THEME [SiS.2013.2.2.3-1]
[Research on the role of teaching methods and assessment methods in addressing low achievement in the field of Mathematics, Science and Technology (MST)]

Grant agreement for: Collaborative project*

Annex I - "Description of Work"

Project acronym: FaSMEd

Project full title: " Improving progress for lower achievers through Formative Assessment in Science and Mathematics Education "

Grant agreement no: 612337

Version date:

Table of Contents

Part A

Workplan Tables

A1:
Project summary

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per project

General information

Project title [3]	Improving progress for lower achievers through Formative Assessment in Science and Mathematics Education		
Starting date [4]	01/01/2014		
Duration in months [5]	36		
Call (part) identifier [6]	FP7-SCIENCE-IN-SOCIETY-2013-1		
Activity code(s) most relevant to your topic [7]	SiS.2013.2.2.3-1: Research on the role of teaching methods and assessment methods in addressing low achievement in the field of Mathematics, Science and Technology (MST)		
Free keywords [8]		Education Mathematics Science Technology Innovation Classroom response systems Low achieving Students Teaching Formative Assessment Secondary Primary	

Abstract [9]

The project aims to research the use of technology in formative assessment classroom practices in ways that allow teachers to respond to the emerging needs of low achieving learners in mathematics and science so that they are better motivated in their learning of these important subjects.
This international project will adapt and develop existing research-informed pedagogical interventions (developed by the partners), suited to implementation at scale, for working with low attaining pupils and transforming teaching.
The project will seek to: report the differences in the way that systemic structures influence the trajectories of lower achieving students within the participating countries; identify their typical pathways through the school system and reveal the educational opportunities that are open to these students. It will report on the varying assessment tools that are used to identify lower achieving students and may determine these pathways, with attention paid to the different interpretations of low achievement in each country.
This project aims to:
• foster high quality interactions in international classrooms that are instrumental in raising achievement for low achievers;
• expand our knowledge of technologically enhanced teaching and assessment methods addressing low achievement in mathematics and science
Major objectives for the project are to:
• offer approaches for the use of new technologies to support the formative assessment of lower achieving students.
• develop sustainable teaching practices that improve attainment in M&S for the targeted students.
• produce a toolkit for teachers to support the development of practice and a professional development resource to support it
• disseminate the outcomes

A2:
List of Beneficiaries

Project Number [1]	612337	Project Acronym [2]	FaSMEd

List of Beneficiaries

No	Name	Short name	Country	Project entry month[10]	Project exit month
1	UNIVERSITY OF NEWCASTLE UPON TYNE	UNEW	United Kingdom	1	36
2	THE UNIVERSITY OF NOTTINGHAM	UNOTT	United Kingdom	1	36
3	ECOLE NORMALE SUPERIEURE DE LYON	ENS de Lyon	France	1	36
4	NATIONAL UNIVERSITY OF IRELAND MAYNOOTH	NUIM	Ireland	1	36
5	Pädagogische Hochschule Freiburg	PHF	Germany	1	36
6	UNIVERSITA DEGLI STUDI DI TORINO	UNITO	Italy	1	36
7	UNIVERSITEIT UTRECHT	UU	Netherlands	1	36
8	The AIMS Trust	AIMSSEC	South Africa	1	36
9	HOGSKOLEN I SOR-TRONDELAG	HiST	Norway	1	36

A3:
Budget Breakdown

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One Form per Project

Participant number in this project [11]	Participant short name	Fund. %[12]	Ind. costs[13]	Estimated eligible costs (whole duration of the project)					Requested EU contribution
				RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D	
1	UNEW	75.0	T	270,905.60	0.00	27,520.00	88,078.40	386,504.00	318,777.00
2	UNOTT	75.0	T	298,700.80	0.00	0.00	0.00	298,700.80	224,025.00
3	ENS de Lyon	75.0	T	194,694.40	0.00	0.00	14,756.80	209,451.20	160,776.00
4	NUIM	75.0	T	200,988.80	0.00	0.00	19,283.20	220,272.00	170,024.00
5	PHF	75.0	T	274,328.00	0.00	0.00	20,803.20	295,131.20	226,549.00
6	UNITO	75.0	T	255,414.40	0.00	0.00	16,129.60	271,544.00	207,689.00
7	UU	75.0	A	206,039.00	0.00	0.00	10,701.00	216,740.00	165,230.00
8	AIMSSEC	75.0	S	275,494.00	0.00	0.00	14,538.00	290,032.00	221,158.00
9	HiST	75.0	F	266,416.80	0.00	0.00	24,036.00	290,452.80	223,848.00
Total				2,242,981.80	0.00	27,520.00	208,326.20	2,478,828.00	1,918,076.00

Note that the budget mentioned in this table is the total budget requested by the Beneficiary and associated Third Parties.

*** The following funding schemes are distinguished**

Collaborative Project (if a distinction is made in the call please state which type of Collaborative project is referred to: (i) Small of medium-scale focused research project, (ii) Large-scale integrating project, (iii) Project targeted to special groups such as SMEs and other smaller actors), Network of Excellence, Coordination Action, Support Action.

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project, and it cannot be changed. The project number **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

2. Project acronym

Use the project acronym as indicated in the submitted proposal. It cannot be changed, unless agreed during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry info force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a detailed justification on a separate note.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Activity code

Select the activity code from the drop-down menu.

8. Free keywords

Use the free keywords from your original proposal; changes and additions are possible.

9. Abstract

10. The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

11. The number allocated by the Consortium to the participant for this project.

12. Include the funding % for RTD/Innovation – either 50% or 75%

13. Indirect cost model

A: Actual Costs
S: Actual Costs Simplified Method
T: Transitional Flat rate
F :Flat Rate

Workplan Tables

Project number

612337

Project title

FaSMEd—Improving progress for lower achievers through Formative Assessment in Science and Mathematics Education

Call (part) identifier

FP7-SCIENCE-IN-SOCIETY-2013-1

Funding scheme

Collaborative project

WT1
List of work packages

Project Number [1]	612337	Project Acronym [2]	FaSMEd

LIST OF WORK PACKAGES (WP)

WP Number [53]	WP Title	Type of activity [54]	Lead beneficiary number [55]	Person-months [56]	Start month [57]	End month [58]
WP 1	Project design	RTD	1	20.50	1	7
WP 2	Landscape collection of data and review of literature and systemic practices	RTD	6	25.50	4	12
WP 3	Design and production of toolkit for teaching and assessment toolkit	RTD	5	75.00	4	36
WP 4	Intervention cases	RTD	3	98.50	14	25
WP 5	Cross comparison analysis of historical and intervention cases	RTD	9	40.50	22	31
WP 6	Final synthesis – policy recommendations – identified future research needs	RTD	1	24.50	30	36
WP 7	Exploitation and Dissemination	OTHER	1	26.00	1	36
WP 8	Scientific Coordination	RTD	1	16.50	1	36
WP 9	Evaluation	RTD	1	1.00	6	36
WP 10	Project management and administration	MGT	1	4.00	1	36
			Total	332.00		

WT2:
List of Deliverables

Project Number [1]	612337	Project Acronym [2]	FaSMEd

List of Deliverables - to be submitted for review to EC

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	Map	1	1	4.00	O	PU	7
D1.2	Glossary	1	1	2.50	O	PU	7
D1.3	Protocols	1	1	4.00	O	PU	7
D1.4	Schools	1	1	1.00	O	PU	7
D1.5	Professional development	1	1	9.00	O	PU	7
D2.1	Data Report	2	6	8.50	R	PU	10
D2.2	Survey	2	6	10.00	R	PU	10
D2.3	Technology report	2	6	7.00	R	PU	10
D3.1	Prototype toolkit	3	5	8.00	O	PU	10
D3.2	Evaluation of tookit	3	5	13.00	O	PU	25
D3.3	Final toolkit	3	5	16.00	O	PU	36
D3.4	Prototype professional development package for teachers	3	5	9.00	O	PU	10
D3.5	Evaluate professional development package	3	5	13.00	O	PU	25
D3.6	Final professional development package	3	5	16.00	O	PU	36
D4.1	Cluster meetings	4	3	30.00	O	PU	25
D4.2	School visits	4	3	38.50	O	PU	25
D4.3	Case studies	4	3	30.00	O	PU	25
D5.1	Methodology	5	9	10.50	R	PU	25
D5.2	Cross-comparative study of case studies	5	9	15.00	R	PU	31
D5.3	Cross comparative	5	9	15.00	R	PU	31

WT2:
List of Deliverables

Delive-rable Number [61]	Deliverable Title	WP number [53]	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
	analysis of country studies						
D6.1	Approaches to raising attainment	6	1	9.00	R	PU	36
D6.2	Policy guidelines	6	1	9.00	R	PU	36
D6.3	Future research	6	1	6.50	R	PU	36
D7.1	Website	7	1	9.00	O	PU	3
D7.2	Newsletter	7	1	3.00	O	PU	3
D7.3	Briefing documents and conference participation	7	1	3.00	O	PU	12
D7.4	Film of project	7	1	1.00	O	PU	30
D7.5	Posters and booklets	7	1	2.00	O	PU	12
D7.6	International conference	7	7	3.50	O	PU	35
D7.7	Stakeholder meetings	7	1	4.50	O	PU	3
D8.1	Inception meeting	8	1	1.00	O	PU	1
D8.2	Phase two launch (toolkit)	8	5	1.00	O	PU	12
D8.3	Phase three launch	8	8	1.00	O	PU	24
D8.4	Final meeting	8	7	1.00	O	PU	36
D9.1	Evaluation report	9	1	1.00	R	RE	12
D10.1	Mid-term review	10	1	1.00	R	PU	21
D10.2	Ethical Review Report 1	10	1	0.10	R	PP	19
D10.3	Ethical Review Report 2	10	1	0.10	R	PP	36
			Total	316.70			

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP1	Type of activity [54]	RTD
Work package title	Project design		
Start month	1		
End month	7		
Lead beneficiary number [55]	1		

Objectives

Establish the theoretical and methodological foundations of the design study by drawing on evidence based approaches to educational change with a focus on raising the achievement of students in mathematics, science and technology.

Description of work and role of partners

Set out the strategy for the project by drawing on exemplars of effective interventions which have transformed teaching practices and raised student achievement. This could include:
1.1 Map out the stages of the design study and evaluation process
1.2 A glossary of terminology used within the project, translated into the required languages
1.3 Develop a set of research protocols to support the collection of data at each stage of the study
1.4 School selection criteria – schools, teachers, students
1.5 Design professional development strategy.
Milestone 1 Inception
This is the inception meeting that will occur as soon as viably possible in Newcastle (UNEW). The target date is the end of the first month. However, due to practical constraints regarding international travel it may have to be delayed until all partners are able to acquire tickets. This meeting will be used to ensure that partners understand the general framework and management of the project which they have agreed to through the consortium agreement which will have been signed prior to the GA signature, including the rules of FP7 (WP8) such as partners' responsibilities and reporting requirements, deliverable sign-off procedure, templates for all project documentation, among others.
In addition, WP leaders will discuss all work packages in detail and the programme of activities for WPs 1-4 will be decided. Each WPL will also compile a dissemination plan for her/his WP. Intensive work on WP1 starts.
Milestone 2 Framework
At the end of Month 6, WP1 Framework will be completed. This work package will have structured the theoretical and methodological foundations of the project. This WP will form a homogeneous theoretical and methodological base for the historical and current assessments and the intervention cases in the partner countries (WPs 2-4). The work for these case studies will intensify at this point.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	3.00
2	UNOTT	3.00
3	ENS de Lyon	3.00
4	NUIM	2.00
5	PHF	1.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
6	UNITO	3.00
7	UU	1.00
8	AIMSSEC	3.50
9	HiST	1.00
	Total	20.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D1.1	Map	1	4.00	O	PU	7
D1.2	Glossary	1	2.50	O	PU	7
D1.3	Protocols	1	4.00	O	PU	7
D1.4	Schools	1	1.00	O	PU	7
D1.5	Professional development	1	9.00	O	PU	7
		Total	20.50			

Description of deliverables

D1.1) Map: Map out the stages of the design study and evaluation process [month 7]

D1.2) Glossary: A glossary of terminology used within the project, translated into the required languages [month 7]

D1.3) Protocols: A set of research protocols to support the collection of data at each stage of the [month 7]

D1.4) Schools: School selection criteria – schools, teachers, students [month 7]

D1.5) Professional development: An agreed approach to professional development [month 7]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS2	Framework	1	7	At the end of Month 7, WP1 Framework will be completed. This work package will have structured the theoretical and methodological foundations of the project.

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP2	Type of activity [54]	RTD
Work package title	Landscape collection of data and review of literature and systemic practices		
Start month	4		
End month	12		
Lead beneficiary number [55]	6		

Objectives

The establishment of a baseline of data on the approaches to low achievers in mathematics and science across the EU and South Africa.

Description of work and role of partners

The work package leader will coordinate the collection of data about the approach to low achievers in the participating partners. In addition the work package leader and/or partners will carry out a wider review of approaches across the EU outside the participating partners.
The work package leader will work with a partner or partners to identify the range of tools and technology available to support teaching and assessment in mathematics and science.
5.1 Collection of comparative data on the landscape for low achievers in mathematics and science in the partner countries including South Africa.
5.1.1 Identification of 'low achievers'
5.1.2 Typical trajectory
5.1.3 Typical outcomes (attainment, future path)
5.2 EU wide survey of systemic practices in respect of low achievers in mathematics and science
5.3 Research on use of tools and technology to support teaching and assessment

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	2.00
3	ENS de Lyon	3.00
4	NUIM	1.00
5	PHF	1.00
6	UNITO	7.00
7	UU	2.00
8	AIMSSEC	7.50
9	HiST	2.00
	Total	25.50

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D2.1	Data Report	6	8.50	R	PU	10
D2.2	Survey	6	10.00	R	PU	10
D2.3	Technology report	6	7.00	R	PU	10
		Total	25.50			

Description of deliverables

D2.1) Data Report: Report on comparative data on the landscape for low achievers in mathematics and science in the partner countries [month 10]

D2.2) Survey: Survey of EU systemic practices in respect of low achievers in mathematics and science [month 10]

D2.3) Technology report: Report on the use of tools and technology to support teaching and assessment [month 10]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP3	Type of activity [54]	RTD
Work package title	Design and production of toolkit for teaching and assessment toolkit		
Start month	4		
End month	36		
Lead beneficiary number [55]	5		

Objectives

This work is the core of the project and involves the design and production of activities for teachers and students, together with guidance on approaches to teaching and assessment and the use of technology

Description of work and role of partners

The work will be split into mathematics and science.
Four partners will focus on the development of the science toolkit - PHF will lead with the support of ENS de Lyon, NUIM and Hist. (23.5 PMs)
UNOTT and UNEW will co-lead the development of the mathematics toolkit with the support of UNITO. (20 PMs)
The workload is equally balanced between science and mathematics.
UU and AIMSSEC will focus on the development of their own particular strand of the mathematics toolkit - digital environments.
PHF will coordinate the development of both the mathematics and science strands.
The development of the toolkit will be informed by WP1 and WP2. This WP will involve the majority of partners as either major or secondary contributors to:
3.1 Develop a prototype toolkit for teachers to support their use of formative assessment in the classroom including advice and support in using technology
3.2 Evaluation of prototype
3.3 Develop final toolkit
3.3.1 Case studies
3.3.2 Starting points
3.3.3 Activities
3.3.4 Tools
3.4 Produce a professional development package to support teachers in their use of the toolkit
3.5 Evaluate professional development package
3.6 Produce final version of professional development package

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	3.00
2	UNOTT	9.00
3	ENS de Lyon	1.00
4	NUIM	6.00
5	PHF	14.00
6	UNITO	8.00
7	UU	13.00

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
8	AIMSSEC	18.50
9	HiST	2.50
	Total	75.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D3.1	Prototype toolkit	5	8.00	O	PU	10
D3.2	Evaluation of tookit	5	13.00	O	PU	25
D3.3	Final toolkit	5	16.00	O	PU	36
D3.4	Prototype professional development package for teachers	5	9.00	O	PU	10
D3.5	Evaluate professional development package	5	13.00	O	PU	25
D3.6	Final professional development package	5	16.00	O	PU	36
		Total	75.00			

Description of deliverables

D3.1) Prototype toolkit: A prototype toolkit for teachers to support their use of formative assessment in the classroom including advice and support in using technology [month 10]

D3.2) Evaluation of tookit: The evaluation will be an iterative process in continuous operation from month 10 to month 25 [month 25]

D3.3) Final toolkit: The final toolkit consists of: 3.3.1 Case studies 3.3.2 Starting points 3.3.3 Activities 3.3.4 Tools [month 36]

D3.4) Prototype professional development package for teachers: A prototype professional development package to support teachers in their use of the toolkit [month 10]

D3.5) Evaluate professional development package: The evaluation will be an iterative process in continuous operation from month 10 to month 25 [month 25]

D3.6) Final professional development package: Final version of professional development package [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP4	Type of activity [54]	RTD
Work package title	Intervention cases		
Start month	14		
End month	25		
Lead beneficiary number [55]	3		

Objectives

This work package is the focus for intervention with teachers and students to implement the toolkit of approaches designed in WP3. There will be feedback into WP3 through cluster meetings to develop and adapt the resources to meet local contexts as the project develops in year 2.

