific literacy into a training package for teachers. UCPH will also lead partners in producing training materials targeted both at specific disciplinary areas and at more general teaching problems in scientific literacies.

Staff members who will be undertaking the work:

Jens Dolin, Ph.D., Associate Professor, will be the WP8 leader. Dolin, who is head of the Department, has done research in teaching and learning science (with a focus on dialogical processes, forms of representation and the development of competencies), general pedagogical issues (bildung, competencies, assessment and evaluation) and organisational change (reform processes, curriculum development, teacher conceptions). He has led a number of cross institutional research projects (Validation of PISA in a Danish context, Motivation and Learning, Potentials and Barriers for School Development and others), and has authored a 'Competence Description of the Sciences' in relation to scientific literacy and ultimately, science teaching.

Robert Evans, PhD, Associate Professor, will be an assistant WP8 leader. He has many years of experience teaching science teaching methods courses to pre-service teachers. He has helped lead a teacher induction program to extend university support and education to new science teachers. His international research in personal capacity beliefs has focused on understanding factors affecting new science teachers and devising programs of support for them.

Carl Winsløw, Ph.D., Professor, will also be an assistant WP8 leader. His recent research has been in comparative international studies of mathematics teacher education, studies of ICT-tools in university education and on interactions between research and teaching in university science and mathematics. His current projects concern collaborative formats for teacher work, in particular the role of such formats in teacher induction.

Indicative Allocation of Person-Months: UCPH		
name	**role**	**PM (total 40)**
Jens Dolin	production of 8.1.	12
Robert Evans	production of 8.2, 5.3, 5.4, 6.7, 6.8	12
Carl Winsløw	Asst. WP8 leader, production of 8.2, , 5.3, 5.4, 6.7, 6.8	10
Administrator	Collating case study material, schools liaison etc	6

10. University of Leeds (UNIVLEEDS)

The University of Leeds is acclaimed world-wide for the quality of its teaching and research. Leeds is one of the largest universities in the UK with an income of £422m (2006/07). The University has over 30,000 students including over 5,100 from overseas, attached to 700 different first-degree programmes and 470 postgraduate degree programmes. The large numbers of students are supported by 8,000 members of staff. Leeds is a research intensive university which strives to create, advance and disseminate knowledge; develop outstanding graduates and scholars and make a major impact on global society. It is amongst the top ten universities for research in the UK. Including post-graduates it employs some 3,000 researchers and has an annual research income of more than £90m. Its emphasis on innovative research and its investment in high-quality facilities and first-rate infrastructure means that no fewer than 35 of its departments are rated internationally or nationally 'excellent'. The University's Knowledge Transfer Unit demonstrates the institution's forward thinking approach by promoting new ways for the University to build partnerships beyond the academic sector. The Centre for Studies in Science and Mathematics Education (CSSME), in the School of Education, is one of the leading centres for science education research, teaching and knowledge transfer in the world with its staff including three full professors. CSSME has recently been involved in producing professional development materials addressing the challenges of science teaching and learning. These materials were commissioned by the government and are being used by teachers nationally.

Task allocation

The first phase of the work of UNIVLEEDS in S-TEAM is to work collaboratively with groups of science teachers, in their school science departments, over a sustained period to promote innovative teaching and learning practices which lead to an enhanced understanding by students of scientific conceptual knowledge and its application. The pedagogical approach taken is referred to as 'dialogic teaching', which involves opportunities for students to bring existing understandings to the classroom and to link them to scientific perspectives. Key features of dialogic teaching are student engagement and motivation. In the second phase of the work, science teachers from phase 1 schools will be supported in cascading the developing expertise to neighbouring schools and then nationally, through the UK National Science Learning Centre. UNIVLEEDS will produce: professional development materials for dialogic teaching, to be used within school science departments; professional development programmes to frame the use of these materials; tools to measure the impact on students' learning; a report of evidence of impact on both teaching and learning. UNIVLEEDS will, within WP6, collaborate with the Mälardalen University, University of Aarhus, the Hacettepe University, NTNU and Israel Institute of Technology in developing, refining and disseminating approaches to dialogic teaching.

Staff members who will be undertaking the work:

Phil Scott, Professor, is the Director of CSSME at the University of Leeds and Adjunct Professor at NTNU, Norway. He has over 30 years experience of firstly teaching science in schools and then working with science teachers through the University. His central research interest is in science teaching and learning around which he has led several national projects, published widely for both research and professional communities, and presented many key-note lectures internationally.

Jaume Ametller is a Research Fellow at the University of Leeds. He has wide experience of working with science teachers on development projects, in a range of

European contexts. He has particular interests and expertise in capturing and analyzing classroom interactions.

Indicative Allocation of Person-Months: UNIVLEEDS		
name	**role**	**PM (total 9)**
Phil Scott	UNIVLEEDS leader, production of 6.5, 6.6, dissemination	4.5
Jaume Ametller	production of 6.5, 6.6, dissemination	4.5

11. Friedrich-Schiller-Universität Jena (FSU)

The Department of Educational Psychology at the Institute of Educational Science at Friedrich-Schiller-University Jena is concerned with research on teaching and learning, and with teacher education and teacher professional learning in science education. In the area of research on teaching and learning, a six-year video study on science teaching practices, funded by the German Research Foundation, was conducted to investigate typical teaching patterns in German science classrooms. The outcomes of this project include the development of video codes and instruments to describe science teaching practices and the creation of tools for researchers and practitioners to analyze video recorded lessons. Video analysis instruments were applied to different samples of science classrooms in order to describe teaching practices in German physics classes. In addition, we studied how these teaching practices affected student learning. In addition to the video studies, we summarized the state of the art in research on teaching and learning in the last decade by means of a meta-analysis, and in particular the international state of the art in science teaching practices by means of a review using the contextual framework of the international PISA 2006 study. In 2008, the participant was awarded the Review of Research Award of the American Educational Research Association (AERA), together with her co-author Prof. Dr. R. J. Shavelson, Stanford University, USA. In the area of teacher education and teacher professional learning, the participant's institution is involved in research on teacher education and on professional development of in-service teachers. In the area of professional development of in-service teachers, the institution is focused on research-based models that help teachers to reflect upon teaching routines and tools to change science teaching practices.