Description of work and role of partners

All partners will have a cluster of about three schools to implement each of the approaches – depending on the focus of the partner and their chosen schools – for example there could be three schools working on secondary mathematics and another three on science.
Some partners, for example UU and Hist have indicated that they will be working with primary schools.
The exact number and range of schools to be focused on either science or mathematics or both will, to some extent, be subject to negotiation during the first year of the project. It will depend on the location and relationships established between the partners and local schools and also on the schools' capacities which can change from year to year, so it is difficult to specify numbers in advance.
At present the following partners will be working with science teachers: UU, ENS de Lyon, PHF, NUIM, Hist and the following with mathematics teachers: AIMSSEC, UNOTT, UNEW, UNITO. Some have indicated that both science and mathematics teachers will be involved: UU, Hist, ENS de Lyon.
Hence an even balance between science and mathematics should be achieved.
4.1 Manage local cluster meetings (local groups of schools and HEI's to share practice and progress). Each partner will be interacting with their local group of teachers and students.
4.2 Arrange classroom visits for HEI partners and evaluator(s)
4.3 Develop case studies to feed into WP5 and feedback to WP3 about impact of toolkit.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	6.00
2	UNOTT	5.00
3	ENS de Lyon	24.00
4	NUIM	7.00
5	PHF	6.00
6	UNITO	16.00
7	UU	6.00
8	AIMSSEC	24.50
9	HiST	4.00
	Total	98.50

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D4.1	Cluster meetings	3	30.00	O	PU	25
D4.2	School visits	3	38.50	O	PU	25
D4.3	Case studies	3	30.00	O	PU	25
		Total	98.50			

Description of deliverables

D4.1) Cluster meetings: Local groups of schools and HEI's to share practice and progress monthly [month 25]

D4.2) School visits: Classroom visits for HEI partners and evaluator(s) monthly [month 25]

D4.3) Case studies: Develop case studies to feed into WP5 and feedback to WP3 about impact of toolkit. [month 25]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP5	Type of activity [54]	RTD
Work package title	Cross comparison analysis of historical and intervention cases		
Start month	22		
End month	31		
Lead beneficiary number [55]	9		

Objectives

Elaborate a systematic comparative analysis of the results and findings emerging from the assessment of existing experiences and the newly developed interventions

Description of work and role of partners

This work package will draw on the results and findings emerging from WP2, WP3 and WP4. Although the reports produced in these WPs will be mainly based on the case studies, they will also include references to the state-of-the-art, theoretical debates, and practical experiences taking place elsewhere.
5.1 Methodology: The WP leaders will propose a common methodological approach for the analysis drawing upon the WP1 findings. All WP participants will comment on the adequacy of this cross-comparative methodology for their particular cases. The methodology will be discussed with key members of the stakeholder groups to ensure a transdisciplinary perspective in the analysis.
5.2 Case studies: WP participants will produce the inputs from their case studies. The WP leaders will circulate a first draft of the integrated cross comparative analysis to be commented by the participants including the stakeholders. This will take the form of an electronic conference organised by the WPL.
5.3 Country studies within their context: In each country the partners will produce an analysis framing the results from FaSMEd within the policy and practice of the country. The WPL and UNEW will produce the final comparison of the experiences.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	5.00
3	ENS de Lyon	3.00
4	NUIM	5.00
5	PHF	2.00
6	UNITO	8.00
7	UU	6.00
8	AIMSSEC	2.50
9	HiST	9.00
	Total	40.50

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D5.1	Methodology	9	10.50	R	PU	25
D5.2	Cross- comparative study of case studies	9	15.00	R	PU	31
D5.3	Cross comparative analysis of country studies	9	15.00	R	PU	31
		Total	40.50			

Description of deliverables

D5.1) Methodology: The WP leaders will propose a common methodological approach for the analysis drawing upon the WP1 findings [month 25]

D5.2) Cross- comparative study of case studies: WP participants will produce the inputs from their case studies. The WP leaders will circulate an integrated cross comparative analysis to be commented by the participants including the stakeholders. [month 31]

D5.3) Cross comparative analysis of country studies: In each country the partners will produce an analysis framing the results from FaSMEd within the policy and practice of the country. The WPL and UNEW will produce the final comparison of the experiences [month 31]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP6	Type of activity [54]	RTD
Work package title	Final synthesis – policy recommendations – identified future research needs		
Start month	30		
End month	36		
Lead beneficiary number [55]	1		

Objectives

Produce guidelines for the design and implementation of sustainable, appropriate and innovative socio-technical approaches to the raising of achievement in mathematics, science and technology education.

Description of work and role of partners

This work package will build on the results provided by the research activities conducted in the previous phases of the project. It will focus on identifying the conditions and requirements for promoting sustainable, appropriate and innovative socio-technical approaches to the raising of achievement in mathematics, science and technology education.
This work package will also draw lessons and develop scenarios and policy options to support the relevant policy-making process in the identification and execution of appropriate educational interventions in raising achievement in mathematics, science and technology education. Given the scope of our case studies, we expect that these recommendations would be applicable to other socio-cultural and economic contexts not just in the EU and South Africa but also across the developing world.
Lastly, based on the experiences gained through the research activities, this work package will identify needs and opportunities for further research. This WP will be led by UNEW with active input from all other partners.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	4.00
2	UNOTT	1.00
3	ENS de Lyon	3.00
4	NUIM	2.00
5	PHF	2.00
6	UNITO	4.00
7	UU	1.00
8	AIMSSEC	5.50
9	HiST	2.00
	Total	24.50

WT3:
Work package description

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D6.1	Approaches to raising attainment	1	9.00	R	PU	36
D6.2	Policy guidelines	1	9.00	R	PU	36
D6.3	Future research	1	6.50	R	PU	36
		Total	24.50			

Description of deliverables

D6.1) Approaches to raising attainment: Socio-technical approaches to the raising of achievement in mathematics and science education [month 36]

D6.2) Policy guidelines: National, regional and EU policy guidelines for the provision of approaches to the raising of achievement in mathematics and science education [month 36]

D6.3) Future research: Recommendations for future research [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP7	Type of activity [54]	OTHER
Work package title	Exploitation and Dissemination		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

Building in dissemination and communication as integral from the start.
Create and maintain a clear internal project identity and goal, which comes from teacher experimentation using proven principles of feedback, using ICT and involving students as much as possible, the refrain being 'working with students';
Relate the project to other school improvement, inclusion and employment related agendas, so that it is not presented as a bolt-on activity;
Use the distinct project identity and coherence to establish and maintain relationships with other stakeholders, as relationships underpin communication, influence and getting messages into networks both during and at the end of the project;
Relate the project to vocational training agendas and use vocational education stakeholder groups to communicate the messages;
Relate the training and toolkit to national agendas and contexts rather than just presenting a monolithic block, whilst maintaining an essential coherence;
Disseminate and communicate the progress and results of the project in manner to a broad audience (all the stakeholders) and to defined targeted groups (such as science teachers who are involved in the project, or employers in engineering).
Implement a comprehensive programme of engagement and dissemination of the project's results with the aim of a major intervention in an international conference in y3.

Description of work and role of partners

Establish a sub-group of the SAC to advise on dissemination
• Set up and manage website (with a commitment to maintenance for 2 years after the end of the project)
• Maintain a steady flow of stories related to the project to maintain the profile amongst target audiences and among the participants through newsletters
• Dissemination of outcomes of other work packages through briefing documents and participation in conferences.
• Local Stakeholder meetings within each country organised by the country partner each year to ensure that all stakeholders are kept informed of progress.
• Liaise with sub-contractor for film documentary on participants in the project
• Produce material and briefs for specific audiences of policy makers and government agencies at a regional, National, European and International level and other target groups at regular intervals, starting around the time of the first periodic report and updated at the end of implementation
• Plan major conference to disseminate outcomes at the end of Y3.
The strategy will ensure that all material will reference the Science in Society origin of the project and the links with Responsible Research and Innovation (RRI). In addition, attempts will be made to identify other projects of the same theme and to communicate with them so as to be aware of and identify possible areas for collaboration in order to create an 'RRI Momentum' early in Horizon 2020. If it is thought beneficial, connections will be established with similar other SiS projects, via memoranda of understanding
Attention will be paid to the gender dimension of low attainment through: including this dimension in reports; ensuring that, when organising events, a topic on gender or a workshop on gender will be an important part of the programme and by inviting experts in gender in science and mathematics education and low achievement to participate.

In addition, a link to the website of the Gender Campaign: 'Science: It's a Girl Thing!' (http://science-girl-thing.eu) will be established on the FaSMeD website.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	4.00
3	ENS de Lyon	3.00
4	NUIM	4.50
5	PHF	2.00
6	UNITO	4.00
7	UU	2.00
8	AIMSSEC	3.50
9	HiST	3.00
	Total	26.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D7.1	Website	1	9.00	O	PU	3
D7.2	Newsletter	1	3.00	O	PU	3
D7.3	Briefing documents and conference participation	1	3.00	O	PU	12
D7.4	Film of project	1	1.00	O	PU	30
D7.5	Posters and booklets	1	2.00	O	PU	12
D7.6	International conference	7	3.50	O	PU	35
D7.7	Stakeholder meetings	1	4.50	O	PU	3
		Total	26.00			

Description of deliverables

D7.1) Website: Set up and manage website (with a commitment to maintenance for 2 years after the end of the project) Monthly updating of website for project. [month 3]

D7.2) Newsletter: 3 Monthly newsletter to participants Maintain a steady flow of stories related to the project to maintain the profile amongst target audiences and among the participants through newsletters [month 3]

D7.3) Briefing documents and conference participation: Dissemination of outcomes of other work packages through briefing documents and participation in conferences. [month 12]

D7.4) Film of project: Liaise with sub-contractor for documentary on participants in the project (in target languages?) [month 30]

D7.5) Posters and booklets: Publicity for the project in target languages [month 12]

D7.6) International conference: Final conference in Utrecht [month 35]

D7.7) Stakeholder meetings: Stakeholder meetings local to each country to be held annually in each country to disseminate progress in the project [month 3]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead beneficiary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP8	Type of activity [54]	RTD
Work package title	Scientific Coordination		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

The scientific co-ordination of the project (WP8) work package is responsible for the technical management of the project. This WP will be the overall responsibility of UNEW with the Project Coordinator having final responsibility for the delivery of the scientific elements of the project. This will be facilitated by the participation of UNEW in all the work packages across the project, in conjunction with continuous dialogue with the Work package Leaders (WPL). A strategic advisory committee will be established to provide advice and guidance to the project with a subgroup focused on dissemination.

Description of work and role of partners

The main tasks of WP8 are:
• coordination and monitoring of scientific work within the consortium and work-packages
• overall coordination and communication with the Commission
• the supervision of project progress milestones and project global critical path;
• contacts and meetings with the project Strategic Advisory Committee
• the scientific review of the work performed by the partners including scientific monitoring of deliverables and milestones and the work plan, including the verification of the quality, consistency and respect of deadlines
• conflict resolving relating to technical and organisational issues
Each of the WPL will be responsible for the coordination of activities in their work packages. Each WPL will be supported by a Co-leader. All the WPLs are known experts in their fields. The scientific coordination within the project will be supported by management meetings, organised once a year and teleconferencing when deemed necessary by the Project Coordination Unit.
Liaison between the participants will be maintained by email, videoconference and skype or elluminate. A password protected website will also be developed to ensure that communication flows securely between the coordinator and the partners. This will be accompanied by short bullet point progress reports every three months.

Progress consortium meetings will be held 3 times during the project, 1 in the UK, 1 in Germany and 1 in South Africa. Each meeting will serve to establish the trajectory for the following year in the project. Since each year corresponds to a distinct phase, 3 meetings will be necessary. The first meeting will take place in the first month of the project in Newcastle upon Tyne, UK. This meeting will be used to establish the general framework and management of the project including the rules of the FP7 programme such as partners' responsibilities and reporting requirements, deliverable sign-off procedure and templates for all project documentation, etc. The second meeting will coincide with the conference to launch the toolkit and establish the methodology for the second phase of the project this is in Freiburg, Germany. The third consortium meeting will take place in Cape Town, South Africa, at the start of the third phase (month 24). This meeting will serve to discuss the preliminary key findings of WPs 2-5 and to consolidate the dissemination activities of WP7. It will enable participants to experience the South African context in order to support the SA colleagues in their development of their version of the toolkit and analysis of the project outcomes.

WT3:
Work package description

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	4.00
3	ENS de Lyon	2.00
5	PHF	2.00
6	UNITO	2.00
7	UU	1.00
8	AIMSSEC	3.50
9	HiST	2.00
	Total	16.50

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D8.1	Inception meeting	1	1.00	O	PU	1
D8.2	Phase two launch (toolkit)	5	1.00	O	PU	12
D8.3	Phase three launch	8	1.00	O	PU	24
D8.4	Final meeting	7	1.00	O	PU	36
		Total	4.00			

Description of deliverables

D8.1) Inception meeting: As soon as possible after the start of the project [month 1]

D8.2) Phase two launch (toolkit): All participants will join a together at the launch of the toolkit at Freiburg University. [month 12]

D8.3) Phase three launch: A meeting in Cape Town for the work package leaders to report on the outcomes of the interventions, experience the South African context and prepare for the final year of evaluation and dissemination. [month 24]

D8.4) Final meeting: Final meeting in Utrecht to round off the project, ensure all work has been completed and to share outcomes and plans for further research. [month 36]

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS1	Inception meeting	1	1	In Newcastle upon Tyne, UK as soon as possible after the start of the project

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS3	Toolkit Launch	5	12	In Freiburg, Germany to introduce the toolkit to the participants in the project
MS5	Mid project meeting	8	24	In Capetown, SA to launch the final year of the project
MS6	Final meeting	7	36	In Utrecht, Netherlands to round off the project

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP9	Type of activity [54]	RTD
Work package title	Evaluation		
Start month	6		
End month	36		
Lead beneficiary number [55]	1		

Objectives

On the advice of the independent expert review for the EC that the Consortium involves external experts, who will evaluate whether the proposed project reaches its objectives concerning low achievement in science and mathematics.

Description of work and role of partners

Evaluation is a constant theme in design study and this is aimed to be a 'learning project' where design does not cease with WP1 but is carried through by formative evaluation of the process of the project through reflection and evaluation by the WP leaders and participants.

We have invited a small number of world experts on science education, educational technology, mathematics education and assessment to form an evaluation group who will meet annually to review progress and provide a final report to the project in the 3rd year. The evaluation group will be asked specifically to focus feedback on issues of gender and low attainment.
The evaluation experts will be sub-contracted to participate in this group.
This evaluation group provides the third mechanism of quality control.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	1.00
	Total	1.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D9.1	Evaluation report	1	1.00	R	RE	12
		Total	1.00			

Description of deliverables

D9.1) Evaluation report: The evaluation report will be disseminated to the steering group annually [month 12]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments

WT3:
Work package description

Project Number [1]	612337	Project Acronym [2]	FaSMEd

One form per Work Package

Work package number [53]	WP10	Type of activity [54]	MGT
Work package title	Project management and administration		
Start month	1		
End month	36		
Lead beneficiary number [55]	1		

Objectives

Administration and co-ordination of project
Maintenance of the consortium agreement

Description of work and role of partners

This WP will be led by UNEW, as the coordinator of the project, with the active engagement of all other partners.
Management activities include:
Maintenance of the consortium agreement.
The overall legal, ethical, financial and administrative management, including, for each of the beneficiaries, the obtaining of the certificates on the financial statements if necessary.
Any other management activities foreseen by the annexes, except coordination of research and technological development activities.

Person-Months per Participant

Participant number [10]	Participant short name [11]	Person-months per participant
1	UNEW	4.00
	Total	4.00

List of deliverables

Delive-rable Number [61]	Deliverable Title	Lead benefi-ciary number	Estimated indicative person-months	Nature [62]	Dissemi-nation level [63]	Delivery date [64]
D10.1	Mid-term review	1	1.00	R	PU	21
D10.2	Ethical Review Report 1	1	0.10	R	PP	19
D10.3	Ethical Review Report 2	1	0.10	R	PP	36
		Total	1.20			

Description of deliverables

D10.1) Mid-term review: The mid-term review will be completed and delivered to the EC [month 21]

D10.2) Ethical Review Report 1: Ethical Review Report by Independent Ethical Advisor [month 19]

D10.3) Ethical Review Report 2: Ethical Review Report by Independent Ethical Advisor [month 36]

WT3:
Work package description

Schedule of relevant Milestones

Milestone number [59]	Milestone name	Lead benefi-ciary number	Delivery date from Annex I [60]	Comments
MS4	Mid term review	1	22	The mid term review will be carried out by the external experts appointed by the EC

WT4:
List of Milestones

Project Number [1]	612337	Project Acronym [2]	FaSMEd

List and Schedule of Milestones

Milestone number [59]	Milestone name	WP number [53]	Lead beneficiary number	Delivery date from Annex I [60]	Comments
MS1	Inception meeting	WP8	1	1	In Newcastle upon Tyne, UK as soon as possible after the start of the project
MS2	Framework	WP1	1	7	At the end of Month 7, WP1 Framework will be completed. This work package will have structured the theoretical and methodological foundations of the project.
MS3	Toolkit Launch	WP8	5	12	In Freiburg, Germany to introduce the toolkit to the participants in the project
MS4	Mid term review	WP10	1	22	The mid term review will be carried out by the external experts appointed by the EC
MS5	Mid project meeting	WP8	8	24	In Capetown, SA to launch the final year of the project
MS6	Final meeting	WP8	7	36	In Utrecht, Netherlands to round off the project

WT5:
Tentative schedule of Project Reviews

Project Number [1]	612337	Project Acronym [2]	FaSMEd

Tentative schedule of Project Reviews

Review number [65]	Tentative timing	Planned venue of review	Comments, if any
RV 1	22	Brussels	According to special clause 5

WT6:
Project Effort by Beneficiary and Work Package

Project Number [1]	612337	Project Acronym [2]	FaSMEd

Indicative efforts (man-months) per Beneficiary per Work Package

Beneficiary number and short-name	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7	WP 8	WP 9	WP 10	Total per Beneficiary
1 - UNEW	3.00	2.00	3.00	6.00	5.00	4.00	4.00	4.00	1.00	4.00	36.00
2 - UNOTT	3.00	0.00	9.00	5.00	0.00	1.00	0.00	0.00	0.00	0.00	18.00
3 - ENS de Lyon	3.00	3.00	1.00	24.00	3.00	3.00	3.00	2.00	0.00	0.00	42.00
4 - NUIM	2.00	1.00	6.00	7.00	5.00	2.00	4.50	0.00	0.00	0.00	27.50
5 - PHF	1.00	1.00	14.00	6.00	2.00	2.00	2.00	2.00	0.00	0.00	30.00
6 - UNITO	3.00	7.00	8.00	16.00	8.00	4.00	4.00	2.00	0.00	0.00	52.00
7 - UU	1.00	2.00	13.00	6.00	6.00	1.00	2.00	1.00	0.00	0.00	32.00
8 - AIMSSEC	3.50	7.50	18.50	24.50	2.50	5.50	3.50	3.50	0.00	0.00	69.00
9 - HiST	1.00	2.00	2.50	4.00	9.00	2.00	3.00	2.00	0.00	0.00	25.50
Total	20.50	25.50	75.00	98.50	40.50	24.50	26.00	16.50	1.00	4.00	332.00