Task allocation

The main task attributed to FSU is the leadership of WP9 (indicators) which includes the development of tools for the formative evaluation of the project. The participant contributes expertise on formative and summative evaluation of research projects in science education.

Staff members who will be undertaking the work:

Tina Seidel is Professor of Education and Chair of the Educational Psychological Department at the Institute of Education at Friedrich Schiller University Jena, Germany. Prior to her appointment in Jena she was Assistant Professor of Education, Vice Head of the Educational Department, and Chair of the Research Committee at the Leibniz-Institute for Science Education at the University of Kiel, Germany. She was Visiting Professor at the School of Education at Stanford University. She is a member of the AERA, the European Association for Research on Learning and Instruction, the German Association of Educational Research, and the German Psychological Association. She served as invited expert for the PISA 2006 Questionnaire Expert Group, and as member of the OECD Joint Committee on a Long-Term Strategy to Study Teaching and Learning. In her capacity as an expert on teaching and learning, she is a member of the Germany PISA 2006 Research Group. Her current work includes (video-based) analysis of cultural patterns in classroom teaching and learning, professional learning of teachers, improvement of university teaching, and educational research designs. Her publications include 'Stability of Teaching Patterns in Physics Instruction: Findings from a Video Study' (with Manfred Prenzel), 'How to Run a Video Study (Technical and Methodological Guide for Video Analysis', with
M. Prenzel and M. Kobarg), and 'The Role of Student Characteristics in Studying

Micro Teaching-Learning Environments'. She is currently working on an OECD thematic report for International Science Teaching and Learning Practices (with M. Walker, B. McCray and M. Prenzel).

Indicative Allocation of Person-Months: FSU		
name	**role**	**PM (total 38)**
Tina Seidel	WP9 Leader	2
Researcher	Collating indicators and instruments, and analysis of data from instruments used within S-TEAM	36 (duration of project)

12. University of Strathclyde (UNIVSTRATH)

The University of Strathclyde is the third largest university in Scotland, has an international reputation as 'a place of useful learning' and is strategically committed to excellence in research, student experience and knowledge exchange. There are five Faculties: Science Engineering, Business, Law/Arts/Social Science and Education. The Faculty of Education has a long and proud history in the field of teacher education and now has more students in programmes of Initial Teacher Education than anywhere else in Britain. Staff also teach courses at postgraduate level, engage in personal research and supervise students undertaking higher degrees. Another major activity is the provision of award-bearing and short courses designed to meet the continuing professional development needs of qualified teachers and other professionals. The Faculty of Education is committed to evaluation and and review and will continue to explore with stakeholders and through research how to deliver excellence in teacher education.

Task allocation

The main task attributed to UNIVSTRATH is leading Work Package 5. The focus is the early professional development of beginning teachers of Science, covering ITE and the first year of induction. It will collate examples and principles of evidence-based good practice in Science Teaching, including the work of SINUS, 'MindtheGap' and the outputs of other WPs, to deliver a tried and tested package of practicable pedagogy for beginners. It will also define in a broader sense what it means to become an effective teacher of Science. UNIVSTRATH is also NLP for Scotland

Previous experience relevant to this task consists of considerable breadth of experience in teaching and teacher education in Science, including specific, recent achievements of a) development of a practice-based theory of pedagogy in investigative science* b) successful completion of the four year ESRC funded (£700k) EPL project (www.ioe.stir.ac.uk/research/projects/epl) c) tried and tested indicators of children's views and teacher interactions, to be adapted for the specific case of new teachers of science

Staff members who will be undertaking the work:

Work Package Leader: Jim McNally, Professor of Teacher Education, former Director of ITE, Lecturer in Science Education, Head of Physics/Science in Secondary School. Seconded to write the Framework for the Induction of New Teachers in Scotland and previously involved in many developments in science education e.g. writer of national curriculum module, independent learning package, exemplar videotape of teaching investigative science; writer of innovative Primary degree with Science as a specialism. Led the EPL project to a successful conclusion, has a range of publications in international journals and has worked across the academic and professional communities.
Researchers: Allan Blake was the research fellow on the EPL Project and has expertise in qualitative and quantitative data analysis, as well as working with practitioners. He will co-ordinate a) adaptation of indicators (scepsati and inquiract) of new teacher effectiveness b) collate range of evidence from STEAM Project overall. Dr. Colin Smith, also from the EPL Project, is an experienced teacher of science, researcher and author of articles in professional journals. He will coordinate the input of practising teachers in adapting evidence for effective practical use. Both researchers will provide rigorous evaluations of implementation along with dissemination of WP deliverables.

Indicative Allocation of Person-Months: UNIVSTRATH		
name	**role**	**PM (total 40)**
Jim McNally	WP5 Leader, NLP, dissemination	9
Allan Blake	Production of 5.1, 5.2, 9.5	25
Colin Smith	Adviser on production of 5.1, 5.2	6

13. Leibniz Institute for Science Education (IPN)

The Leibniz Institute for Science Education (IPN) was founded in 1966 as a research centre for science education. As an institute of the Leibniz Association with a nationwide function, IPN receives basic funds from the federal government and the commission of German states (Länder). IPN is also affiliated to the University of Kiel. The institute's mission is to develop and promote science education through research. Its research therefore deals with the full range of issues concerning teaching and learning in the sciences, inside and outside schools. The institute comprises five departments: Educational Science (including Research Methodology and Statistics), Biology Education, Chemistry Education, Physics Education, and Mathematics Education. Approximately 140 people make up the IPN staff, and about 100 persons are working as scientists with university degrees, including 40 doctoral students.
IPN's tasks range across the entire field of science and technology education. It concentrates on long-term and nationwide research projects, which cannot be covered by universities.
The IPN research program focuses on aims, perspectives and curricula of science education (e.g. conceptions of scientific literacy or standards for science education), teaching-learning processes in science education (e.g. comparative video studies in physics instruction), innovative concepts for science teaching (contextualized chemistry / physics / biology instruction), computer-based diagnostic of competencies and research methodology (e.g. multidimensional adaptive tests; item response modelling), educational monitoring (national surveys), learning in and out of school across the lifespan (e.g. nationwide pilot programs for collaborative teacher professionalization; quality development for extracurricular activities in the mathematical-scientific-technological field).