WT7:
Project Effort by Activity type per Beneficiary

Project Number [1]	612337	Project Acronym [2]	FaSMEd

Indicative efforts per Activity Type per Beneficiary

Activity type	Part. 1 UNEW	Part. 2 UNOTT	Part. 3 ENS de	Part. 4 NUIM	Part. 5 PHF	Part. 6 UNITO	Part. 7 UU	Part. 8 AIMSSEC	Part. 9 HiST	Total
1. RTD/Innovation activities										
WP 1	3.00	3.00	3.00	2.00	1.00	3.00	1.00	3.50	1.00	20.50
WP 2	2.00	0.00	3.00	1.00	1.00	7.00	2.00	7.50	2.00	25.50
WP 3	3.00	9.00	1.00	6.00	14.00	8.00	13.00	18.50	2.50	75.00
WP 4	6.00	5.00	24.00	7.00	6.00	16.00	6.00	24.50	4.00	98.50
WP 5	5.00	0.00	3.00	5.00	2.00	8.00	6.00	2.50	9.00	40.50
WP 6	4.00	1.00	3.00	2.00	2.00	4.00	1.00	5.50	2.00	24.50
WP 8	4.00	0.00	2.00	0.00	2.00	2.00	1.00	3.50	2.00	16.50
WP 9	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Total Research	28.00	18.00	39.00	23.00	28.00	48.00	30.00	65.50	22.50	302.00
2. Demonstration activities										
Total Demo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Consortium Management activities										
WP 10	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
Total Management	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00
4. Other activities										
WP 7	4.00	0.00	3.00	4.50	2.00	4.00	2.00	3.50	3.00	26.00
Total other	4.00	0.00	3.00	4.50	2.00	4.00	2.00	3.50	3.00	26.00
Total	36.00	18.00	42.00	27.50	30.00	52.00	32.00	69.00	25.50	332.00

WT8:
Project Effort and costs

Project Number [1]	612337	Project Acronym [2]	FaSMEd

Project efforts and costs

Beneficiary number	Beneficiary short name	Estimated eligible costs (whole duration of the project)						Requested EU contribution (€)
		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat-rate or scale-of-unit (€)	Total costs	
1	UNEW	36.00	161,600.00	44,000.00	52,465.00	128,439.00	386,504.00	318,777.00
2	UNOTT	18.00	141,888.00	0.00	44,800.00	112,012.80	298,700.80	224,025.00
3	ENS de Lyo	42.00	88,772.00	0.00	42,135.00	78,544.20	209,451.20	160,776.00
4	NUIM	27.50	113,540.00	0.00	24,130.00	82,602.00	220,272.00	170,024.00
5	PHF	30.00	142,670.00	0.00	41,787.00	110,674.20	295,131.20	226,549.00
6	UNITO	52.00	137,456.00	0.00	32,259.00	101,829.00	271,544.00	207,689.00
7	UU	32.00	105,170.00	0.00	30,500.00	81,070.00	216,740.00	165,230.00
8	AIMSSEC	69.00	178,597.00	0.00	63,096.00	48,339.00	290,032.00	221,158.00
9	HiST	25.50	188,888.00	0.00	53,156.00	48,408.80	290,452.80	223,848.00
Total		332.00	1,258,581.00	44,000.00	384,328.00	791,919.00	2,478,828.00	1,918,076.00

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It cannot be changed unless agreed so during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

53. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

54. Type of activity

For all FP7 projects each work package must relate to one (and only one) of the following possible types of activity (only if applicable for the chosen funding scheme – must correspond to the GPF Form Ax.v):

• **RTD/INNO =** Research and technological development including scientific coordination - applicable for Collaborative Projects and Networks of Excellence

• **DEM =** Demonstration - applicable for collaborative projects and Research for the Benefit of Specific Groups

• **MGT =** Management of the consortium - applicable for all funding schemes

• **OTHER =** Other specific activities, applicable for all funding schemes

• **COORD =** Coordination activities – applicable only for CAs

• **SUPP =** Support activities – applicable only for SAs

55. Lead beneficiary number

Number of the beneficiary leading the work in this work package.

56. Person-months per work package

The total number of person-months allocated to each work package.

57. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

58. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

59. Milestone number

Milestone number:MS1, MS2, …, MSn

60. Delivery date for Milestone

Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

61. Deliverable number

Deliverable numbers in order of delivery dates: D1 – Dn

62. Nature

Please indicate the nature of the deliverable using one of the following codes

R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

63. Dissemination level

Please indicate the dissemination level using one of the following codes:

• **PU =** Public

• **PP =** Restricted to other programme participants (including the Commission Services)

• **RE =** Restricted to a group specified by the consortium (including the Commission Services)

• **CO =** Confidential, only for members of the consortium (including the Commission Services)

• **Restreint UE =** Classified with the classification level "Restreint UE" according to Commission Decision 2001/844 and amendments

• **Confidentiel UE =** Classified with the mention of the classification level "Confidentiel UE" according to Commission Decision 2001/844 and amendments

• **Secret UE =** Classified with the mention of the classification level "Secret UE" according to Commission Decision 2001/844 and amendments

64. Delivery date for Deliverable

Month in which the deliverables will be available. Month 1 marking the start date of the project, and all delivery dates being relative to this start date

65. Review number

Review number: RV1, RV2, ..., RVn

66. Tentative timing of reviews

Month after which the review will take place. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

67. Person-months per Deliverable

The total number of person-month allocated to each deliverable.

PART B

COLLABORATIVE PROJECT

Table of Contents

B1. CONCEPT AND OBJECTIVES, PROGRESS BEYOND STATE-OF-THE-ART, S/T METHODOLOGY AND WORK PLAN

B1.1 Concept and project objective(s)

The Rocard report (2007) identified widespread concern across the EU about the economic consequences and social impact of underachievement in mathematics, science and technology education and recommended the adoption of an inquiry based pedagogy. This project is a collaboration of international partners, all of whom are skilled in such pedagogies, to research the role of technologically enhanced formative assessment methods in raising the attainment levels of low-achieving students in science and mathematics.

The project aims to research the use of technology in formative assessment classroom practices in ways that allow teachers to respond to the emerging needs of low achieving learners in mathematics and science so that they are better motivated in their learning of these important subjects. Outcomes will inform the development of a toolkit that informs teachers of emergent formative assessment pedagogies in mathematics and science.

This international project will adapt and develop existing research-informed pedagogical interventions (developed by the partners), suited to implementation at scale, for working with low attaining pupils and transforming teaching. The intervention will be strongly cross-disciplinary and cross-subject, focused on the development of technologically enhanced practices of formative interpretations of assessment[1] within day-to-day teaching approaches. The project will focus on upper primary and lower secondary age students (10 -14), since this is an age group where teachers are actively shaping new norms of classroom participation and where it is relatively free from the 'backwash' effect of preparation for examination. We believe that interventions developed for low attainers in this age group will be applicable in both contexts as there is a large overlap between the levels of achievement across the phases.

The project aligns itself with the focus of the Science in Society (SiS) Action of the EC for Responsible Research and Innovation (RRI) where: "societal actors work togetherduring the whole research and innovation process in order to better align both the process and its outcomes, with the values, needs and expectations of Europeansociety." (EU, 2012)

Low achievement in science and mathematics is a common concern for all European countries. (Rocard et al, 2007; ECEA/Eurydice, 2011a) It is an issue associated not only with the effectiveness of teaching and learning, but also with providing an equitable system of education. A range of approaches have been developed to support underperforming students and to attempt to close the persistent gap between the highest and lowest achieving students. In this project, low achievement refers to student performance that is below the expected level of attainment. Under-performance occurs for a wide variety of reasons. However, this project focuses on school-related factors and does not address those linked to specific learning disabilities such as dyscalculia and does not address the provision of support exclusively

[1] Defined by Black, P., &Wiliam, D. as 'Practice in a classroom is formative to the extent that evidenceabout student achievement is elicited, interpreted, and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited' *in* (2009). Developing the theory of formative assessment.*Educational Assessment Evaluation and Accountability, 21*(1), pp. 5-31.

related to special needs education. Moreover, research (Malony et al, 2013) shows that stereotyped attitudes have an impact on achievement in mathematics and this may also be the case for science. Thus attention will need to be paid to strategies to challenge such attitudes on the part of teachers and students.

The project draws on evidence from large scale systematic reviews of educational interventionswhich reveal that the effect size (*see section 3 for an explanation of this measure*) on achievement of interventions that focus on the development of teaching using formative interpretations of assessment in classrooms is significantly greater than most other intervention approaches(Hattie, 2009). A key element of this diagnostic approach to teaching using assessment and intervention relates to the quality of the information generated by the various feedback loops that exist in the classroom setting and the involvement of the students within this process. Hence, the introduction of innovative technological tools[2]to create a digital environment which enhances connectivity and feedback to assist teachers in making more timely formative interpretations has the potential to amplify the quality of the evidence about student achievement in real-time for access by both students and teachers.

This project aims to:

- foster high quality interactions in classrooms in participating countries that are instrumental in raising achievement for low achievers which support teachers in enabling low attaining students to:
    - Learn more mathematics and science
    - Get better at learning mathematics and science
    - Feel better about themselves as mathematics and science students

(Watson & De Geest, 2005)

and to:

- expand our knowledge of technology enhanced teaching and assessment methods addressing low achievement in mathematics and science

1.1.2 Objectives

The objectives for the project are to:

- produce a toolkit for teachers to support the development of practice. ***(NB. The expression 'toolkit' refers to a set of curriculum materials and methods for pedagogical intervention)***
- produce a professional development resource that exemplifies use of the toolkit.
- offer approaches for the use of new technologies to support the formative assessment of lower achieving students.
- develop sustainable assessment and feedback practices that improve attainment in mathematics and science for the targeted students.
- challenge stereotyped attitudes and practices which raise anxiety on the part of teachers and students : research (Malony et al, 2013) shows that anxiety and

[2]For example, Promethean ActivVote; SmartVote; TI Navigator technologies; Ipad.

stereotyped attitudes have a strong impact on achievement in mathematics and this may also be the case for science.
- disseminate the outcomes of the project in the form of online resources, academic and professional publications, conference presentations as well as policy briefs to government agencies at a regional, National, European and International level.

We believe that these aims are congruent with the expected impact for the FP7 programme of enhancing the performance of students, reducing the number of low-achieving students and preventing early drop-out in mathematics and science. For example, a recent report states that: "there is no specific support policy for low achievers in science subjects. Help for low achievers isusually provided as part of the general framework of support for students with difficulties in anysubject. Few countries have launched nation-wide programmes for tackling low achievement atschool. In most countries, support measures are decided at school level." (ECEA/Eurydice, 2011b)

Although it is not a major focus for this project, technological education will be addressed through the science curriculum and through developing strategies to ensure that students have day to day access to technology in their classrooms and learn how to use it effectively to support their learning.

Where possible, existing online materials and open educational resources will be adapted for use.

1.1.3 Research questions

In WP2, the project will seek to: report the differences in the way that systemic structures influence the trajectories of lower achieving students within the participating countries; identify their typical pathways through the school system and reveal the educational opportunities that are open to these students. It will report on the varying assessment tools that are used to identify lower achieving students and may determine these pathways, with attention paid to the different interpretations of low achievement in each country. The research will survey the current policies and practices in formative assessment and teaching in the partner countries and beyond. The research will also survey the technology currently available in classrooms to support formative assessment of students' understanding in mathematics and science.

Research questions to be addressed as a theme across the project and answered in a summary in WP6 are:

- How can research-informed approaches help to understand and address key challenges in enhancing participation, engagement and achievement in science / mathematics [in particular to address differences linked to socio-economic status, gender, and ethnicity which appear to be linked to low achievement]?
- What specific new interventions, or changes in policy or practice, offer the greatest potential to improve engagement and learning in science / mathematics and how could their potential effectiveness and feasibility be assessed more fully?

Case studies from WP4 and analysed in WP5 will report on:

- How do teachers process formative assessment data from students using a range of technologies?
- How do teachers inform their future teaching using such data?
- How is formative assessment data used by students to inform their learning trajectories?
- When technology is positioned as a learning tool rather than a data logger for the teacher, what issues does this pose for the teacher in terms of their being able become more informed about student understanding?

B1.2 Progress beyond the state of the art

The challenge

This is a complex educational challenge, since there is no clear characteristic of low achievers in mathematics and science. While they share the common feature of underachievement, such groups typically contain a disproportionate number of those from disadvantaged social, cultural and racial groups, and in some countries without a good command of the first language of the classroom (Boaler, Wiliam, & Brown, 2000; Ireson & Hallam, 2001). Established approaches for working with such students are frequently characterised by a 'deficit' model of their potential which entails repeating material from earlier years, broken down into less and less challenging tasks, focused on areas of knowledge which they have previously failed and which involve step-by-step, simplified, procedural activities in trivial contexts. In contrast, the TIMSS seven-nation comparative study shows that high achieving countries (Hiebert et al., 2003) adopt approaches which preserve the complexity of concepts and methods, rather than simplifying them.

In addition, evidence indicates that attitudinal factors on the part of both students and teachers can have a powerful impact on achievement, particularly with this group of students. In mathematics, anxiety and stereotyping, for example, are known to have a significant impact on the performance of students and these factors can also have an impact on how teachers approach this subject, particularly in primary school where they may not be 'subject experts' (Malony et al., 2013). It is not known whether similar factors impact on science, although students in scientific topics which use a significant amount of mathematics might be expected to exhibit similar problems. It is also possible that the use of technology to support interventions may introduce an additional barrier through teacher and students attitudes to its use in science and mathematics education.

This project will build on the evidence of research from, for example, the LAMP (Ahmed, 1987), RAMP (Ahmed & Williams, 1991) and IAMP (Watson, De Geest, & Prestage, 2003) projects in mathematics teaching and the CASE (Michael Shayer & Adey, 2002) project in science teaching in the UK and elsewhere which adopted approaches focused on the proficiencies of the students rather than their deficiencies. The project will also have access to the Gates foundation funded work in the US from UNOTT on formative assessment lessons. The current best practice (Swan, 2006; Watson & De Geest, 2005) concerning teaching and assessment methods that address achievement in mathematics and science, uses an activating pedagogy and enhances the feedback loops (ie. formative interpretations of assessment) in the classroom between the teacher and student and between the students themselves in order to develop current understanding, stimulate debate and afford appropriate intervention by the teacher. This approach, tested in the Improving Learning in Mathematics project (Swan, 2000) and the current epiSTEMe project (Ruthven et al, 2010) is based on the creation of a

classroom environment in which there is clear, shared understanding of the value and functions of dialogue for learning (Alexander, 2004).

Evidence base for choice of activities in mathematics and science

Recent meta-analyses of the accumulated corpus of research on effective teaching that haveexamined teaching components in mathematics and science(Seidel & Shavelson, 2007),teaching strategies in science (Schroeder, Scott, Tolson, Huang, & Lee, 2007), and teaching programs in mathematics(Slavin & Lake, 2008; Slavin, Lake, & Groff, 2009)provide clear indications of the relative effectiveness of some types of teaching component.

These highly effective types of teaching component (Ruthven, 2011) are as follows:

• *Domain-specific inquiry* (in which classroom activity is organised around types ofproblem solving which focus on disciplinary concepts and gives serious attention tothe pupil thinking that this stimulates) is highly effective for attainment in both subjects

• *Co-operative group-work* is relatively effective for attainment in both subjects as long as pupils have been properlyprepared and activity is well structured.

• *Enhanced context* (in which teaching makes strong links to pupil experiences andinterests) is particularly effective for science attainment

This evidence will inform the development of activities for the teachers' toolkit, building on work already available through the partners' activities and building in the formative assessment approach developed by UNOTT in the UK and US, enhanced by the available technology.

The impact of technology and low attaining students

The creation of a digital environment in the classroom has particular benefits for low achieving students, for example, the facility to respond 'anonymously' to questions from teachers or peers reduces the anxiety levels which research shows has a significant impact on participation. Also, the facility for teachers to carefully track individual responses will support a more focused diagnostic intervention with students, a key element in supporting the progress of these students who can often be lost in the wider mass of the classroom (Shirley, Irving, Vehbi, Pape, & Owens, 2011).The use of digital environments in classroom in recent years has changed from a more "private" to a "public" use that integrates private use(Hegedus & Moreno-Armella, 2009; Robutti, 2010) as predicted in Sinclair &Jackiw (2005). This shift, which echoes the historical shift from the use of individual handheld slate to blackboards, is recognised by recent literature about the relationships between the use of "private" activity (individual or in small groups) and "public" activity (to which all the students participate).The public screen not only displays the student work in real time, providing immediate feedback, it enables individual students to compare and connect their own work with that of others.

There has been widespread adoption of projective technology in the classroom in some countries. Although these technologies have the potential to afford a shared interactive space for teachers and students, the impact has been patchy, with many teachers using the technology to convey information rather than using it to stimulate more active learning. Indeed the students themselves have had diminishing opportunities to access the technology in the mainstream classroom. However, the rapid development of small mobile devices gives an opportunity for students to access technology as and when they need it in the classroom.

Several partners (UU, ENSL, UNITO, PHF) have been involved in EU research on the impact of ICT in the mathematics classroom (Edumatics) and in the worldwide network of professional development for teachers of mathematics and science using technology: Teachers Teaching with Technology (UNEW, UU, ENSL, PHF, UNITO).

1.2.2 Progress on state of the art

Integrating technology

The main locus of progress in this project will exploit the synergy between the most promising current practice in teaching and assessment in mathematics and science with the latest technological developments to create a new pedagogical approach called 'the Connected Classroom'(Shirley et al., 2011) drawing on mobile technology and wireless networking. For example: new technological tools such as Student Response Systems (SRS) offer an opportunity for teachers to develop aspects of their existing practices for the advantage of their lower achievers. Such tools can act as an amplifier of the feedback systems in the classroom but little is known about their impact on this target group. In doing so the students and teachers will develop their understanding of how they can choose when and when not to use technology to support learning. A variety of technologies will be available, providing opportunities for comparison of their effectiveness and allowing teachers working with technology with their pupils tobecome better informed in terms of their students' developing understanding using a range of technologies.