IPN has headed several nationwide projects to improve science and mathematics teaching and is partner in the EU-FP7 funded project *Mind the Gap* which focuses on improving science teaching through inquiry based science teaching.

Task allocation

Within the German quality and teacher development program SINUS-Transfer a set of 11 modules for improving science and mathematics teaching have been developed, tested and successfully implemented in more than 1.700 schools. The aim of WP3 is to identify relevant modules that apply to the specific situations in the participating countries and disseminate them to different teacher training institutions at a European level.

Staff members who will be undertaking the work:

Manfred Prenzel, Professor, Dr., will be the leader of WP3. He is a professor of Education at the University of Kiel and managing director of IPN and director of the educational department of IPN. He has extensive experience in research on learning and instruction (especially on motivation / interest, conceptual change, transfer, patterns of instruction), with focus on mathematics and science education and quality development, and professional development in education.

Matthias Stadler, Dr., is a postdoctoral researcher. He has worked for more than 4 years at IPN coordinating the quality and teacher professional development program SINUS-Transfer.

Indicative Allocation of Person-Months: IPN		
name	**role**	**PM (total 34)**
Manfred Prenzel	WP3 Leader, NLP, dissemination	5.5
Matthias Stadler	Production of 3.1-3.5	28.5

Deliverable	**Person Months (senior researcher)**	**Remarks**
National workshops	4	
Training packages	15	1 PM each plus 1PM for overall coordination
Web access and feedback	6	
Reports	3	1 + 2
TOTAL	28	

14. Universidade de Santiago de Compostela (USC)

The University of Santiago de Compostela (USC) is one of the oldest in Europe (1495). It has over 30.000 students, 2.200 research and teaching staff and 1000 administrative staff. It is organised in two campuses in the cities of Santiago de Compostela (Unesco World Heritage) and Lugo, which hold 19 Faculties and Technical Schools, offering a wide range of degrees, from Humanities to Technical, and 67 doctoral programs, plus Master and Postgraduate degrees. Research and Technology Development (RTD) is carried by its 300 research teams, which in the last five years have executed over 650 research contracts with Public Funding Offices, 750 with industry and SMEs and 1150 technology contracts. It has participated in over 100 projects under the EU RTD Framework Programmes. Its official language is Galician, close to Portuguese, and Spanish is co-official. The Faculty of Education and the Science Education Department (Departamento de Didáctica das Ciencias Experimentais, DDCE), within it, is involved in Teacher Education, both primary and secondary. The Science Education Department runs a doctoral program, certified as a Quality programme, with a focus on discourse analysis and argumentation through classroom-based studies. The DDCE is involved in USC-headed projects, from the Spanish funding agency and under the Spanish-Latinoamerican framework, in a long-standing cooperation in particular with Brazil and Argentina universities. Currently it is participating in the EU funded project Mind the Gap. It has also a long tradition of cooperation with practising primary and secondary school teachers, who form part of its action-research teams.

Task allocation

The main tasks attributed to USC are the leadership of WP7 (assisted by UNIVBRIS). This involves coordinating the implementation and dissemination of training resources and strategies for supporting teaching and learning in argumentation and other discursive practices in science classrooms. It will also support teachers in addressing citizenship issues through argumentation. It will contribute its expertise in the design of learning environments and authentic tasks to promote argumentation, developed since 1994.

Staff members who will be undertaking the work:

Maria Pilar Jiménez–Aleixandre, Professor, will be the WP7 leader. She is Science Education Professor in the faculty of education of USC, with a background in biology, and previous experience as high school teacher and as coordinator of the Spanish in-service teacher training programme. She is Principal Investigator in a project on the development of scientific competencies on argumentation, use of evidence and epistemic practices, part of the DDCE research program, and has also been responsible for research on the factors affecting girls' options in technical education, and for other international collaborations. She is the author of more than 100 papers and book chapters

Juan Ramón Gallástegui Otero, will be the WP7 assistant leader, and responsible for the country national role. He is lecturer in the faculty of education of the USC, teaching science methods and environmental education. His previous positions included teaching high school physics and chemistry. He is completing his doctoral research, focusing on the quality of students' questioning, as part of classroom discursive practices, as well as on the use of chemistry models by secondary school students. He has authored over 30 papers and book chapters.

Blanca Puig Mauriz, is a PhD student in the DDCE doctoral program. Her research explores students' use of evidence in the construction of arguments, with a focus on the permanence of biological determinism in students' explanations about

human “racial” differences. An outcome will be a methodological frame for evaluating the use of evidence by secondary school students, as well as suggestions for citizenship education in connection with “racial” issues.

Indicative Allocation of Person-Months: USC		
name	**role**	**PM (total 24)**
Maria Pilar Jiménez–Aleixandre	WP7 leader, Production of 7.1, 7.2-7.4	7
Juan Ramón Gallástegui Otero	NLP, Production of 7.1, 7.2-7.4	9
Blanca Puig Mauriz	Production of 7.2-7.4	8

15. University of Helsinki (HU)

The University of Helsinki has the widest range of disciplines in Finland. It was established in 1640. The number of faculties is eleven. There are 38,000 degree students and 7,600 staff. The number of degrees taken each year is almost 4,300, of which 400 are doctorates. The University concentrates on high-level scientific research and researcher education. The University operations support the development of society, as well as business and industry. The University has strong international connections. The active partner in the project is Department of Applied Sciences of Education. The Department is divided into four sections: Class teacher education, Subject teacher education, Kindergarten teacher and early childhood education, Special education.

The partner has developed web-based video libraries where several teaching models for science student teachers, and has also research and development activities dealing with teachers' knowledge, based partly on Pedagogical Content Knowledge and partly on practitioner knowledge and professional knowledge.

Task allocation

Within WP 2 and 3, HU will participate in the data gathering and dissemination activities. For WP2 we will write a report of science teacher education in Finland and provide other necessary official documents which are needed by the WP2 leader. As NLP, HU will disseminate SINUS information, from WP 3 in Finland.
Within WP6, HU is participating actively in developing and distributing innovative methods in teacher education. Our activities are dealing with teacher knowledge. HU will also participate the evaluation activities (WP9) and general dissemination activities (WP 10).

Staff members who will be undertaking the work:

Jari Lavonen, PhD, Professor, has worked since 1985 in pre- and in-service science teacher education. He has been active in developing instruction in teacher education. He is a director of the Finnish Graduate School for Mathematics and Science Education. His main research interests are connected to science teaching and learning, science teacher education and ICT use in science education and in teacher education. He has published 145 scientific papers in scientific journals, refereed conference proceedings and books; 44 general articles and 119 textbooks.

Kalle Juuti, PhD, is a senior lecturer in physics and computer science education. He teaches science education in primary school and upper secondary school teacher education programmes. His research interests are: ICT use in science education and teaching and learning science.

Jarkko Lampiselkä, PhD, is a senior lecturer in chemistry and physics education. He teaches science education in primary school and upper secondary school teacher education programmes. His research interests are: teaching and learning science.

Heidi Krzywacki-Vainio, MEd, is an assistant in mathematical subjects. She is writing her doctoral thesis in the field of mathematics teacher education.

Indicative Allocation of Person-Months: HU		
name	**role**	**PM (total 12)**
Jari Lavonen	NLP, HU leader, dissemination	3
Kalle Juuti	Production of 6.11	3
Jarkko Lampiselkä	Production of 6.11	3
Heidi Krzywacki-Vainio	Production of 6.11	3

16. Tallin University, Center of Educational Technology (TLU)

Tallinn University is the third largest public university in Estonia with 7800 students in 17 research institutes and two colleges. Centre for Educational Technology (CET), established in 1998, is an interdisciplinary R&D unit within the Institute of Informatics. CET works in close collaboration with the Institute of Mathematics and Natural Science. CET staff consists of 14 full-time researchers, software developers, project managers, educational technologists, some part-time employees and a group of postgraduate students. Scientific and technological qualifications of CET staff combine deep pedagogical knowledge, technological programming and development skills, and experiences of empirical research in authentic educational and work settings in the field of ICT and science education. The main ongoing scientific research projects in CET are related to developing the new generation of distributed learning environments consisting of interoperable free social software and other pedagogical ICT applications, and self-directed learning in hybrid environments. CET has been actively participating in the European FP6 IST projects Calibrate and iCamp. Science education and teacher education serve as one of the main testing grounds of CET activities.

Task allocation

CET has developed several open-source software solutions that can be potentially applied in the S-TEAM project as mediators supporting the use of innovative methods in science classrooms what the project targets. These tools are: an electronic portfolio system DiPo (http://eportfoolio.opetaja.ee) for competence management and reflection upon pedagogical practices and collaborative learning resource authoring platform LeMill .

Staff members who will be undertaking the work:

Kai Pata, Senior researcher in CET, holds PhD in Education (University of Turku, Finland), MSc in Science Education (University of Tartu, Estonia). Her main expertise is in learning management in distributed learning environments and social systems for inquiry learning, tutoring models and scaffolding elements in web-based collaborative learning environments, and cognitive aspects of constructivist and socio-cultural learning in inquiry learning environments. She has been responsible at the 6th Framework projects (BIOHEAD-CITIZEN, iCamp) as a pedagogical expert.
Priit Reiska, Professor of science education at the Institute of Mathematics and Science, TLU. He holds the Dr. sc. paed. habil. degree in physics didactics from the University of Kiel (2002). He coordinates two national research projects: The Impact of Different Dimensions of Interdisciplinary Instruction on the Development of Students` Science Literacy and Promoting teachers' understanding of the Nature of Science and its relationship with the Nature of Science Education as a step for improving student attitudes towards science. He has been involved in PISA.
Mart Laanpere, Head of CET, MSc in Educational & Training Systems Design (University of Twente, the Netherlands). He has participated in a number of R&D projects in the field of educational technology (e.g. Calibrate and iCamp). His main focus in research and teaching is instructional design of online courses, conceptual design of e-learning systems and tools, and implementing ePortfolios for competency management in teachers' professional development.

Terje Väljataga, Researcher in CET, MSc in geo-ecology (TLU), MSc in Educational & Training Systems Design (University of Twente, the Netherlands). Currently she is a 3rd-year PhD student in Tampere Technical University (Finland), investigating self-directed learning with distributed learning environments. She has been working as a science teacher in a secondary school in Tallinn.

Indicative Allocation of Person-Months: TLU		
name	**role**	**PM (total 12)**
Kai Pata	TLU Leader, NLP, design input, dissemination	4
Priit Reiska	Design input, 10.2	2
Mart Laanpere	Supervision, dissemination	3
Terje Väljataga	Design input, 10.2	3

17. The Technion – Israel Institute of Technology (IIT)

For more than eight decades the Technion - Israel Institute of Technology has been Israel's primary technological university and its largest centre of applied research. It is ranked among the 25 leading technological universities in the world. Many innovations in all fields of science, technology, engineering and life sciences have their origins in research conducted at the Technion. An example of one of the Technion's recent achievement is the 2004 Nobel Prize in Chemistry granted to Professors Avram Hershko and Aaron Ceichanover for their pioneering research on degradation of intracellular proteins. The Technion occupies about 1,325,000 square meters and includes 100 buildings. There are about 40 research centres, 11 research institutes and 10 Centres of Excellence. At present there are approximately 8,448 undergraduate students, 2,553 M.Sc. students and 1,499 Ph.D., M.D. and D.Sc. students - a total of 12,500 students. Since 1929 79,358 students have graduated. There are over 650 faculty members and 58 spin-off companies. Since its foundation in 1965, the Department of Education in Technology and Science has been widening the range of its functions. The tasks of the department includes the training of high school mathematics, science and technology teachers, offering masters and doctoral degrees, providing in-service teacher education, as well as leading a wide range of projects, and a very active research and development centre.