Existing online assessment materials which provide formative feedback congruent with the aims of the project may be trialled by some partners. For example the 'Smart' (specific mathematics assessments that reveal thinking) tests developed at the University of Melbourne are an example of such materials. (See www.smartvic.com) The University of Utrecht is also developing online materials which may support assessment.

An example of such technology (but there will be a variety of technologies trialled) is the TI-Nspire™ Navigator™ which is a bespoke wireless system of handheld devices designed to support mathematics and science classrooms. This uses a 'hub and spoke' architecture to allow data, programs and questions to be sent and received from the students' handheld devices. The hub is connected to a projector which creates a public interactive space where students' responses and activities can be shared. Pedagogies developed using such a system will prepare the education system for a future where handheld devices are available in all classrooms (Clark-Wilson, 2010).

The formative assessment lesson

Some of the participants will be developing an advanced pedagogy: the 'formative assessment lesson' in a digital environment. Students begin by tackling a significant task unaided (on their own). The teacher then, overnight and with guidance, prepares some follow up questions that will move student thinking forward. These are then fed back to students digitally who then discuss their responses to the questions. They then try to produce joint solutions to the problem. Students are then given some "student work" (carefully designed imperfect work that simulates what students might actually do-usually based on real work), that shows a variety of ways of thinking about the problem. They critique these in groups. This shows them new ideas they may not have thought about. They then revise their work using these ideas. Thus students engage in a process of review and refinement, using their mobile devices as a way of sharing and collating opinions and solutions.

The effect size for students of this sort of problem solving teaching, according to Hattie (2009) is 0.61.

Reflective practice

One long-standing successful programme which developed a pedagogical intervention aimed at 'cognitive acceleration' (M Shayer & Adhami, 2007) suggests that this had been most successful where it had served not as a complement to conventional instruction, but as a constructive critique of it, leading teachers to incorporate elements of the new pedagogical model into their 'normal' teaching. Thus progress beyond the state of the art in this educational context will depend on the teachers having the opportunity to engage in a process of development where they can reflect on and contrast their experience in using this approach. This process will be built into the iterative, collaborative methodology for this study. Hence the approach of the intervention in WP4 will be to engage teachers as practitioner researchers using a 'lesson study' method for professional development (Lewis, Perry, & Murata, 2006).

Beliefs

According to Ernest (1989), three main elements affect the teaching of mathematics and, we would argue, the teaching of science: the belief system and knowledge, the social context inwhich the teaching takes place and the reflection on the teaching/learning process. In the same vein Nathan and Knuth state that "To understand and inform practice, it is necessary to also understand the teacher's curricular goals and her beliefs about student learning and development as they are crucial to the enactment of curricular goals" (2003, p. 180). Thus, in our opinion, the beliefs of the participating teachers will have a very significant impact on progress beyond the state of the art(Philipp, 2007; Thompson, 1992): beliefs about mathematics/science teaching and learning, beliefs about the use of technology, beliefs about low achievement in mathematics/science will be elicited and drawn against research evidence and practice by participation in this project.

Developing countries

The FP7 2013 Science and Society Work Programme states that research and innovation are global activities by nature. They must therefore be dealt with at an international level first by systematically integrating the national and regional cultural, social, economic and ethical context, and by exploring options for global governance of research and innovation. It is the case that projects involving technology are frequently used in already enriched environments. In South Africa, where underachievement is very widespread (Carnoy et al., 2012; Report, 2012), this project could have a significant impact on the educational standards for the population as a whole. The project will focus on how formative, diagnostic assessment practices can be embedded in classrooms in challenging circumstances – for example where the first language of teachers and students is different to the language of instruction. We believe that the inclusion of South Africa as a participating country will significantly enrich the project through the contrast with the EU educational environment stimulating creative responses to its challenges, particularly in relation to language issues and situations where resources are limited. There will be opportunities for teachers to work with colleagues in SA and there may be opportunities for students to communicate with their peers in SA.

Implementation sustained at scale

It is also the case that evidence shows that such innovation is difficult to implement at scale in order to spread and sustain beyond the initial input and there is a need to know which practices can be introduced where access to more sophisticated tools is limited and low attainment is widespread (for example in South Africa). Hence the project will also seek to build on what is known about the most effective professional development practices (Timperley et al., 2007) to provide approaches which will sustain and enhance innovation in a wide range of EU and international contexts.

B1.3 S/T Methodology and associated work plan

B1.3.1 Overall strategy and general description

The scientific strategy for this project is design study, for which one of the partners, Nottingham University (UNOTT), is a centre of excellence. Shavelson *et al*(2003, p. 26) suggest that the key principles of design studies are that they are: a) iterative; b) process focused; c) interventionist; d) collaborative; e) multileveled; f) utility oriented and g) theory driven. Hence the design of the project will lead to an iterative, collaborative, process-focused approach to the development of the toolkit for teachers, evaluation of technologies and professional development and build on research evidence for approaches which have the greatest impact. However, we recognise that pedagogical improvement at scale must take account of the existing state of the system and the resources and practices already in place. These constraints imply the adoption of a 'redesign' stance (see Ruthven et al (2010)), building on existing practices and research.

Evaluation is a constant theme in design study and this is aimed to be a 'learning project' where design does not cease with WP1 but is carried through by formative evaluation of the process of the project through reflection and evaluation by the WP leaders and participants. A separate evaluation workpackage (WP9) has been created, which will enable a small group of international external experts, drawn from science and mathematics education and assessment practices to meet annually and provide feedback to the project about its progress and plans for the next phase. In accordance with Special Clause 5 of the Grant Agreement, a Mid-Term Review will be carried out in month 22 (tentative) of the project.

The project will be organised in three phases:

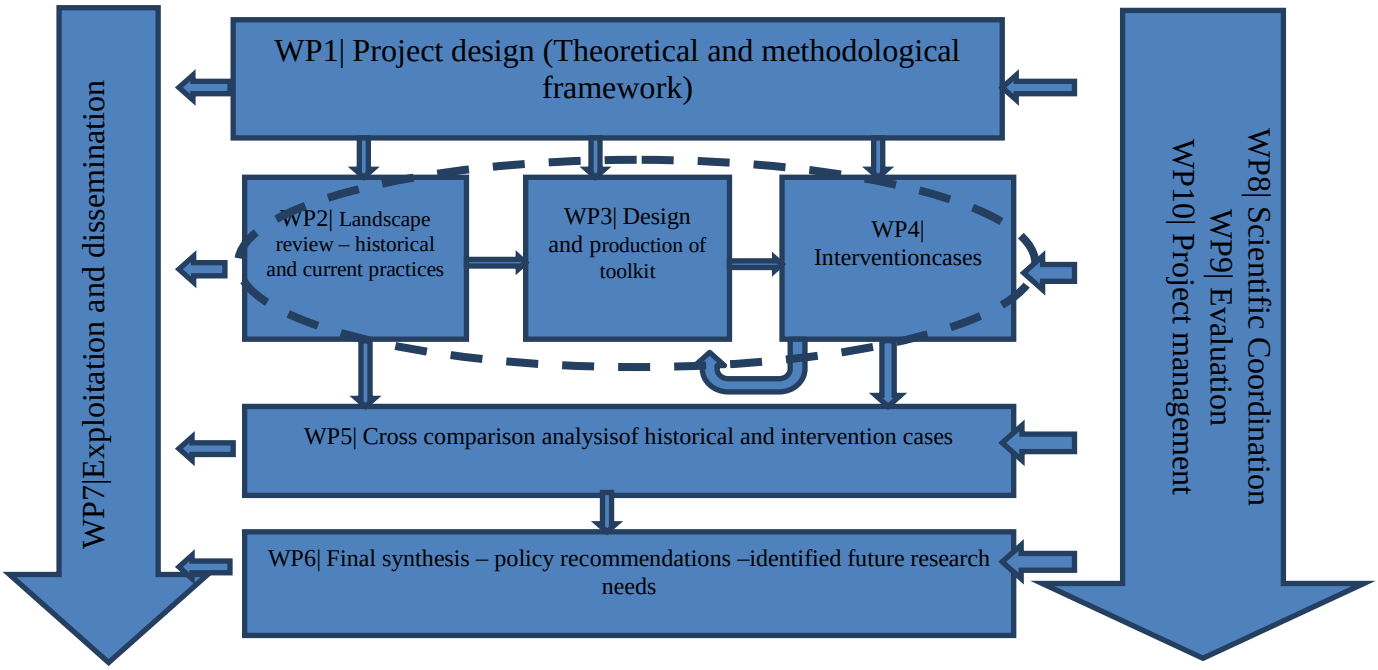
1. The first year will begin with the development of the theoretical and methodological framework for the project. The framework will then be used to establish a baseline of current practice and achievement in mathematics and science education in the EU and internationally; research innovative practices and technologies for supporting formative assessment, develop a prototype toolkit and professional development protocol and select appropriate schools and students for the study. Dissemination and conferencing among the partners will be an integral element of the project from the beginning with the development of a website a priority. A strategic guidance group consisting of representatives of technology companies and academic advisors will be appointed (membership of this group has already been appointed provisionally) to provide input to the design process and quality control. The strategy group will be split into mathematics and science. The science advisors will be recruited from the participants in the SAILS (Strategies for Assessment of Inquiry Learning in Science) FP7 project, who are not related to the partner countries in the consortium, for example Sweden, Portugal and Hungary. The requirement that advisors be recruited

from countries not related to the partner countries was made by the external reviewers and SAILS does satisfy this stipulation. The aim of the SAILS project is to support teachers in adopting inquiry based science education (IBSE) at second level (students aged 12-18 years) across Europe. This will be achieved by utilising existing resources and models for teacher education in IBSE both pre-service and in-service. In addition to SAILS partners adopting IBSE resources within their curricula and implementing teacher education in their countries, the SAILS project aims to develop appropriate strategies and frameworks for the assessment of IBSE skills and competences and prepare teachers not only to be able to teach through IBSE, but also to be confident and competent in the assessment of their students learning. Through this unified approach of implementing all the necessary components for transforming classroom practice, i.e. teacher education, curriculum and assessment around an IBSE pedagogy, a sustainable model for IBSE will be achieved. The SAILS project, therefore, is highly compatible with FASMED: it will have been running for one year when FASMED begins and then the two projects will be running concurrently. The involvement of science advisors from SAILS will therefore be of great benefit to FASMED as they can offer theoretical and methodological advice based on their experiences of working with teachers. SAILS plans to provide teacher education workshops in IBSE across the twelve participating countries and promote a self-sustaining model encouraging teachers to share experiences and practice of inquiry approaches to teaching, learning and assessment by building a community of practice. Such expertise and input will allow for refined tools, the sharing of good practice and through the developing findings and outcomes, potential dissemination pathways. SAILS advisors are the most relevant choice for FASMED. The year will finish with an event to launch the main intervention.

2. During the second year the main intervention in schools will iteratively initiate the approach(es) and professional development process, with frequent opportunities to evaluate and share progress among participants. Students' initial achievement and final achievement will be measured drawing on internationally recognised assessment protocols. A sub-contractor will film and track the development process among a range of schools, teachers and students. An online conferencing facility will enable frequent contact among the participants. There will be a well-designed study to measure the effects of the interventions.

3. A mid-term review of the project will be carried out in month 22 (tentative) of the project as detailed in Special Clause 5 of the Grant Agreement.(GA).

4. During the third year the final report will be compiled and the final version of the teachers' toolkit and the professional development package produced. A conference will be held to launch the final report and articles published, papers delivered to national and international conferences. (But papers and presentations will be produced throughout the course of the project whenever possible).



Graphical presentation of components showing their interdependencies

Significant risks and associated contingency plans

The team at UNEW have successfully managed a diverse range of inter/trans disciplinary projects. In light of this experience, we anticipate that the project will require careful **methodological coordination** in order to extract the maximum research benefits. To this end, we have designed an entire WP (1) that will provide for a homogenous methodological framework for the development of the research. In addition, work package leaders and co-leaders will be responsible for ensuring that these methodological guidelines are followed and UNEW will provide permanent methodological support for the case studies.

Regarding the implementation of the work programme: successful implementation depends on teachers believing that they and their students have the capacity to engage productively with this type of approach. This represents a considerable challenge for a programme which aims to design for implementation at scale and avoids the risk of the programme being assimilated to established pedagogies by teachers replacing or revising materials to make lessons less challenging, focused on areas of knowledge on which students have previously failed and which involve step-by-step, simplified, procedural activities in trivial contexts. There will also clearly be issues arising regarding the implementation of approaches with regard to local contexts (beyond the obvious issue of translating into the participating languages) and partners will be invited to contribute to each draft in order to address this.

To address this risk the design of the project will adopt an approach that recognises that the successful planning of change has to take account of the existing state of affairs as well as an intended one. The New Zealand approach to 'best evidence synthesis' (Anthony & Walshaw, 2007) emphasises that reform at scale depends on successful negotiation, across the constituencies forming a professional community, of a new collective understanding of effective practice. Hence the design will adopt an iterative,

collaborative, process-focused approach in which researchers address the counter-examples, qualifications and challenges which arise as ideas are tested out by teachers. A successful example of this approach is the epiSTEMe project (Ruthven et al., 2010) in which the translation into practice of ideas about dialogic teaching in mathematics and science has involved the 'integration, tuning and restructuring of theoretical knowledge to the demands of practical situations and constraints' (Bromme & Tillema, 1995). In concrete terms,the beneficiaries will convene frequent, regulated meetings with local teacher clusters where progress and difficulties shall be discussed, experiences will be shared as well as lessons-drawn from other countries and developments in other countries and communicate their experiences to their international colleagues, so as best practices to be identified and factual findings spread in Europe and beyond. The dissemination work package and policy put in place will enable this to occur and will be supported through WP4.

Our previous experience has taught us that the main risk does not necessarily come from particular situations in the project areas but from the difficulties that partners have to understand the intricacies of the **Framework Programme rules**. In particular, our South African partner may have problems understanding the reporting requirements, the eligibility rules and the flows of funds, which impinge on the smooth implementation of the work programme. That is the main reason why in the first project meeting, emphasis will be placed on carefully explaining the rules of FP7 and what they mean for project management. UNEW Project support team will be introduced personally to the participants to ensure that they are aware of how to get help if needed. We have made provision for a strong and clear management structure, with well-defined tasks and responsibilities among the partners (see section 2.1). In this project this risk has been minimized having a majority of partners with FP experience. UNEW"s Project Coordination Unit will coach the partner without experience directly and partners will receive support from other partners when necessary.

Lastly, we are aware of the intrinsic difficulties of **coordinating** a dispersed transcontinental consortium. We have scheduled 3 project meetings to guarantee the sufficient level of mutual understanding amongst partners and a common understanding of the implementation of the work programme. We will also require partners to provide bi-monthly summary project reports and updated road maps for the WPs. We will remain in permanent communication with the partners via email and Skype. These rules of coordination will also be clearly established in the inception meeting.

B1.3.2 Timing of work packages and their components

Activity	Year 1												Year 2												Year 3											
	Month																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
WP1 Project design																																				
D1.1 An agreed map of the design study/theoretical and methodological framework						x																														
D1.2 A glossary of terminology used within the project, translated into the required languages						x																														
D1.3 A set of research protocols to support the collection of data at each stage of the study						x																														
D1.4 School selection criteria – schools, teachers, students						x																														
D1.5 An agreed approach to professional development						x																														
WP2 Landscape collection of data and review of systemic practices																																				
D2.1 Report on comparative data on the landscape for low achievers in mathematics and science in the partner countries										x																										
D2.2 Survey of EU systemic practices in respect of low achievers in mathematics and science										x																										
D2.3 Report on the use of tools and technology to support teaching and assessment										x																										
WP3 Design and production of toolkit for teaching and assessment																																				
D 3.1 Prototype toolkit for launch event										x																										
D 3.2 Evaluation of toolkit													x	x	x	x	x	x	x	x	x	x	x	x	x											
D 3.3 Final version																																				x
D3.4 Professional development package for teachers										x																										
D3.5 Evaluate professional development package													x	x	x	x	x	x	x	x	x	x	x	x	x											
D3.6 Final version of professional development package																																				x
WP4 Intervention cases																																				
D4.1 Cluster meetings													x	x	x	x	x	x	x	x	x	x	x	x												
D4.2 Classroom visits													x	x	x	x	x	x	x	x	x	x	x	x												
D4.3 Case studies																									x											
WP5 Cross comparison analysis of historical and intervention cases																																				
D5.1 Agreed methodology																								x												
D5.2 Cross- comparative study of case studies																														x						
D5.3 Cross comparative analysis of country studies.																														x						
WP6 Final synthesis – policy recommendations – identified future research needs																																				
D6.1 Socio-technical approaches to the raising of achievement in mathematics, science and technology education																																				x
D6.2 National, regional and EU policy guidelines for the provision of approaches to the raising of achievement in mathematics, science and technology education																																				x
D6.3 Recommendations for future research.																																				x
WP7 Exploitation and Dissemination																																				
D7.1 Setting up and maintaining website	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
D7.2 Regular electronic newsletter to participants			x			x			x			x			x			x			x			x			x			x			x			x
D7.3 Dissemination through briefing documents			x							x																				x						x
D7.4 Documentary programme in target languages																														x						
D7.5 Postcards, posters, booklets										x																				x						
D7.8 International conference																																				x
D7.9 Stakeholder meetings in y1, y2 and y3			x											x											x											x
WP8 Project management and administration																																				
D8.1 Inception meeting	x																																			
D8.2 Phase two launch (toolkit)												x																								
D8.3 Phase three launch																								x												
WP9 Evaluation																																				
WP10 Project management and Administration																																				

B2. IMPLEMENTATION

B 2.1 Management structure and procedures

2.1.1. Coordinator Track Record and Management Capacity

Newcastle University has extensive experience of managing EU projects and successfully administered 140 projects in FP6 to the value of €50 million. It currently has over 150 projects in FP7 (including 42 Marie Curie projects) with contracts either signed or in the process of negotiation and worth almost €51 million to the University. In 2010, the University won the Times Higher Education Leadership and Management Award for the 'Outstanding Research Management Team'. The University has a dedicated EU contracts team within Research and Enterprise Services, which manages projects through the application, award and negotiation phases. A dedicated EU accountancy team within the Research Accounting Service manages post-award financial issues and use the latest upgrade of management information software available (SAP Version 6.0). The team is responsible for the preparation of cost statements for the project as frequently as required by the contract and the arrangement of audits where necessary. During the period 2009-2011, five Newcastle University FP7 projects were selected for audit by the European Commission. On each occasion the auditors concluded that the financial management of the projects was carried out in an "acceptable manner" and in compliance with the requirements of the contracts. In addition, at the end of 2008 and again at the start of 2009, the European Court of Auditors selected two large collaborative projects coordinated by Newcastle University for process compliance testing. Feedback has indicated that there were "no matters of material concern"

Contractual management

The project details and documentation will be held on "MyProjects", the University's project management and customer relationship management tool. 'MyProjects' is central to the University's ISO9001:2000 certification and provides a comprehensive audit trail.