In addition to the scientific staff, IIT has a dedicated administrative staff with extensive experience in research management, legal issues and financial management of EU-projects.

Task allocation

The main tasks attributed to IIT are development and evaluation of novel pedagogical approaches based on dialogic teaching (WP7, WP8), responsibility as a national liaison point for carrying out the local surveys and studies in Israel (WP2, WP3, WP9), as well as contributing expertise particularly involving science communication (WP10).

Staff members who will be undertaking the work:

Ayelet Baram-Tsabari, Ph.D., Lecturer for Biology Education and Science Communication at the Department of Education in Technology and Science. Her professional background is a combination of academic research in the field of science education, focused on innovative teaching strategies and students' interest in science; and the active communication of science in the mass media.

Ran Peleg, a Ph.D. student at the Department of Education in Technology and Science, and an active performer and producer of Science Theatre. He will investigate ways in which theatre and drama can be utilized as an educational tool for science teaching in order to enhance scientific literacy and positive attitudes to science among school children, and provide recommendations for science educators as to the utilization of drama in conjunction with the formal science program.

Galit Hagay, a Ph.D. student at the Department of Education in Technology and Science and an active high-school biology teacher. Galit will identify high school students' personal and specific interests in three biology topics. Based on her findings she will develop, enact and evaluate a curricular intervention which is based on student-interest focused biology learning materials and teaching strategy.

Indicative Allocation of Person-Months: IIT		
name	**role**	**PM (total 14)**
Ayelet Baram-Tsabari	IIT leader, media adviser	6
Ran Peleg	Production of 8.4	4
Galit Hagay	Production of 8.3	4

18. Mälardalen university (MDU)

Mälardalen University is a state university college established in 1977. There are 15,000 students enrolled. There are 1080 employees of which 750 academic staff, with 42 professors (of whom 6 are women). Didactic research is one of the research subjects in focus in the research strategy together with Real Time systems, Process & Resource Optimization, Innovation & Design, Health, Working life & Welfare, and Environmental & Energy Technology. The teaching program is linked to science education research and didactics in the School of Education, Culture and Communication. Educational research is performed by 6 professors and 15 senior lecturers. All research performed at Mälardalen University is under sustainability control, and MDU was the first university in Europe to be certified according to ISO 14001 standards, and still holds this certificate. The University participates in some ten national research schools and conducts graduate studies within the technological branch of scholarship. A Master program in Didactics starts in 2010.

Task allocation

The main tasks attributed to MDU in WP6 are work with teacher collaboration groups in a sustainable way, bridging the gap between science teachers and science education research. By giving seminars and training packages for teachers in schools, MDU will disseminate research informed knowledge from dialogic teaching and teaching for education for sustainable development. MDU will produce video-films from teaching sequences when teachers collaborate in learning studies, and produce teaching materials providing dialogic teaching and teaching for sustainable development. MDU will, within WP6, focus on collaboration with the University of Leeds, University of Aarhus, the Hacettepe University and Technion (Israel) and will disseminate and interchange teaching sequences whilst comparing experiences. We will contribute to papers about dialogic teaching and education for sustainable development. We are able to start teacher collaboration groups in primary, secondary and upper secondary school, and between pre-service and in-service teachers.

Staff members who will be undertaking the work:

Margareta Enghag, Dr., is Senior Lecturer and researcher in the field of communication in the classroom. She studies discourse patterns during small group works and laboratory work. She has special interest in student ownership of learning, seen as actions of choice and control, both in groups and as individuals, and in student-generated questions. She has on-going research with teacher collaboration in learning studies for physics in schools with dialogic teaching. She has been a visiting academic at the University of Leeds. She works with new physics courses aiming to include education for sustainable development and dialogic teaching into the classroom.

Per Sund PhD gives courses in the teacher programme about the education for sustainable development approach (ESDA).

Susanne Engström teaches technology didactics in the teacher program, and her PhD studies are in approaching sustainable energy into school science courses.

Birgitta Brorsson, Dr., is Senior Lecturer and an expert on teacher evaluation of students' written texts. Her focus is making teachers become more aware of the importance of writing discursive texts and the specific genre features of different subjects as well as of the learning potential that writing represents. She works with teacher focus groups in schools.

Indicative Allocation of Person-Months: MDU		
name	**role**	**PM (total 18)**
Margareta Enghag	MDU leader, dissemination and collaborative activity with UNIVLEEDS, JyU, AU	6
Per Sund	Production of 6.5, 6.6, dissemination	4
Susanne Engström	Production of 6.5, 6.6, dissemination	4
Birgitta Brorsson	Production of 6.5, 6.6, dissemination	4

19. Hacettepe University (HUT)

HUT is one of the largest universities in Turkey with 25,800 students and 3,479 academic staff. The university has participated in several projects under the EU Framework Programmes and EU Education and Youth Programmes. The university has 13 faculties, 9 schools, 1 conservatory, 13 institutes, 35 research and application centres.
The Faculty of Education has a long history in the Turkish Education System, carrying out educational and instructional activities since 1983. The faculty is able to meet the challenge of contemporary education through its highly-qualified academic staff who are open to change and development and also benefit from international experience and cooperation. Faculty of Education has 16 programmes under five departments (Computer Education and Instructional Technology, Educational Sciences, Secondary Science and Mathematics Education, Foreign Language Education and Elementary Education) with 3,675 undergraduate and 325 postgraduate students.
HUT has researchers with extensive experience in science curriculum development, in-service teacher training activities and in other projects funded by the EU to improve the quality of education. In addition, HUT has a collaboration agreement with more than 50 kindergarten, primary and secondary schools.