The University of Newcastle upon Tyne is a Higher Education Institution trading as Newcastle University, and is a charity by statute. The latest financial information can be found by accessing the following link: http://www.ncl.ac.uk/documents/financialstatement10.pdf

2.1.2 Management structure and communication flows

In FaSMEd, UNEW's **Project Co-ordination Unit (PCU)** will be composed of the ***Co-ordinator (***Jill Clark), the ***Deputy-Co-ordinator (***David Wright) and the ***Project advisor*** (Prof David Leat). It will be supported by Lucy Tiplady, our Research Associate (***RA***) contracted for the project, who beside a research role will help with the compilation of project reports and deliverables. This multidisciplinary team will work under the common umbrella provided by the Newcastle Research Centre for Learning and Teaching (CfLaT).

The coordinator, Jill Clark, will lead and take responsibility for the overall management of the project. Jill will be responsible for day-to-day contact with the funders, the delivery of project deliverables and as an employee of Newcastle University, will be supported by the University's Project Management and Quality Assurance procedures. She has been Principal

Investigator on 15 externally funded research projects and has worked with teams on a total of 50+ projects.

The deputy coordinator, David Wright's previous role as project officer for the UK government agency, the British Educational Communications and Technology Agency (Becta) gives him a strong background in project management. Since joining Newcastle University as Programme Leader for Secondary Mathematics he has successfully managed a major research project for the National Centre for Excellence in Teaching Mathematics (NCETM) and many smaller ones, the Teaching Development Agency (TDA) (several research projects on the application of information technology in teacher education) and Texas Instruments (producing materials to support formative assessment activities).

Lucy Tiplady will be the dedicated Research Associate for UNEW. Lucy joined Newcastle University as a researcher within CfLaT in 2005. Since then, Lucy has worked on a diverse range of projects and evaluations within Education and has developed subject specialisms in the areas of practitioner enquiry and visual research methods. Working collaboratively with schools and the wider education community has led to a keen interest in how research methods can be used as tools for enquiry to aid teacher and pupil learning and how visual methods can be used to mediate and enhance interviews.

Professor David Leat will support the unit as *Project Advisor,* with his experience in a wide range of educational research projects, he will act as the **first mechanism of quality control**.

Financial Standing and Resources

All partners have been selected on the basis of proven experience, capacity and capabilities relevant to the project's aim and work to be performed. This includes the cardinal, financial standing and resources (both human and financial) available to carry out thedescribed work. The partners have considered workloads and are aware of available time/resources and existing commitments. The partnership has put together a bid based on realistic expectations of resource and time implications and each member of the partnership has committed a proportion of their time in relation to their existing commitments.

A **Strategic Advisory Committee (SAC)** will be formed at the beginning of the project including representatives from technology companies manufacturing the feedback tools and experienced educational researchers. Members have already been approached and agreed to participate. The members of the committee will be the Science Communication Manager of Newcastle University and a member of the coordinating team from European Schoolnet of the FP7 project iTEC.These members will give advice on dissemination and could form a small subgroup in order to focus on this issue. Moreover, representatives of the technology companies to be involved in the project shall provide up to date information about technology used and a member of the London Knowledge Lab, who coordinated the Comenius Edumatic project. The science advisors will be recruited from the participants in the SAILS (Strategies for Assessment of Inquiry Learning in Science) FP7 project, who are not related to the partner countries in the consortium, for example Sweden, Portugal and Hungary. SAC will be formally consulted about the progress of the project on a 6-month basis, particularly in preparation for the Project Meetings. The committee will be asked to address scientific, engagement and dissemination issues. This Committee will provide the **second mechanism of quality control**. Together, the ***PCU***and the ***SAC*** will provide **strategic guidance** to the whole project in scientific, administrative and engagement and dissemination issues.

On the advice of the independent external experts , which evaluated the initially submitted proposal for FASMED, based on the relevant European Commissions' rules – namely: that the Consortium involves external experts who will evaluate whether the project reaches its objectives concerning low achievement in science and mathematics, a small number of international experts on science education, educational technology, mathematics education and assessment will compose an evaluation group (see also WP9). This group will meet annually to follow-up and review the progress achieved, keeping analytical minutes to this end, which shall serve two purposes: (a) provide the final report to the project in the last reporting period of the project and (b) provide to the Commission the minutes and a report on the state of the art (progress achieved so far), which shall be communicated to the Commission and shall be also taken into account when the Mid-Term Review of FASMED shall take place. The evaluation methodology will be an issue addressed through WP1 in order to brief the evaluation group on their roles. This evaluation group provides the **third mechanism of quality control** alongside Professor David Leat as project advisor (the first mechanism of quality control) andthe Strategic Advisory Committee(the second mechanism of quality control) – see p15 for details.

Advice on dissemination will be provided through the inclusion on the Strategic Advisory Committee of the Newcastle University Science Communication Manager and a member of the coordinating team from the European Schoolnet project 'iTEC'.

The technology companies involved, are all producers of technology for the classroom which provides ways of enhancing feedback between students and teachers, they are all large companies, not SME's. One company has a strong relationship with education and are currently a partner in iTEC, a very large FP7 project to 'Design the Future Classroom'. Their products include integrated, technology-enabled environments, comprised of interactive whiteboards, learner response systems, software, training and professional development, resources and instructor communities, designed to improve educational results.
Another company is a multi-national technology company which uses extensive research to help improve mathematics and science education. For more than 20 years, researchers in North America, Europe and Asia have contributed to substantial research on the use of handheld graphing technology and classroom networks to transform mathematics and science teaching.It is the primary sponsor of a large technology programme for teachers, the largest professional development program for mathematics and science teachers in the United States and Canada. This network now extends across Europe and several of the partners in FaSMEd (PHF. UNEW, ENS de Lyon) are linked with this professional development network. The programme trains about 14,000 teachers a year on the appropriate use of handheld technology.
The third company are long standing manufacturers of technology and handheld calculators – they are interested in demonstrating how their technology can support learners of science and mathematics. The involvement of all three companies contributes considerable added value to FASMED in both provision of technology resources and the development and testing of such technology in different pedagogic settings. If any sub-contracting will take place, these procurement rules shall be followed according to the internal rules of the beneficiary.

Contract Management Meetings

CfLaT's quality policy ensures all projects are designed and conducted to meet the requirements and expectations of our clients. All projects undertaken by CfLaT are reviewed

once a week by team members at a project progress meeting. This meeting brings together all of the project team in order to fully review project progress and resolve any issues which may have arisen. The CfLaT Executive Directorate, headed by Professor David Leat, the Executive Director, also meets monthly to review project progress. Where necessary we can facilitate and operationalise conference calls to help with communication.

At the **operational level** there will be two complementary structures:

The **Project Coordinator** will communicate directly with the **Principal Investigators** of each of the teams for management decision matters concerning that project. The **Steering Group (SG)**will be formed by the Coordinator, the Deputy Coordinator and the Principal Investigator of each of the participants. The SG will be a standing structure that will meet formally at every Project Meeting (more information in *2.1.5.*).

They will be the forum for:

- overseeing the overall legal, contractual, ethical, financial and administrative management of the consortium;overseeing the preparation, updating and management of the Consortium Agreement;
- Managing and resolving risks, which may occur, as well as potential disputes issues, according to the rules set in the Consortium Agreement.
- overseeing the preparation and submission to the EC of all contractual documents (reports and other deliverables, etc.);
- coordinating any issues arising regarding knowledge management activities;
- overseeing science and society issues that may arise in relation to the activities conducted within the project;
- overseeing the promotion of gender equality in both the organization of the action work and in the activities in the field;
- implementing the recommendations coming from the strategic management level
- resolving emerging risks and disputes according to the rules set in the Consortium Agreement

The **scientific management (WP8)** of the project will be the joint responsibility of the **Workpackage Leaders** (WPL) in continuous dialogue with the Project Coordination Unit. This is facilitated by the participation of UNEW in all the workpackages of the project. The Project Coordinator remains having final responsibility for the delivery of the scientific elements of the project. Each of the WPL will be responsible for the coordination of activities in their workpackages. Each WPL will be supported by a Co-leader. All the WPLs are known experts in their fields.

In addition the Strategic Advisory Committee (SAC) will provide external guidance and advice via the PCU. The SAC will meet at least every six months or be convened as necessary and provide advice on the overall development of the project.

2.1.3. Consortium Agreement

Regarding the internal organisation of the consortium and with the aim of ensuring proper management, the partners of FASMED, as also explicitly stated in the Grant Agreement (GA) under Article 1.4, will conclude a Consortium Agreement. Overall, the Consortium Agreement (CA) shall ensure clarity of management, transparency, provision of full

information required for good collaboration, cooperation and collective decision-making, as deemed appropriate, conflict(s) prevention/avoidance, dispute(s) resolution, etc. Shall specify the relationships among the consortium, in particular with respect to the organisation of the work agreed to be performed by all the partners, including the Coordinator, governance structure, rights, obligations, responsibilities, decision-making process, etc. and formally commit all partners to proper delivery. The Consortium Agreement is established before the signature of the Grant Agreement (GA).

Organisation of the consortium and role of the Coordinator

The coordinator shall:

a) administer the Community financial contribution regarding its allocation between beneficiaries and activities, in accordance with the grant agreement and the decisions taken by the consortium. The coordinator shall ensure that all the appropriate payments are made to the other beneficiaries without unjustified delay;

b) keep the records and financial accounts making it possible to determine at any time what portion of the Community financial contribution has been paid to each beneficiary for the purposes of the project;

c) inform the Commission of the distribution of the Community financial contribution and the date of transfers to the beneficiaries, when required by the grant agreement or by the Commission;

d) review the reports to verify consistency with the project tasks before transmitting them to the Commission;

e) monitor the compliance by beneficiaries with their obligations under the grant agreement.

The coordinator may not subcontract the above-mentioned tasks.

The beneficiaries shall fulfil the following obligations as a consortium:

a) provide all detailed data requested by the Commission for the purposes of the proper administration of this project;

b) carry out the project jointly and severally vis-à-vis the Community, taking all necessary and reasonable measures to ensure that the project is carried out in accordance with the terms and conditions of the grant agreement.

c) make appropriate internal arrangements consistent with the provisions of the grant agreement to ensure the efficient implementation of the project. When provided for in Article 1.4 these internal arrangements shall take the form of a written consortium agreement (the " consortium agreement"). The consortium agreement governs inter alia the following:

i. the internal organisation of the consortium including the decision making procedures;

ii. rules on dissemination and use, and access rights;

iii. the distribution of the Community financial contribution;

iv. the settlement of internal disputes , including cases of abuse of power;

v. liability, indemnification and confidentiality arrangements between the beneficiaries.

d) engage, whenever appropriate, with actors beyond the research community and with the public in order to foster dialogue and debate on the research agenda, on research results and on related scientific issues with policy makers and civil society; create synergies with education at all levels and conduct activities promoting the socioeconomic impact of the research.

e) allow the Commission to take part in meetings concerning the project.

Last, with respect to the obligations per partner of FASMED:

They shall fulfill and abide to other Specific performance obligations as stated in the Annex II, accompanying the Grant Agreement (GA). Moreover, in case of any scientific disputes or controversial issues, which may arise, the Commission – and the responsible Scientific/Project Officer to whom the overall management of the project has been assigned to be the Commission – shall be informed accordingly by the Coordinator. The Coordinator shall in the first place together with the consortium try to find solutions/resolve such issues and if not he shall seek the advice from the Commission.

Environmental Statement

The research team acknowledge and will adhere to the adoption of environmentally friendly techniques/processes where possible, in particular the use of electronic libraries and database management systems and the conscientious use of photocopying resources. We use recycled paper for all our research materials and reports.

Data Security

With regards to data storage, all electronic files will be protected by a password and stored on encrypted personal computers. Storage of hard copies will be in a locked cupboard. Data will be stored together with all documentation necessary to allow further efficient use of the data. This documentation will include: survey instruments (questionnaires/interview schedules/focus group outlines); field reports; sampling methodology. Except with the agreement of the subject, no data analysis report should allow the reader to identify an individual subject. In general, quantitative data analysis will be conducted only on anonymised datasets.

2.1.4. Decision-making

The **Project Coordinator**, supported by the Deputy-Coordinator, will ensure proper integration of the activities of FaSMeD and allocate tasks among staff. Her administrative role includes:

a) administer the Community financial contribution regarding its allocation between beneficiaries and activities, in accordance with the grant agreement and the decisions made by the consortium. The coordinator shall ensure that all the appropriate payments are made to the other beneficiaries without unjustified delay;

b) keep the records and financial accounts making it possible to determine at any time what portion of the Community financial contribution has been paid to each beneficiary for the purposes of the project;

c) inform the Commission of the distribution of the Community financial contribution and the date of transfers to the beneficiaries, when required by the grant agreement or by the Commission;

d) review the reports to verify consistency with the project tasks before transmitting them to the Commission;

e) monitor the compliance by beneficiaries with their obligations under the grant agreement.

Day-to-day decision-making will be the responsibility of the **Principal Investigators** of each participant (for scientific and minor administrative matters) and the **Coordinator** (for major administrative matters and issues requiring liaison with the EC). The Coordinator will consult as widely as possible with all participants in the event of queries from the EC requiring a rapid response where appropriate. Each **Workpackage Leader** will be responsible for the day-to-day management of his/her WP. Each Principal Investigator will be responsible for ensuring that his/her staff contribute to the WPs as required by the workpackage leaders.

It will be an important task of the Coordinator to ensure that the activities proposed on each WP take place as required by the workplan. This will be accomplished by monitoring progress according to the timetable and as indicated in progress reports, through discussion at progress meetings and through email and Skype liaison. Short bullet point progress reports will be circulated in this manner at two-month intervals. Additional coordination tasks include implementing the CA, planning and running the progress meetings, ensuring that reports are produced as required, arranging payments to the participants and liaising with the EC. When audits are required, allowance has been made for the use of external auditors.

CfLAT has a long track record of communication with partners in multiple collaborative projects. In our experience, the existence of "soft-links" between the Coordination Unit and the Principal Investigators of all the groups is key for success. This is the best guarantee for a continuous flow of information in an environment of mutual trust. The project will combine the use of formal means of communication (eg newsletters) with the extensive use of electronic media (eg project webpage with file sharing capabilities). In particular, we will use the full potential of audiovisual means such as Skype to maintain personal contact both with researchers and stakeholders. When possible, films of interactions with the community will be shared with the consortium.

2.1.5. Project Meetings

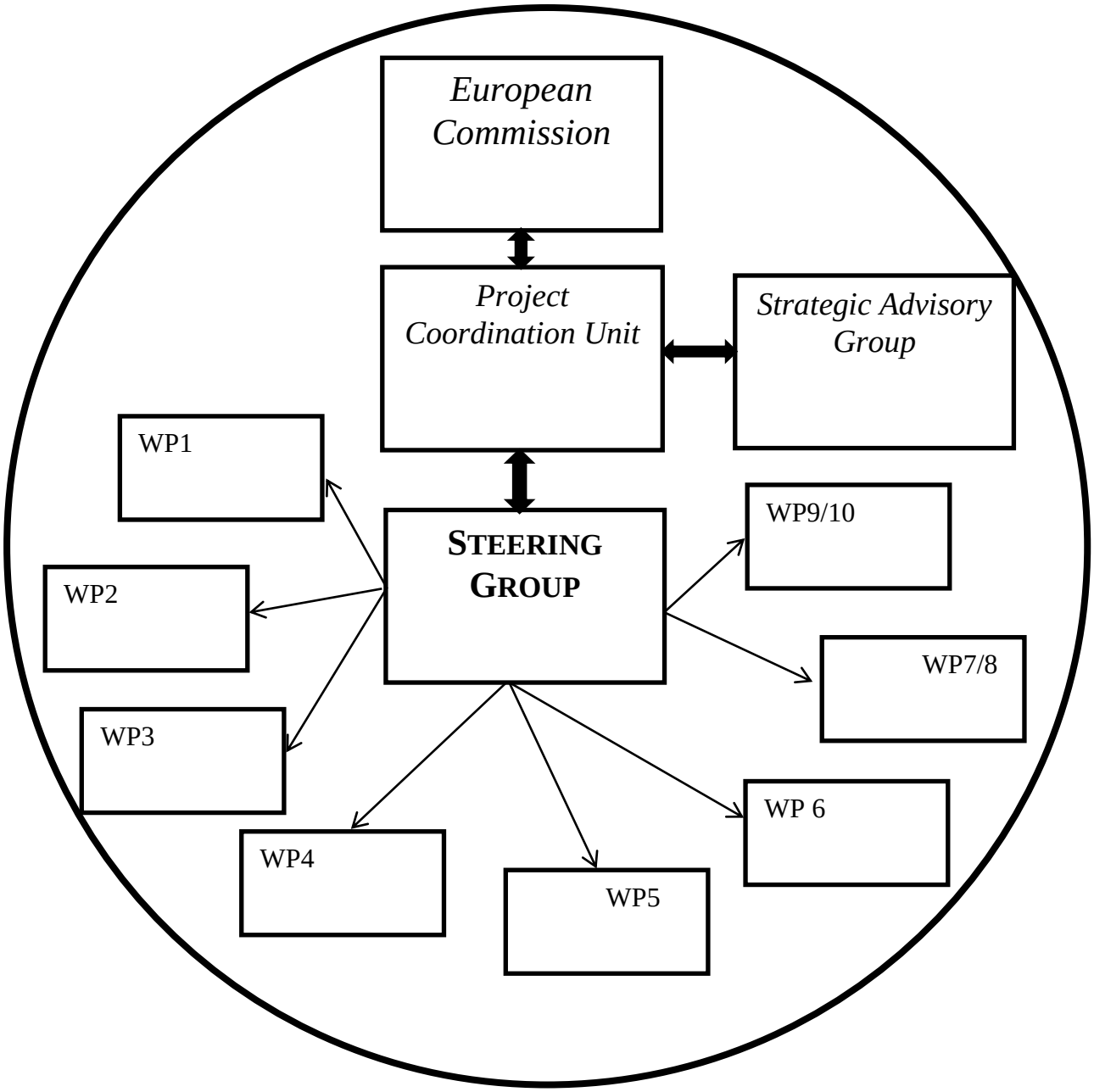
Beyond the communication channels explained above, regular meetings, in particular three Management Meetings (WP8) of the Steering Group will be used to monitor the action's progress and discuss and correct any problems that may arise in relation to project management issues. The schedule for these meetings can be found in the description of WP8 in the previous section. International external experts will be invited to provide feedback and adviceto evaluate the project, subcontracted as detailed in WP9, meeting annually and reporting to the consortium meetings.

We believe that three management meetings are necessary, because the project is in three distinct phases: planning, implementation and evaluation and a meeting is needed to launch and emphasise the change and development during each phase. The second management meeting will be held during the launch event.

During the project life, each work package leader partner will participate in the three Management Meetings. In case that the work package leader is not able due to justified reasons to participate in the management meetings, it shall be ensured that one representative will attend each of these meetings (this actually forms part of their contractual duties of each partner and will be specified in the Consortium Agreement). Adequate funding has been allocated to ensure that all work package leaders can attend these meetings. Each Management Meeting will have feedback fromthe international external experts, who will provide feedback and peer monitoring of the project progress (WP9). The expert group, the **third mechanism of quality control,** will focus on the cross-disciplinary co-generation of knowledge within the project.

Wherever possible, Management Meetings will include complementary local stakeholder meetings open to the wider public, with the object of disseminating the project's work and outcomes, receiving feedback, and promoting participation at the local level.

The Project Coordination Unit will oversee the organization of all 3 Management Meetings in collaboration with the hosting partner. The First Management Meeting (D8.1), will deal with the key organisational and methodological aspects of the action's launch.This meeting will be used to establish the general framework and management of the project including the rules of the FP7 programme such as partners' responsibilities and reporting requirements, deliverable sign-off procedure and templates for all project documentation and will take place in Newcastle. The second management meeting will be held during the launch event for the toolkit in month 12 to coordinate arrangements for the interventions in year 2. The third meeting (D 8.3) will take place in Cape Town, South Africa, near the middle of the project (month 24). This meeting will serve to discuss the preliminary key findings of WPs 2-5 and to consolidate the dissemination activities of WP7. The justification for this location is that it will be an opportunity for the attendees to learn about the very different context for the implementation of the project approach in South Africa in order that the South African colleagues can be appropriately supported in contributing to the final toolkit and evaluation in year 3.In the management meeting which shall take place in Cape Town, South Africa only the work package leader of WP 2-5 and 7 (or his/her representative in case his/her justified non-availability) shall participate and the international external experts.



B 2.2 Beneficiaries

Participant	UNEW	Participant No	1
Description of legal entity UNEW has one of the largest EU research portfolios in the UK. It is a member of the prestigious Russell Group, comprising 20 leading institutions in the UK. UNEW has been coordinator in 63 of the 160 FP7 projects it has been awarded since 2007, totalling €53 million. The Research centre for Learning and Teaching - CfLaT (see: http://www.ncl.ac.uk/cflat/) is renowned for its experience in terms of research design and methodology, project management, and knowledge of the policy and practice area. They have built up a reputation for delivering good quality, clear conclusions that are user-friendly, policy and practice relevant to tight time-scales. Recent projects (totalling £1 million+ in awards), include:			

- National Evaluations of Full Service and Extended Services (including thematic reviews of strategies for reaching disadvantaged groups and of the role of local authorities) (DCSF/DfE)
- Extended Schools Subsidy Pathway Evaluation (DCSF)
- Participation of young people in research (AHRC)
- Interventions in aspirations and attitudes: influencing educational attainment (JRF)
- Transition projects: 'Bridging the Gap' – looking at transition from school and FE colleges to HE; the first year experience of students in HE; transition and independent learning programme with Gateshead LA and schools.

All these projects target multiple outputs to maximise impact and engagement within the Centre, the School, Faculty and University, as well as within the practice community and beyond and we are interested in three fields for potential impact and for outcomes: Research; Practice and Policy.

CfLaT collectively has extensive experience in designing and conducting research and evaluations using qualitative methods (including interviews, observations, visual methods and case study approaches), alongside experience of conducting large-scale postal and online questionnaire surveys. We use a variety of analytical techniques as appropriate to the design and aims of the research. We are able to draw on additional capacity and expertise when needed from CfLaT, which lessens any risk to the project arising. We have strong existing relationships with schools, colleges and LAs across the country and we are particularly careful to ensure that participating organisations receive some benefit from their participation, usually in the form of feedback on how their work fits within a broader national pattern. Our projects have given us considerable experience in conducting in-depth interviews with, e.g., Head teachers; service providers; and policymakers, and we regularly involve children and young people in our research using appropriate skills and methods built up over several years.

Main tasks in the project

WP1, WP6, WP7, WP8, WP9, WP10

Profile of staff members that will be doing the work – all of whom are directly employed by UNEW.

Jill Clark is a Senior Research Associate and Business Development Director of CfLaT and has worked as an academic researcher for over 20 years. Although now working in the field of educational research, Jill has a strong background in Social Sciences research. Her first degree is in Behavioural Sciences and she then completed her postgraduate degree at Cambridge University. Jill has extensive experience in the formulation of research design and methodology, both qualitative and quantitative, the day to day administration and management of nationally funded research projects, including supervision of research, administrative staff and budgets. She has been Principal Investigator on 15 externally funded research projects and has worked with teams on a total of 50+ projects. She has specialist knowledge and experience of the application of qualitative research methods such as participant observation, and conducting in-depth, sensitive, interviews and focus group discussions. She has an international profile in the theory and use of participatory research techniques, evidenced by a unique contribution in the book on user participation and a sole-authored paper in an international peer-reviewed journal. Her research interests have a strong focus on the experiences – and views - of young people; and projects (among others) include transition from school/FE to HE research, researching thinking and communication skills in prisons, 14-19 curriculum research and a JRF study of housing and schooling.

David Wright is a graduate of the London School of Economics. Prior to his employment at Newcastle University he worked in secondary education and then for the UK government, first as an analyst for the Treasury and then as a project officer for the British Educational Communications Technology Agency where he was responsible for commissioning and coordinating a range of projects on behalf of the UK government. He leads the Secondary Mathematics PGCE programme and since joining Newcastle University he has been Principle Investigator for a range of research projects for the Teaching Development Agency, the National Centre for Excellence in Teaching Mathematics and Texas Instruments. He is the author of a number of articles and book chapters on the integration of information technology in the mathematics classroom, a book on thinking skills in mathematics education and was editor of the journal 'Micromath' dedicated to the application of information technology in mathematics education.

Lucy Tiplady joined Newcastle University as a researcher within CfLaT in 2005. Since then, Lucy has worked on a diverse range of projects and evaluations within Education and has developed subject specialisms in the areas of practitioner enquiry and visual research methods. Working collaboratively with schools and the wider education community has led to a keen interest in how research methods can be used as tools for enquiry to aid teacher and pupil learning and how visual methods can be used to mediate and enhance interviews.

David Leat is Professor of Curriculum Innovation and Executive Director of CfLaT. His research interests are in thinking skills, inquiry based learning, curriculum development and professional learning. He is the author of many journal articles, the editor of the Thinking Through … series of books and for 3 years worked for the education ministry in developing professional learning materials for pedagogic innovation. From 2007-2009 he was the academic supervisor for a Knowledge Transfer Partnership on Student Self Assessment of Inquiry Skills. He is currently working with Professor Sugata Mitra on developing the SOLE (Self Organised Learning Environment) method for inquiry based learning.

Administrative staff

Within the Newcastle team, the duties of the administrator will include (but not be limited to):

• Providing administrative support to the co-ordinating team and liaison between the partners and the EU Commission
• Organisation of meetings and events (both physical and virtual, e.g. Skype) with partner teams, participating schools, suppliers and EU Commission staff
• Facilitation of such meetings and events, including minute taking, room bookings, catering arrangements etc.
• Researching travel for team members when attending meetings and liaising with central university personnel
• Providing support with the reporting data and documentation to the EU Commission and the EU project managers and in turn liaising with Newcastle University EU staff.
• Provides administrative support in report/paper/documentation preparation and website content.

Participant	University of Nottingham (UNOTT)	Participant No	2

Description of legal entity

The University of Nottingham is a research-led university that is consistently ranked among the

top 10 UK Universities with the School of Education being one of the largest and most well-established education departments in the UK (recently ranked 8th for research in the UK). The Centre for Research in Mathematics Education (CRME) is one of three Centres in the School and is one of the largest such groups in the UK. The Centre caters for a wide range of teaching and supervision of higher degrees with research being focused in the interrelated areas of policy and equity, curriculum and pedagogy, continuing professional development and pedagogies. As part of CRME the MARS/Shell Centre, founded in 1968, is a professional design research and development group with team members having extensive experience of designing teaching, learning, assessment materials and professional development for teachers of mathematics and science both in the UK and internationally, particularly in the United States. The Centre team have wide experience of working on Formative Assessment, and are currently working with the University of California (Berkeley) on the Mathematics Assessment Project, which is aimed at producing formative assessment lessons to support the Common Core Curriculum Standards for Mathematics across the US. This is funded by the Bill and Melinda Gates Foundation. Members of the Centre have worked on several EU projects, including: LEMA (Learning and Education in and through Modelling and Applications - a Comenius project), PRIMAS (Promoting Inquiry-based Learning in Mathematics and Science – FP7); MASCIL (both FP7 projects).

Main tasks in the project

WP1 WP3

Profile of staff members that will be doing the work – all of whom are directly employed by UNOTT.

Professor Malcolm Swan, started his career as a Mathematics teacher and has now worked at the University of Nottingham for 30 years and directs the Centre for Research in Mathematics Education. He is acknowledged worldwide as an *expert in designing classroom materials and materials for teacher professional development*. All his materials are theoretically informed and have been evaluated and have proven efficiency and efficacy. The outputs of his research into professional development have been supported by the UK government's Education Department and distributed to all secondary schools (for 11-18 year old students), Further Education colleges (for post-16 students) and Adult Education providers in UK through the National Centre for Excellence in Teaching Mathematics. His work offers "highly successful approaches to teaching, learning and professional development" (OfSTED, 2006). Recently he was responsible for developing a multimedia (and online) resource for promoting inquiry-based pedagogies among Mathematics Teachers that is widely used in Secondary Schools. Professor Swan leads a team of educational designers who are currently working extensively on the development of teaching materials for use in the United States that focus on inquiry approaches and formative assessment.

Geoff Wake recently joined the Centre as Associate Professor in Mathematics Education following a successful twenty-year period at the University of Manchester, where he led teacher education in secondary mathematics and worked on a wide range of mathematics education research and development projects primarily in applications of mathematics in the post-compulsory sector. He has an exceptionally strong track record of research that has explored applications of mathematics at all levels with much of this stimulated by an ***interest in applications of mathematics in vocational learning and workplaces***. Parallel research that explored activity in workplaces and assessment of mathematics for vocational students led to a significant amount of work in curriculum development and the design of new 'applications of' mathematics qualifications at a national level that have been thoroughly evaluated to show

increased dispositions towards further study of S & T subjects.

Marie Joubert is a Senior Research Fellow in Mathematics Education at the University of Nottingham. She had a twenty-year career in teaching mathematics, computing and ICT in secondary schools before she joined the University of Bristol as a PhD student and researcher. Her research interests are in three overlapping areas: mathematics education, computers in education and professional development. Her experience includes, for example, research on the use of handheld computing devices across all curriculum areas, the use of computer software in the teaching and learning of mathematics, effective professional development for teachers of mathematics. Her most recent past project was the STELLAR EU Network of Excellence, where she made a significant contribution to the scientific leadership of the Network. Currently she is involved in research related to formative assessment in mathematics and in developing and evaluating professional development toolkits to support teachers of mathematics and science in adopting enquiry-based approaches to teaching.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

Participant	Freudenthal Institute, Utrecht University, Netherlands (UU)	Participant No	3

Description of legal entity

The Freudenthal Institute for Science and Mathematics Education (FIsme) is part of the Faculty of Science of Utrecht University in the Netherlands. The institute, with its scientific staff of over 40 researchers and designers, aims to contribute to a better understanding of the learning and teaching of science and mathematics, in order to develop improved models of education. In these models, bottom-up approaches, guided reinvention, inquiry and creativity are key concepts. FIsme research covers a wide range of educational settings from pre-school education to higher education, and in addition addresses informal and out-of-school learning as well as learning on the workplace. Also, teachers' professional development is at the heart of FIsme's interests. The influence of the work of the institute is reflected in the Dutch curricula, which use contextual situations, support inquiry-based activities and connect students' strategies with carefully chosen didactic models. FIsme is recognized by the Dutch Ministry of Education as the national expertise centre for science and mathematics education.

As a core activity, the Institute investigates the potential of ICT in mathematics education. It hosts websites that attract many students, teachers, parents and others by their games and applications that invite creativity, such as Rekenweb and Wisweb ('arithematic web' and 'math web', http://www.fisme.science.uu.nl/rekenweb/en/ and http://www.fi.uu.nl/wisweb/en/) and the

Digital Mathematics Environment (DME, http://www.fisme.uu.nl/dwo/en/).

FIsme participates in several EU projects, such as Primas (Promoting inquiry in mathematics and science education across, FP7-SCIENCE-IN-SOCIETY-2009-1, http://www.primas-project.eu/), MaSciL (Mathematics and Science for Life!, Support-SiS.2012.2.2.1-1) and EdUmatics (503254-2009-LLP-UK-COMENIUS-CMP, http://www.edumatics.mathematik.uni-wuerzburg.de/en/).

Main tasks in the project

WP1. WP3. WP4

Profile of staff members that will be doing the work - – all of whom are directly employed by UU.

Prof. Dr. Marja van den Heuvel-Panhuizenhas much experience in research and development of mathematics education, including early childhood mathematics and mathematics in special education, assessment, longitudinal teaching-learning trajectories for mathematics, the use of online games in mathematics education, solving context problems, early algebra in primary school, gender differences, early talent development, and the professional development of teachers and mathematics coordinators. Since 1987 she has been working at the Freudenthal Institute and she is also affiliated to the Faculty of Social and Behavioural Sciences, Department of Pedagogical and Educational Sciences. Her PhD study was on assessment and Realistic Mathematics Education. She has a strong track record of publications and acquired a substantial number of grants for research and development projects. Among other things, she was for several years the leader of a project, granted by the Ministry of Education, aimed at developing a teaching-learning trajectory for mathematics in primary school. From 2005 to 2010 she was a visiting professor at IQB of Humboldt University Berlin, where she was involved in a national project aimed at the evaluation and implementation of the standards for primary school mathematics in Germany. Recently she completed together with the University of Cape Town a teaching-learning trajectory for the South African Foundation Phase. One of her last projects was on revealing mathematical potential of special education students by using an ICT-based assessment tool. Currently she is involved in a research project on classroom assessment carried out in the Netherlands and in China.

Prof.Dr. Paul Leseman (education, special education) is coordinator of the Utrecht University team and of the QECEU project. His research interests concern typical and atypical development of working memory, executive functions, language, literacy and numeracy in early and middle childhood as related to biological risks, home characteristics, day care, and pre- and primary school quality, using neuropsychological and eye-tracking methods. Leseman is principal investigator of the national cohort study Pre-COOL. For the OECD, within the framework of the Starting Strong review, he wrote a report on preschool intervention programs for disadvantaged children, published in 2002. In 2007 he was commissioned by EURIDICE to conduct a research synthesis review on early childhood education and care as a means to combat educational inequity, which was published in 2009. Following this, he was advisor to DG EAC of the European Commission for the Communication on Early Childhood Education and Care of the European Commission (issued in 2011). As an external evaluator, he is involved in the Comenius project TODDLER. Leseman is coordinator of the Special Interest Group Development and Learning in Early Childhood of the EARLI.

Peter Boon works as a senior software developer, educational designer and researcher at Utrecht University's Freudenthal Institute for Science and Mathematics Education. He combines his

technology expertise and his mathematics teacher background for developing rich learning content. He has not only designed many online resources that have had much impact on education in the Netherlands and outside, he is also the architect of the Digital Mathematics Environment DME, a tool for designing and delivering interactive online curricula, that used by many schools and publishers.

Wim van Velthoven works as an allround senior software developer at the Freudenthal Institute and has been involved in numerous ICT projects during the last 25 year. He is the co-designer and the main programmer of the DME management system.

MiekeAbels is a former mathematics teacher and works as a designer at the Freudenthal Institute since the 1990s. She is also very experienced in delivering professional development courses and workshops. Her special expertise is in low achieving students, both in special primary school education, in general primary education and in lower vocational education.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

Participant	École Normale Supérieure de Lyon (ENS de Lyon)	Participant No	4

Description of legal entity

The ÉcoleNormaleSupérieure de Lyon (ENS de Lyon) is the product of a very recent integration of two ÉcolesNormales: Humanities on the one hand, Sciences on the other. Expertise and research foci of the institution are based on strong disciplinary competence, search for interdisciplinary projects and international cooperation. Laboratories at the ENS de Lyon are directly involved insignificant national and international activities: European and French programs (12 FP7 project, 130 projects of the French national research funding agency –ANR), publications (around 1000 publications a year), agreements with 224 university partners in 26 countries.
The French Institute of Education is a component of the ENS de Lyon, but it has its own instances of management (director, board governance, policy advice and scientific). The French Institute of Education is a national research, training and mediation of knowledge in education, based on constant interaction with educational communities, through the recruitment of seconded teachers and professors. The French Institute of Education, according to its statutes has overall responsibility:

- to develop researches on various forms and practices of education in France and abroad;
- to provide support for piloting and evaluation of policies in education, in France and in international organisations;

- to provide initial training or continuing education in all areas of economic and social life;
- to make available scientific resources in education;
- to feed a space for debate on major contemporary issues in education.

Main tasks in the project

WP4

Profile of staff members that will be doing the work – all of whom are directly employed by ENS de Lyon.