Task allocation

HUT is the Turkish national liaison point (NLP) of the project and will be responsible for establishing a working relationship with partner institutions, providing information about national policy and practice to WP2 and creating networks with national stakeholders (WP10). In addition, HUT will introduce, disseminate and develop SINUS & SINUS-Transfer programs in teacher education (WP3), and integrate scientific literacy and Nature of Science studies into teacher education (WP6)

Staff members who will be undertaking the work:

Gultekin Cakmakci, Ph.D., Lecturer, will be the Turkish national liaison point (NLP) of the project. He received his BSc. degree in Chemical Engineering from Ankara University, MA in Science Education from the University of York, U.K. and Ph.D. in Science Education from the University of Leeds, U.K. He teaches courses on science education and does consultancy in engineering education. His research interests focus on developing scientific literacy among students/teachers, and on the design, implementation and evaluation of science teaching. He has been responsible for several national projects on out-of-school science education.

Buket Akkoyunlu, Professor, holds a Ph.D. in Educational Technology from the University of Leicester. She is currently the Dean of the Faculty of Education, Hacettepe University. Her main research areas include information literacy, web-based learning, multi- media learning, and instructional design. She has conducted research and published articles and books in the fields of educational technology, web-based learning and multimedia learning.

Yalcin Yalaki, Lecturer, completed his Ph.D. at Florida State University with a thesis on the influence of teacher worldviews on science teaching. He has been teaching science education courses including chemistry, science-technology-society, and science teaching since 2004. His research interests have centred on science teacher education, formative assessment and worldviews in science education.

Zeki Bayram, Lecturer, worked as a high school chemistry teacher for two years and then completed his Ph.D. at Ecole Normale Supérieure de Cachan, France with a thesis about how to check the influence of laboratory activities on learning chemistry. His research interests focus on formative assessment and influence of lab work on learning science and science process skills. He teaches courses on chemistry and science education.

Indicative Allocation of Person-Months: HUT		
name	**role**	**PM (total 12)**
Gultekin Cakmakci	NLP leader, dissemination	4
Buket Akkoyunlu	Production of 8.6, dissemination	2
Yalcin Yalaki	Production of 8.6, dissemination	3
Zeki Bayram	Production of 8.6, dissemination	3

20. University of Jyväskylä (JyU)

The University of Jyväskylä is a rapidly growing multidisciplinary university which was established in 1934 as Jyväskylä College of Education. Natural Sciences and Mathematics, Sport and Health Sciences and Teacher Education form the core fields of research and education of the University of Jyväskylä. The University has seven faculties including the faculty of Information Technology and the faculty of Sport and Health Sciences which is the only one in Finland. The University of Jyväskylä is one of the largest, most attractive and dynamic research-universities in Finland, with over 16 000 students, including international students from some 70 countries. Our highly valued international partner universities are located on all continents. At the moment we have about thirty ongoing EU Framework Programme projects. As a multidisciplinary organisation, the University of Jyväskylä has a strong commitment to develop human-oriented approaches to future technologies. The University is also known for its active role in developing innovations in education and research, especially in collaboration with business and commerce, and other actors of the region. Agora Centre, Nanoscience Centre, Viveca and the Accelerator Laboratory bring together experts from research and enterprises.

We have experience in research in teacher students' and in-service teachers' interaction with the students via talk. In our teacher education courses we have developed methods for analysing time-content-based description of classroom discourse, especially concentrating on the continuity of discourse. We have also developed and evaluated new evidence-based teaching materials for use in normal school contexts.

Task allocation

The Department of Teacher Education at JYU will mainly be involved in the relationship of innovative methods and professional development within WP6.

Staff members who will be undertaking the work:

Jouni Viiri, Ph.D., Prof, is a professor in mathematics and science education at the Department of Teacher education in JYU. He has thirty years experience in teaching at various schools, text book writing and research in science education. He has also considerable experience in teacher education and supervision of PhD students.

Ilkka Ratinen, Ph.D., Lecturer, is a lecturer in science education at JYU. His main research interest is in environmental and geography education. He has experience in initial teacher education and also in-service teacher education.

Indicative Allocation of Person-Months: JyU		
name	**role**	**PM (total 9)**
Jouni Viiri	WP6c/d - leader for JyU	2
Ilkka Ratinen	Assistant leader JyU, production of 6.5, 6.6 in collaboration with MDU/UNIVLEEDS	4.5
PhD student	Production assistant	2.5

21. Åbo Akademi University, The Faculty of Education (ABO)

Åbo Akademi University is the only completely Swedish-medium university in bilingual Finland. The university offers both undergraduate studies and extensive research opportunities to some 7,500 students on three campuses. The university has an acknowledged national position at the forefront of research in such areas as biosciences, computer science and process chemistry.
The Faculty of Education, located in Vaasa on the west coast since 1974, is responsible for all Swedish teacher education in Finland. The Faculty educates Bachelors, Masters and Doctors of Education. The Bologna process has not brought drastic changes to Finnish teacher education as it has been fully integrated in the university degree system since 1979.

ABO seeks to improve the quality of teacher education and teacher professionalism throughout the teaching career. Current research includes learning and education from a late-modernity perspective with the aim of developing knowledge about these processes e.g. in relation to the increasing multiculturalism in society and digital culture. Since 1996, the Faculty of Education has hosted a Resource Centre for Chemistry Didactics, which primarily is focused on developing teaching materials and providing in-service education for chemistry teachers. At the moment, we are also increasing our experience in supporting recently qualified teachers through mentoring, a competence that can be applied to different subject-fields of teaching. Under the lead of Professor Sven-Erik Hansén, ABO will form a group within the network with experiences and expertise in both science, general and intercultural education.

We see the possibilities for synergy from the joint forces of our respective fields of expertise, as this will provide a more comprehensive approach towards the different variables that need to be taken into account for the successful learning of more students.

Task allocation

We will cooperate with partners in WP6 to further disseminate and upscale results from research constituting experiences of good teaching practices to science teachers. This will be possible through the work of the Resource Centre, through participation in workshops and conferences and by contributing with written material within the work of the WP.

Staff members who will be undertaking the work:

Kaj Sjöholm, PhD, is professor of Foreign Language Education at the Faculty of Education at Åbo Akademi University. Sjöholm's research interests centre on foreign language acquisition and teaching in multilingual and multicultural settings and CLIL (Content and Language Integrated Learning). He is also involved in research in teachers' professional development, and is, together with professor Sven-Erik Hansén, the leader of the project "Teacher professionalism and the Bologna process".
Berit Kurtén-Finnäs, MSc, PhD, teacher educator and leader of the Resource Centre, defended her doctoral thesis in 2008 on the use of open investigations and V-heuristics in grade 7; design research, implementation and classroom research.
Liselott Forsman, EdLic, PhD, teacher educator, is an action researcher working with the competence of teachers to support the learning of all students in the multicultural classroom, incl. principles for cooperation between teachers and with parents. She has an interest in making teacher education itself more investigative, e.g. through the use of action research principles, to get away from a transmission-model of learning.

Indicative Allocation of Person-Months: ABO		
name	**role**	**PM (total 9)**
Kaj Sjöholm	Supervisory and dissemination	As required
Berit Kurtén-Finnäs	Production of WP6g, dissemination	5.5
Liselott Forsman	Production of WP6g, dissemination	3.5

22. Gazi University (GU)

Gazi University was founded in 1926 as the first teacher training institution in the new republic's capital Ankara. Since then it has grown to be the largest teacher training institution in Turkey. Currently more than 10,000 students are enrolled in 9 departments and 26 programs of The Gazi Faculty of Education. Gazi University and The Gazi Faculty of Education are among the largest research institutions in the country as well. In 2007 the university applied for 15 projects under EU's 7th Framework Programme, 11 of which will be coordinated by Gazi University staff. The university has a total of 16 faculties and 6 institutes for graduate studies.

Teacher Education. From the 26 programs of the Gazi Faculty of Education more than 1,000 primary teachers and around 350 secondary teachers graduate each year. The programs cover a wide range of fields from classroom teaching to IT technologies, in education, science, mathematics, arts, social studies, history, language, and teaching of the handicapped. Faculty members constantly become involved in the Ministry of National Education's projects to develop and enhance education in Turkey, including projects in Curriculum development, textbook writing for courses, and in-service teacher training. They also coordinate and undertake graduate education through the Institute of Education and hence get involved in research in various fields of education.

Task allocation

Gazi will contribute trainng materials on the use of computer-aided animations in science education and will assist HUT in disseminating IBST/E in the Turkish national context.

Staff members who will be undertaking the work:

Mehmet Fatih Tasar, Assoc. Prof., is a professor of science education. His main research interests are teaching and learning physics, cognitive foundations of learning, and history and philosophy of science. He was involved in the recent curriculum reform efforts in Turkey which began in 2003 and continue today. He has published in international and national journals and has presented his scholarly works in many international and national meetings. Dr. Tasar is actively involved in science education research and serves as an academic advisor to several masters and doctoral students.

Betül Timur, Research Assistant, is a certified science teacher and holds a masters degree in science education. She has designed and conducted research on teaching scientific inquiry. She is a doctoral candidate in science education. Her main research interests are inquiry teaching methods, place and importance of science process skills, and pedagogical content knowledge.

Hasan Özcan, Research Assistant, is a certified science teacher and holds a masters degree in science education. She has designed and conducted research on the misconceptions of school children and prospective science teachers. He is a doctoral candidate in science education. His main research interests are history and philosophy of science, physics education, and utilizing computer technologies in science teaching and learning.

Indicative Allocation of Person-Months: GU		
name	**role**	**PM (total 12)**
Mehmet Fatih Tasar	WP6k leader and dissemination for GU in WP10	4
Betül Timur	Technical production, 6.14	4
Hasan Özcan	Technical production, 6.14	4

23. University of Aarhus (AU)

The University of Aarhus (AU) was founded in 1928 and is divided into eight faculties. The University has 5700 employees, 30.000 students on bachelor and masters programmes, 2000 PhD students, and an annual budget of more than 490 M€. In the latest rankings from the Times Higher Education Supplement, the University of Aarhus ranks among the best in Europe. The University maintains close ties with the city government and the business sector and continuously works to strengthen its international profile.

The Department of Science Studies is located at the Faculty of Science, University of Aarhus. Research and education is conducted in two areas: One concerns research in science education and science communication. Among current topics of interest are motivational aspects of science education, science learning in informal settings, and teacher education. 6-7 researchers and teaching staff are involved in these activities. The other area concerns research in history of science, philosophy of science, and history of technology. 13 researchers are involved. The Department of Science Studies provides several undergraduate and graduate courses in science studies, science education and science communication including a continuing programme “Master in Science Education”. The Department also provides PhD programmes in Science Education and in History of Science. The Department collaborates with the Department of Science Education at the University of Copenhagen, The Centre for Studies in Science and Mathematics Education (CSSME) at The University of Leeds, and with Universe Research Lab, Sønderborg, Denmark.

For a more than a decade the department has been involved in research and development projects directed at upper secondary level plus a number of in-service training courses directed towards science teachers. The department’s research-based improvement of science education has led to a strategy in which experienced science teachers from upper secondary have been recruited and have qualified for research work. All participating academic staff thus have an intimate knowledge of school science and school culture, and are experienced in collaborating with science teachers in development projects. Furthermore, they all have a research emphasis on students’ motivation in relation to school science.