Dr. Gilles Aldon is a mathematics teacher and researcher at the EcoleNormaleSupérieure de Lyon. He is particularly involved in research on problem solving linked with the integration of new technologies in the classroom. His Phd focuses on the use of technology in the regular classroom of mathematics, seeking to understand how the incidents are indicative of perturbations that change the dynamic of the class. His research focuses:

-on the links between research and the actual use of technology in the classroom,
-on the possibilities of multi-representations given by technology and the links with teaching and learning.
He was involved in the EdUmatics Comenius project (503254-LLP-1-2009-1-UK-COMENIUS-CMP) and is member of the international commission for the Study and Improvement of Mathematics Teaching (CIEAEM).

Michèle Prieur is a science teacher and researcher at the EcoleNormaleSuperieure de Lyon. Her research focuses on the development of science and mathematics teachers' professional knowledge on the status of the hypothesis in inquiry based approaches. She is leader of the national project “Plan sciences” which aims to promote science education and development of scientific culture in socially disadvantages areas in order to ensure the continuity from primary to secondary levels. She is also involved in the national project “tactiléo” which focuses on the use of multitouch tablets in science teaching.

Dr. Karine Bécu-Robinault is an associate professor at IFE in science education at the French Institute of Education, (ENS of Lyon). Her research is centered on physics education in primary and lower secondary school (compulsory education). She participated to the European Projects "Labwork in science education" (SOE2-CT95-2001) and "Computer aided teaching" (141767-LLP-1-2008-1-DE-Comenius-CMP). Her research focus concerns the way teachers implement official guidelines concerning inquiry based science education with their students, evaluate associated competences and promote physics understanding. The theoretical background lies on hypotheses concerning the role of modelling and semiotic representations in physics' learning.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.

• Researching travel for team members when attending meetings and liaises with central university personnel • Provides administrative support in report/paper/documentation preparation.

Participant	National University of Ireland, Maynooth	Participant No	5

Description of legal entity

NUI Maynooth is one of Ireland's fastest growing Universities, and has a strong tradition of teacher development, both in-service and pre-service. Froebel College of Education is an associate college of NUI, Maynooth and will move to the Maynooth campus in 2013 and become the Froebel Department of Primary & Early Childhood Education. Reflecting the philosophy of Friedrich Froebel, the College is deeply committed to emulating his values and principles of 'child-centred' education. The department's research activities includes the management of diverse network of researchers and educational practitioners; including the action-based research network of *Teaching and Learning for the 21st Century* (TL21), *Intel project on maths development with student teachers*, *Dissolving Boundaries Project*, *Discover Sensors Project*, *Asia Europe Classroom* and *Combat Disease of Poverty Consortium* are all research networks of schools and teachers across Europe, Asia and Africa (see http://www.nuim.ie/academic/education/Research.shtml).

- The *TL21 project* enhanced creativity in second-level schools in Ireland and promoted fresh thinking in the teaching and learning process. It was designed in close consultation with national education agencies, including the Department of Education and Science, managerial and leadership bodies, teachers' unions and statutory education agencies.
- The *Dissolving Boundaries Programme* uses Information and Communications Technology (ICT) to facilitate cross-cultural educational linkages between schools.
- The *Discover Sensors Project* in association with Forfás is an initiative looking at embedding IBSE in lower secondary science and developing innovative assessment strategies to assess conceptual learning.
- The *Combat Disease and Poverty Consortium* works on embedding global health and development education across the system in both Primary and Post Primary education.
- NUI Maynooth has been involved as partners in European level projects funded under the Lifelong Learning and GRUNDTVIG schemes.
- Strong involvement in the Irish Africa Partnership (PSC funded)
- Ongoing technical work with Irish Aid in support of education programmes (technical assistance contract, 2009-2011)

Main tasks in the project

WP3, WP4

Profile of staff members that will be doing the work – all of whom are directly employed by NUIM.

Majella Dempsey is course leader for the Bachelor of Science Education and the Bachelor of Mathematics Education programmes in NUI Maynooth. Majella lectures on Curriculum, Teaching, Learning and Assessment and has represented NUIM on study visits to Nigeria and Illinois. She is a member of the high-level expert group for the Amgen Foundation Science Education Initiative and convenor for the Curriculum Innovation Network in the European

Educational Research Association. Majella works with Discover Science and Engineering Network of teachers on developing assessment for learning supports for science teaching and learning. She is currently undertaking doctoral work at Trinity College Dublin on role of key skills for teaching and learning. Prior to joining NUI Maynooth Majella worked as an Education Officer in National Council for Curriculum and Assessment (NCCA), where her main area of responsibility was working on the senior cycle developments with school networks. Majella, a Science and Mathematics teacher, also worked with the Junior Science Support Service as a regional development officer on designing and delivering in-service for investigative science teaching and learning.

Angela Rickard lectures in Educational Technology on the Professional Diploma in Education and on the BScEd programme. She is the Programme Director in the Republic of Ireland of Dissolving Boundaries through Technology in Education www.dissolvingboundaries.org. Angela has also developed and researched a number of initiatives in the Education Department involving the use of digital video to promote student autonomy, reflection, collaboration and creativity.

Ann O'Shea has been a lecturer in the Mathematics and Statistics Department at NUI Maynooth since 1992. She holds a PhD in Mathematics from the University of Notre Dame, USA. She is currently the director of the Mathematics Support Centre at NUI Maynooth, and the mathematics co-ordinator of the first year Science programme. She is also the director of the MSc in Mathematics for Education course for out-of-field mathematics teachers, this course is run in cooperation with the Faculty of Education at the University of Cambridge. She conducts research in the area of Mathematics Education. Recent projects include: a study of the effects of high-stakes examinations on the teaching and learning of mathematics at second level in Ireland and Turkey; an analysis of tasks in Irish second level mathematics textbooks; the creation of a concept inventory for the concept of function; the use of rich tasks to promote conceptual understanding in Calculus; an investigation of concept formation in advanced mathematics; an investigation of the effects of beliefs and attitudes on learning; a study to measure the effectiveness of mathematics support.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

Participant	University of Torino, Italy (UNITO)	Participant No	6

Description of legal entity

The University of Torino (UNITO) is one of the most ancient and prestigious Italian Universities. Nowadays, UNITO has about **70.000 students, 4.000 academic, administrative and technical staff, 1800 post-graduate and post-doctoral students and 120 buildings** in different parts of

Torino and in key places in Piemonte.
UNITO is today **one of the largest Italian Universities,** open to an international perspective in the fields of both research and training. It carries out scientific research and organizes courses in **all disciplines, except Engineering and Architecture. It is organized in 27 Departments where research is carried out.**
UNITO is active at **international level** through involvement of its researchers in several projects with foreign partners, establishment of joint educational courses, such as bi-national degrees and international PhD programmes, through the subscription of formal cooperation agreements (roughly 450) with institutions around the world and active participation in internationalization projects for Italian universities.
It has a long record in participating in **European projects**. Currently UNITO is taking part in 91 research projects funded under the **FP7**, being coordinator in 30 of these.
UNITO participates in the project with the Department of Philosophy and Education. The **Department of Philosophy and Education** is composed of 81 people among educators, philosophers, sociologists, antropologists, and historicians. The Department is the holder of Unesco Chair in Sustainable Development. It has several foreign collaborations. At present it is collaborating with WZB in Berlin and ESRI in Dublin on a project on the Quality of Living in Europe, for the European Foundation on Living and Working conditions. It is involved in a number of projects on Euro Regions and it has an ongoing research and teaching collaboration with Sciences Po in Paris. Its contribution to the project is referred to competences in the field of Environmental Conflicts, Sustainable development, Environmental Accounting Methodologies, Urban Metabolism.

Main tasks in the project

WP2

Profile of staff members that will be doing the work – all of whom are directly employed by UNITO.

Cristina Sabena is assistant professor in Mathematics Education at the Department of Philosophy and Education, University of Torino, Italy. She is expert consultant for the Italian National Institute for the Evaluation of the Formative System (Invalsi). Though a young researcher (Phd in 2007) she has gained a certain experience in international research projects, as witnessed by her participation in a previous European Project on digital media (ReMath-Representing Mathematics with Digital Media, n. IST4-26751, 2007-2009) and in an INTERLINK Project on Eye tracking methodology in mathematics education (MIUR–Inter-University Cooperation with Sweden Torino-Lund, A.F. 2006-CAP. 1712). Her research interests include: the analysis of teaching-learning processes with semiotic lens and related educational implications; empirical studies and theoretical reflection on networking theories strategies in mathematics education; teachers' and future teachers' attitudes and emotions towards mathematics.

Francesca Morselli is assistant professor at the Department of Philosophy and Education of the University of Torino (Italy). She teaches Mathematics Education to prospective primary teachers. Her research interests concern: the intertwining of affect and cognition in mathematics teaching and learning (students' and teachers' beliefs); the teaching and learning of mathematical proof. She is currently involved in a research project aimed designing, experimenting and refining task sequences for a smooth and meaningful approach to proof in lower secondary school.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

Participant	University of Education in Freiburg (PHF)	Participant No	7

Description of legal entity

The University of Education in Freiburg focuses strongly on educational research with systematic structured promotion of young researchers, on pre-service-teacher-training for primary and secondary teachers students and on in-service-teacher-training in this field. A lot of working groups conduct interdisciplinary collaboration and the Institute of Mathematics is involved in a lot of these activities. In these groups, different aspects of mathematics education are investigated - in particular the use of new technologies in teaching and learning mathematics and the development of new learning environments which allows learners more of a social constructivist approach to mathematical topics. The Institute of mathematics is and has been involved into a lot of EU-programmes for mathematics and sciences (e.g. EDUMATICS, LEMA, PRIMAS, MASCIL)

Main tasks in the project

WP3

Profile of staff members that will be doing the work – all of whom are directly employed by PHF.

BärbelBarzel is a professor at the Institute for Mathematics Education in Freiburg. She is working mainly in the field of Secondary mathematics education. She is vice-dean of the faculty of mathematics and sciences and leader of postgraduate programmes (ExMNU - 'Experimentation in Mathematics and Natural Science Teaching', VisDeM) – ´Visualisations in German and Mathematics`) and leader of the nationwide teacher-training-programme T³ Germany. Her research foci are the learning with new media, design research on contexts for making sense in mathematics learning and professional development. Current projects are 'Experimental thinking' – in the postgraduate programme EXMNU, VisDeM, KOSIMA (Contexts for Meaningful Mathematical Learning); CASE-X (Expertise on the use of CAS) and T³ (Teachers Teaching with Technology).

Silke Mikelskis-Seifert is working as a researcher and teacher trainer at the department of physics in Freiburg. Before taking up her position at university, she worked as junior professor for Physics Education at the University of Kiel and Leibniz Institute for Science Education (IPN). Her main research interests are modelling in different contexts; thinking in models on the basis of epistemological aspects in the sense of the nature of science; empirical research and practical instruction research for the project "Physics in Context" and research in the field of teacher

professional development. 2003 to 2007 she was one of the head of the German physics quality development project “Physics in Context” which promotes IBL in Physics seeks to improve students’ scientific literacy in physics through intensive teacher coaching processes. She was responsible for the empirical evaluation of the project. 2009 to 2011 she worked in interdisciplinary EU project "Common problem solving strategies as links between mathematics and science", a COMENIUS Multilateral project.

Ulrike Spörhase is a professor at the Institute for Biological Education in Freiburg. Currently she is the dean of the faculty of mathematics and sciences. In her research she focuses on the construction and evaluation on curricula and tasks for Secondary school pupils in the context of scientific literacy. Here she is leader of the project ‘Effects of differentiated learning material on the learning increase in heterogeneous groups’. In addition she is working in the field of health education of adults. Here she is responsible for theevaluation and construction of Patient education courses for multiple sclerosis and asthma.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

Participant	The African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC)	Participant No	8

Description of legal entity

The African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC) is an outreach initiative of the African Institute for Mathematical Sciences (AIMS) based in Muizenberg, Cape Town. AIMS was established in 2003, in partnership with the Universities of Cape Town, Stellenbosch and the Western Cape, to promote mathematics and science in Africa, to recruit and train talented students and teachers and to work to build capacity for African initiatives in education, research, and technology. AIMS has institutes in Senegal and Ghana, a new institute opening in Ethiopia this year and plans for 15 by 2020. AIMSSEC works in partnership with the University of Fort Hare. Since a consultation exercise in 2002/ 3, AIMSSEC has provided 3-month and 2-year blended learning courses for serving primary and secondary teachers from disadvantaged communities, particularly in rural areas, all over South Africa (a total of more than 1000 students over 10 years and currently 250 to 300 students each year). AIMSSEC provides subject leader training to enable teachers to upgrade their subject knowledge and to train other teachers, spreading the benefits more widely. The AIMING HIGH Teacher Network supports teachers across South Africa. Students receive bursaries and much of the teaching is done by visiting lecturers from overseas on an unpaid voluntary basis. The AIMSSEC

graduates contribute to courses as teaching assistants and coordinate sessions at learning centres around the country that receive AIMSSEC TV broadcasts from Stellenbosch. In 2012 AIMSSEC won a UNESCO-HAMDAN prize for Outstanding Practice and Performance in Enhancing the Effectiveness of Teachers in developing countries.

Main tasks in the project

WP1 WP4 WP6

Profile of staff members that will be doing the workwhom - apart from Mrs Toni Beardon (see below) –are directly employed by AIMSSEC.

Dr Barrie Barnard has a D Ed degree in Mathematics Education, 32 years teaching experience as a mathematics teacher, 19 years as head of a mathematics department and 7 years as deputy principal. He also has 10 years experience as provincial examiner and served as a panel member setting the national examination for grade 12 mathematics for 5 years. He has 4 years experience as AIMSSEC Academic Manager designing course material and organising training courses. He also has a BA Honours Degree in Psychology and is registered with Human Science Research Council (HSRC) as a test user which allows him to undertake diagnostic and achievement tests. He has made eaningful contributions to the improvement of mathematics education through various presentations at congresses, conferences and in-service training of mathematics teachers.

Mrs Toni Beardon is the Founder and Chair of AIMSSEC. She works as a volunteer for AIMSSEC which she started in 2003 after retiring from Cambridge University Millennium Mathematics Project where she was the founder of the NRICH, STIMULUS and Motivate Projects. Toni received an OBE in 2003 for services to Mathematics Education in the UK. As a school teacher, teacher trainer, school inspector, project leader, web author and innovator, in a career stretching across 50 years, Toni's aim has always been to help others to enjoy learning mathematics and to appreciate both its usefulness and its beauty. South African children today are severely educationally disadvantaged. Toni and the AIMSSEC team of volunteers from all over the world are working to empower South African teachers to change that situation. Toni will represent AIMSSEC at some meetings, where travel from South Africa for AIMSSEC staff members might be difficult or expensive.

Dr Claire Blackman:
She completed a BSc(Hons) in Maths, Physics and Astrophysics at University of Cape Town, followed by a PhD in Astrophysics in which she developed software for detecting and analysing time-series data. Wanting a change from astrophysics, she spent 5 years working at Royal Holloway, University of London, as a computer officer and lecturer in the Economics Department. She wanted a deeper understanding of mathematics, so she completed a two year MA in Mathematics at the University of Wisconsin - Madison. While she was at UW Madison, she was invited to teach the maths classes for preservice teachers. She so enjoyed working with student teachers and helping them to gain confidence teaching maths, that she decided to move back to South Africa and help with the mammoth task of training South Africa's maths teachers. AIMSSEC is fortunate to have her on the team and she is already making a difference.

Miss Sinobia Kenny:
After completing her BSc degree at the University of the Western Cape she started her teaching career as a mathematics and physical science teacher in Cape Town in a disadvantaged community. She furthered her career in London as a mathematics teacher and head of year. She became a teaching and learning consultant for a London borough to work alongside colleagues to

raise achievement in mathematics in primary and secondary schools.After spending fourteen years in the UK, she returned to Cape Town to work for AIMSSEC to help raise the quality of teaching and learning of mathematics in South Africa.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

Participant	Sør-Trøndelag University College (HiST), Norway	Participant No	9

Description of legal entity

The Sør-Trøndelag University College (HiST) is a leading institution for teacher education (primary and lower secondary education, Grades 1-10) in Norway, in particular in mathematics and science education. It runs one of the best and most popular Master degree programmes in mathematics education. The university's research profile is equally impressive, with several internationally and nationally esteemed research and development projects (e.g. EU PRIMAS; EU MaSciL; LPS- Learners' Perspective Study; TransMaths Norway; TBM- Teaching better Mathematics, to name but a few). A reliable research team has been established, in particular around the EU mathematics & science projects. In the area of formative assessment HiST has been working with local schools, colleges and the regional school authority, in order to increase engagement and raise achievement in mathematics, science and technology related subjects. From autumn 2013 all mathematics and science teachers have to partake in professional development, and this includes formative assessment programmes and supporting low achievers. With the new teacher education framework, HiST has a profound interest in improving the progress of low achievers in mathematics and science education through formative assessment strategies and using new technology. This is particularly so, as the new TIMSS results for Norway showed the need to bring every child to an appropriate level in mathematics, science and technology education, in order to face the demands of Norway's technology and economy.

Main tasks in the project

WP5

Profile of staff members that will be doing the work – all of whom are directly employed by HiST.

The existing and well-established HiST mathematics and science research team has worked successfully on various EU projects. This will be expanded to include for instance Dr Roger Bergh from HiST's department for technology, who runs projects on innovative technology in

education (e.g. mobile learning initiative). In terms of key players' expertise, Dr Birgit Pepin is professor of mathematics didactics and has worked and conducted research in mathematics education since 1990, both in Norway and in different European countries (e.g. UK, France, Germany). She has led many funded research and development projects in teacher education and professional development (e.g. projects funded by EU, ESRC, etc.). One of her main expertise lies with cross-national comparative studies, and she has published widely in the field of mathematics education internationally. She has also conducted research on formative assessment in mathematics classrooms, in particular with respect to the use of 'tools' and curriculum materials for learning. Both Prof Pepin and Dr Sikko have led courses with formative assessment for the education of low achievers. Dr Svein Arne Sikko is an experienced mathematics education researcher, and Dr Ragnhild Lyngved has researched and developed the use of ICT technology in science education. Both have participated in several national and international research projects, including the EU PRIMAS project. The whole team will add value to the project with their expertise in (1) formative assessment; curriculum resources, and special educational needs; (2) international comparisons; (3) professional development and teacher education; and (4) cross-national research and development project.