Task allocation

The AU contribution to the present project will investigate how established knowledge about students’ motivation can be used to enhance teachers’ practices. It will also investigate how teacher training in informal learning contexts affects learning motivation.

Staff members who will be undertaking the work:

Keld Nielsen, Associate professor, MSc, PhD, is a historian of science and Head of Department. He has served on several government commissions advising on science education and science communication.
Hanne M. Andersen, Research assistant, MSc, PhD, does research on students’ interest in science, based on mixed methods. She has a long career as science teacher and extensive experience with research and development projects at upper secondary level.
Lars B. Krogh, Assistant professor, MSc, PhD, does research on students’ interest in science, based on mixed methods. As a teacher he has participated in action research and all sorts of developmental work at upper secondary level.

Indicative Allocation of Person-Months: AU		
name	**role**	**PM (total 12)**
Keld Nielsen	WP6f Leader	8
Hanne M. Andersen	Assisting in package WP6f, 6.9	3
Lars B. Krogh	Technical adviser	1

24. The European University-Cyprus (CYCO)

The European University-Cyprus (formerly AS Cyprus College Limited) is a newly established University and one of the leading research institutions in Cyprus. Its 8 different Departments include a strong Department of Educational Sciences and a number of research centres and units, including the European University Research Centre, the Foundation of Social and Political Studies, and the Centre for the Study of Childhood and Adolescence. The University has been involved in research projects funded by national and international research institutions and the European Commission (FP7 and FP6 programmes, the Life-Long Learning 2007-2013 programme (Leonardo, Comenius, Grundvig) the 2004-2006 Leonardo, Comenius and Socrates programmes). It represents Cyprus in the International Social Survey Program, it has been appointed by the International Bank as the official administrator of their publications on Cyprus, and it is the national coordinator of the European Social Survey.

The Learning in Science Group (LSG) conducts a co-ordinated program of research, curriculum development and instruction. Through in-depth investigations of student understanding, it seeks to identify and analyze common difficulties that students encounter in their effort to construct meaning in science and to develop the reasoning, investigative and communication skills. The LSG also has extensive experience in preparing future teachers to teach science and technology as socially relevant processes of inquiry and in the provision of on-going professional development to in-service teachers. We have been engaged for a number of years in research projects that involve collection and analysis of videotaped snippets of authentic learning and have developed broad expertise in developing video case studies of classroom environments for science teaching and learning.

Task allocation

CYCO will undertake the leadership of WP6 related to continuing professional development of science teachers. This includes the responsibility of investigating the professional development needs of science teachers, and closely collaborating with science teachers to collect videotaped data of authentic science teaching and developing a series of teacher-authored video-case studies of science teaching and learning. It will be further responsible for developing, implementing and evaluating a professional development seminar for in-service science teachers that will utilize the teacher-authored video-case studies as curriculum materials.

Staff members who will be directing the work:

Consantinos P. Constantinou, Ph.D., Associate Professor, will be the partner leader. He is an associate professor in Science Education and Director of the Learning in Science Group, with more than 20 years' experience in teaching and research for Science Education in Cyprus, and has been responsible for several national and international projects as well as the development of training and professional developments seminars for science teachers.

Loucas T. Louca, Ph.D., Assistant Professor, will be the assistant partner leader. He is an assistant professor in Science Education at the European University-Cyprus. He has been involved in managing a number of locally funded research studies focusing on the science teacher's perceptions of students reasoning abilities and difficulties in science, and the teacher's abilities for identifying, interpreting, evaluating and appropriately responding to their students' reasoning in science.

Indicative Allocation of Person-Months: CYCO		
name	**role**	**PM (total 42)**
Consantinos P. Constantinou	WP leader, technical direction	4.5
Loucas T. Louca	Assistant leader, technical direction	4.5
Researcher	Identifying professional development needs, case studies	8
Post-doctoral student	Identifying professional development needs, case studies	12
Technical Personnel	Collating/editing video material	7
Graduate Student	General assistance, package editing	6

25. Université de Haute Bretagne (UHB)

The reseachers in the UHB team belong to the CREAD (Centre de Recherches sur l'Education, les Apprentissages et la Didactique) and to IUFM Bretagne, the teacher's training institute in Brittany.
CREAD's research work concerns science education both at primary and secondary school levels. The approaches developed are didactical analysis; in particular analysis of potential innovative methods and teacher training devices (with or without an ICT component).
In IUFM Bretagne, 320 primary school teachers, and 120 maths and science teachers are trained each year. The IUFM has a Centre of Resources for Self-Training in Science (CAREST), dedicated to initial and in-service teacher training, directed towards innovative methods. CREAD and IUFM are also involved in national in-service training actions, for teachers, but also for teacher educators.

Task allocation

UHB will contribute material from the Pairform@nce and PEGASE projects to WP4 and WP7, and will also contribute to the creation of a dissemination strategy for France in WP4.

Staff members who will be undertaking the work:

Ghislaine Gueudet will act as group coordinator. She is assistant professor (maître de conférences) in mathematical didactics. In her research works, she focuses on the interactions between teachers and teaching resources (ICT resources, or curriculum materials), and the associated teacher development.

Sylvain Laubé is Assistant Professor (Maître de Conférence), Director of the "PaHST" research group (Patrimony, History of Science and Technology). His research concerns mainly Epistemology and History of Sciences for teacher training, online resources for teachers and students, design processes and teachers' scenarios-in-use.

Gérard Sensevy is a professor in Learning & Teaching Sciences. His main interests lie in Action Theory in Didactics, Comparative Didactics, Mathematics Education, and Epistemology of Sciences. Currently he is the director of CREAD. As a Teacher Educator, he works on Science and Mathematics Teaching with primary school teachers in collaborative groups.

Indicative Allocation of Person-Months: UHB		
name	**role**	**PM (total 15)**
Ghislaine Gueudet	group coordinator	8
Dominique Forest	production	1
Sylvain Laubé	Adviser on History of Science resources	3
Gérard Sensevy	WP4, 7, 10	3

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End of proposal