Administrative Staff

- Providing administrative support to the partner team and liaison between the partners and co-ordinators
- Organisation of meetings (both physical and virtual, e.g. Skype) and/or with partner team members, participating schools and possible suppliers
- Process travel forms for participating teachers and Principals, liaise with Department of Education and Skills for teaching substitution
- Facilitation of such meetings, including minute taking, room bookings, catering arrangements etc.
- Researching travel for team members when attending meetings and liaises with central university personnel
- Provides administrative support in report/paper/documentation preparation.

B 2.3 Consortium as a whole

This consortium has been carefully selected to ensure the right blend of skills, experience, networks and knowledge required to fully meet and implement the objectives of the project. The consortium consists of leading institutions for research into pedagogical development and professional practice in mathematical and science education in their respective countries. The countries are chosen from a wide range of educational systems within the EU and, with the inclusion of South Africa, a contrasting and challenging educational environment. The consortium has a particular strength in mathematics education, but it also has a number of partners (PHF, NUIM, UNITO, HiST) who have strengths in science education, providing strength in depth and across interdisciplinary boundaries. The inclusion of South Africa as a partner will provide a challenge and contrasting environment which will support the development of a robust range of approaches to the programme.

The partners are also chosen to represent a diverse range of educational systems – Scandinavian, Anglo-Saxon, European and African. The selection of this diverse range of partners, countries and subjects will ensure that the programme will include teaching and

assessment practices valued by teachers across international contexts, and ensure congruence between these values and practices.

Several of the partners are already linked by existing networks of complementary EU initiatives in mathematics and science education, for example: PHF, UNOTT and UU in Primas and Compass (FP7) programmes. Other partners are involved in the integration of technology in education and linked through the 'Teachers teaching with Technology' network (PHF, UU, UNEW, ENSL) and the EU programme Edumatic (Comenius) (ENSL, UNITO, UU, PHF). These existing networks will support and strengthen the design and implementation of the project.

Each partner brings its particular strength to the consortium, for example:

The coordinating partner, based in Newcastle University's Research Centre for Learning and Teaching and iLab:learn will provide an established base for project management and a strategic understanding of professional development, formative assessment and innovative use of technology in education.

The Nottingham University Centre for Research in Mathematics Education's particular strength lies in its emphasis on designing and analysing processes, products and experiences with and for teachers and learners. It incorporates and continues the internationally recognised work of the Shell Centre for Mathematics Education and the Mathematics Assessment Resource Service (MARS). As part of its long-term work to raise standards in the design of educational materials and processes, the Centre has worked with others to set up and develop the International Society for Design and Development in Education (ISDDE). UNOTT will have a major role in WP1 and WP3, and allow the project to draw on the materials developed for its successful initiatives in assessment in the UK, EU and the US.

AIMSSEC is an initiative of the African Institute for Mathematical Sciences (AIMS), a centre for education and research based in Muizenberg, Cape Town. Established in 2003 as a partnership project with Cambridge, Cape Town, Oxford, Paris Sud XI, Stellenbosch, and Western Cape Universities, AIMS promotes mathematics and science in Africa, recruits and trains talented students and teachers and works to build capacity for African initiatives in education, research, and technology. The African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC) is a schools mathematics enrichment programme. AIMSSEC was recently selected as one of just three projects nominated from 33 countries for the UNESCO-HAMDAN prize for Outstanding Practice and Performance in Enhancing the Effectiveness of Teachers.

The Freudenthal Institute for Science and Mathematics Education (FIsme) is the world class research institute of Utrecht University. The institute, with its scientific staff of over 40 researchers and designers, aims to contribute to a better understanding of the learning and teaching of science and mathematics, in order to develop improved models of education. In these models, bottom-up approaches, guided reinvention, inquiry and creativity are key concepts. FIsme research covers a wide range of educational settings from pre-school education to higher education, and in addition addresses informal and out-of-school learning as well as learning on the workplace. Also, teachers' professional development is at the heart of FIsme's interests. The influence of the work of the institute is reflected in the Dutch curricula, which use contextual situations, support inquiry-based activities and connect students' strategies with carefully chosen didactic models. FIsme is recognized by the Dutch Ministry of Education as the national expertise centre for science and mathematics education.

As a core activity, the Institute investigates the potential of ICT in mathematics education. It hosts websites that attract many students, teachers, parents and others by their games and applications that invite creativity, such as Rekenweb and Wisweb ('arithmatic web' and 'mathweb', http://www.fisme.science.uu.nl/rekenweb/en/ and http://www.fi.uu.nl/wisweb/en/) and the Digital Mathematics Environment (DME, http://www.fisme.uu.nl/dwo/en/).

FIsme participates in several EU projects, such as Primas (Promoting inquiry in mathematics and science education across, FP7-SCIENCE-IN-SOCIETY-2009-1, http://www.primas-project.eu/), MaSciL (Mathematics and Science for Life!, Support-SiS.2012.2.2.1-1) and EdUmatics(503254-2009-LLP-UK-COMENIUS-CMP, http://www.edumatics.mathematik.uni-wuerzburg.de/en/).

The partners in Norway (HiST), France(ENSL), Germany(PHF), Italy (UNITO) and Ireland (NUIM), chosen to provide as wide as possible spread of approaches to mathematics and science education, are leading research into mathematics and science education and the application of technology in their respective countries, ensuring that the evidence base of case studies will be of the highest quality.

B2.3.1 Subcontracts

FILM(Budget €20000)
To ensure the highest level of impact, a subcontract will be commissioned to produce a documentary film of the participants and the process of professional development in order to communicate a realistic perspective on the process of innovation in a wide range of contexts. Partners involved in the Comenius Edumatic project successfully employed a company which has produced a high quality, multilingual film of the project and the company will be invited to bid for this contract as well as inviting at least two other companies to bid for the project.

The estimated cost (€20,000) allocated to this contract is taken from the costing agreed for the Comenius Edumatic project and we assume that a similar cost will be involved on FaSMEd with some allowance for inflation over the intervening period.However, a procurement process will need to be carried out by UNEW in order to obtain the best value for money.

Evaluation (€24k)
In order to provide the highest level of quality control, a small number (4 maximum) of experts will provide feedback to the management meetings (3 in total) on the progress of the project. Each expert will have a subcontract to pay for their time in providing the most detailed and comprehensive advice. Experts on technology and assessment have also been invited and we are waiting for their response. The scientific expertise of this group will be chosen so that they will give feedback on the methodology as well as the scientific content of the project. The group will be invited to have one face to face meeting in the first year of the project in order to establish relationships. We intend to commission six days work from each expert, arranged across the three years of the project as two days per year. Subsequent communication could take place via by video conference, but we will consult the experts about what they deem necessary for their work. The cost for this subcontract is estimated to be €20k. This cost is calculated on the basis of an average daily charge of approximately €750 for 24 days work (€18k) and subsistence and travel for one face to face meeting (€2k). In addition we need to allow for the work done by the ethics evaluator as recommended by the EC negotiation so an additional €4k has been added to the €20k.

B 2.4 Resources to be committed

The budget for the project has been calculated with the full agreement and involvement of all the partners, and reflects the distribution of activities and responsibilities that each partner will undertake. Those partners leading work packages and tasks naturally tend to have the highest person month allocations. Development and implementation of the toolkit and interventions (WP3 & WP4) account for 48% of the total person months. Dissemination and communication is also prioritised with 10% of person months and 15% of direct expenses. High quality, effective communication and dissemination are seen as crucial to maximise the impact of the project and to reach the largest possible audience, engaging the European teachers' networks and relevant stakeholders. Management costs equate to approximately 9% of the total budget and includes 1.5 person months for all partners (except the coordinator) for compilation of progress and finance reports, attendance at partner meetings (2 people per partner) and all necessary costs for travel and subsistence, venues for consortium meetings, audit certificates as appropriate etc. Travel and subsistence account for 25% of all direct expenses. In a project with 9 partners and 8 countries it is inevitable that travel and subsistence costs will be high, not least to attend consortium meetings, but also for WP meetings and at a local level to engage with schools, teachers, relevant networks and stakeholders etc.

Mrs Toni Beardon, a volunteer working with AIMSSEC but based normally in the UK, will represent them in some meetings in order to reduce travel costs from South Africa and will claim travel, accommodation and expenses from AIMSSEC for this service.

Based on Article II. 16.6 of the Grant Agreement, teachers' replacement costs are not eligible costs. Therefore no salary, fee, compensation, etc. can be provided when the teachers are following a training (either in their country or abroad); being more precise, when the teachers are in fact trainees. Only the costs for travel, accommodation and per diem shall be compensated.

Each classroom will need to be equipped with one of the varieties of technology chosen to be evaluated as a way of enhancing formative feedback between teachers and students. However, the budget proportion of approximately 10% is not excessive.€237k has been allocated to equipment – an estimated cost of approximately €25k per beneficiary. It is anticipated that some equipment will be loaned for the duration of the project by the technology companies associated with the project.

We cannot specify exactly what equipment will be used, since the innovation cycle of information technology is so fast that it will need to be clearly specified nearer the time of implementation. When this time arrives, the exact details will be communicated to the Scientific /Project Officer to whom the management of the project has been assigned to by the European Commission.

Where equipment is purchased for the project, this will be in order to support the focus of the project i.e. to support the feedback process in the classroom through providing students and teachers with a range of communication devices. Since these devices are information technology, whose normal economic life is short and whose value depreciates extremely

quickly, its economic life is not expected to extend beyond the duration of the project. Where it is the case that equipment is purchased, the rules which apply in the financial guide on the purchase cost of durable equipment shall be respected.

B3. IMPACT

B 3.1 Strategic impact

3.1.1 FaSMEd's strategic impact in line with the call

The impact expected is oriented by the overall objective of this FP7 call to: 'stimulate, with a view to building an open, effective and democratic European knowledge-based society, the harmonious integration of scientific and technological endeavour, and associated research policies in the European social web, by encouraging pan-European reflection and debate on science and technology and their relationship with the whole spectrum of society and culture'.

This project needs an international perspective, because it is likely that 'the seemingly ubiquitous nature of the language of formative assessment within international educational discourse masks a poor shared understanding of the underlying meanings around such phraseology' (Shaw, Johnson, & Warwick, 2012). The project will seek to develop a shared international perspective of this approach to establish teaching and assessment practices in mathematics and science which are valued by teachers across international contexts.

3.1.2 *Steps to achieve FaSMEd's expected impact*

The project involves nine teacher education institutions working across eight countries with at least 30 researchers, who will be working with 36 schools involving 108 teachers or more: 72 mathematicians and 36 scientists. Even assuming a minimum of one smaller class per teacher (because low achievers are often found in this situation) this will immediately impact on approximately 2000 students. However, the activities, the professional development programme and dissemination programme is designed for scaling in order to multiply the impact beyond the partner countries involved. This programme will impact on policy for science and mathematics education at an international level.

Hence the work programmes will identify evidence based approaches and implement teaching and assessment methods that impact on achievement in mathematics and science and the role of technology in supporting these interventions, each element of the project is designed to maximise this impact. Low achievement in these areas is an EU wide concern and has a significant impact on the development of countries such as South Africa(Carnoy et al., 2012). It is expected that such approaches will support teachers to enhance the performance of students in this area through: learning more mathematics and science; learning more about how to learn mathematics and science and improving their attitudes to learning more mathematics and science.

The project is designed to be scalable so that the initial impact will not be limited to the schools involved in the case studies but the project materials and approaches used can be adopted across the countries involved and beyond. A film of the classroom activities and professional development process in the project will be produced under a subcontract in WP7. Films of teachers and students working together are very effective in convincing practitioners of the practicality of adopting recommended approaches, since they bring the approach to life.

Effect size – a key measure of impact in education

To inform WP2, WP3, WP4 and WP5 of this project we will use international study series and meta-analytic research syntheses to scope the interventions planned. Hattie's (2008) synthesis of 15 years of research into interventions in education will inform our work. This synthesis of over 800 meta-analyses uses the measure of 'effect size[3]' to compare the impact of over 50000 interventions on the achievement of students(Schagen & Hodgen, 2009). The average (mean) effect size of these interventions is 0.4, corresponding to the impact of one year's schooling. Hence the project will adopt effect size as a key research tool to identify powerful interventions with above average effect size and measure their impact.

For example in WP4: rapid, formative feedback (assessment for learning)(Black & Wiliam, 1996) has an average effect size of 0.79, twice the average effect size and is among the top ten most significant interventions on achievement. Hence, practices which enhance these feedback loops will be a key element in the design of the project. But it is also the case that in order to generate rich feedback loops the activities must be rich and challenging for the students (WP3) and the classroom environment conducive to inquiry and discussion. Such activities and environments are rare in classrooms for low achievers; hence a crucial element in WP4 of this project is on teacher transformation to impact on the mind frames and expectations of teachers and their students(Dweck, 1999).

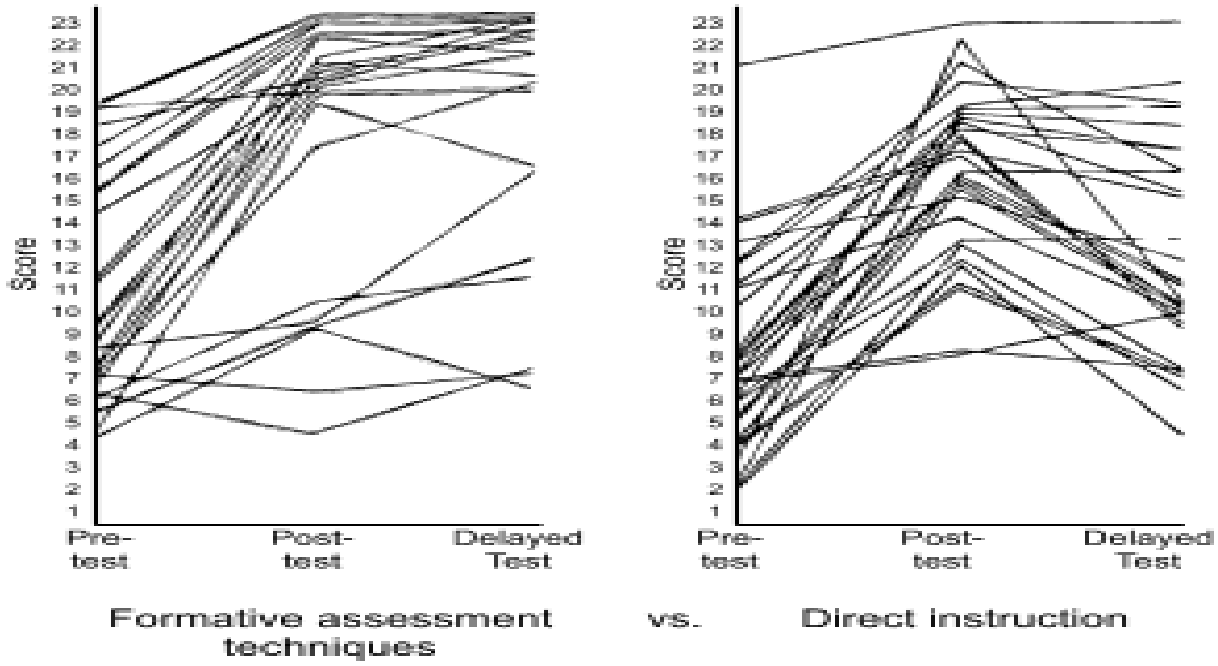
Innovation: integrating technology in education

The partners in the programme are established researchers in these fields and will build on their existing research base to design and implement a programme which will not only develop existing practice, but enable teachers to develop pedagogies for a future where technology is fully integrated into the mainstream classroom for both teachers and students. Hence the main focus of the project is on technologically enhanced feedback systems in the classroom, fostering cooperation and dialogue.

Professional development

Professional development programmes will be implemented which will transform classroom practice with low achievers in mathematics and science by challenging teachers' beliefs about students' capacity, received understanding about practice with low achievers and the use of technology to reveal students' conceptual progress. For example, it is common practice to adopt a 'deficit model' of low attainers' learning which relies on an approach which entails repeating material from earlier years, broken down into less and less challenging tasks. However, as the following graph illustrates (Bell, 1993), although this approach may have a short term impact, long term retention will not persist unless the students are engaged in discussion and debate and focused diagnostic feedback from teachers and their peers.

[3]' A standardised 'effect size' measures the change in the mean (of achievement in this case) produced by an intervention measured in proportion to a standard deviation of the intervention population



Expected Impact	Addressed by work package
Understanding the role of teaching and assessment methods to enhance the performance of students in this area.	WP1, WP2, WP3, WP4, WP5, WP6, WP7
Reduce the number of low-achieving students to prevent early school leaving or drop out.	WP2, WP3, WP4, WP5, WP6, WP7
Equip all young Europeans with the skills and knowledge needed to become future innovation and "science active" citizens.	WP2, WP3, WP4, WP5, WP6, WP7
Enable stakeholders to further develop teaching and assessment methods in order to attain better performing students.	WP3, WP4, WP5

B 3.2 Plan for the use and dissemination of foreground

3.2.1 Dissemination and/or exploitation of project results

The dissemination strategy for the project is intended to generate an effective flow of information and publicity about the objectives and results of the project, the contributions made to European knowledge and scientific excellence, the value of collaboration on a Europe-wide scale, and the benefits to EU citizens in general, among our main aims to work with and for society. The project results will be disseminated through online resources, academic and professional publications, conference presentations and

government agencies at a regional, National, European and International level.Policy briefs to government agencies at a regional, National, European and International level will be produced at regular intervals, starting around the time of the first periodic report and updated at the end of implementation.

The strategy will ensure that all material will reference the Science in Society origin of the project and the links with Responsible Research and Innovation(RRI) (EU 2012). In addition, attempts will be made to identify other projects of the same theme and to communicate with them so as to be aware of and identify possible areas for collaboration in order to create an 'RRI Momentum' early in Horizon 2020. The gender dimension of low achievement will be constantly addressed by including this dimension in reports; ensuring that, when organising events, a topic on gender or a workshop on gender will be an important part of the programme and by inviting experts in gender in science and mathematics education and low achievement to participate. In addition, a link to the website of the Gender Campaign: 'Science: It's a Girl Thing!' (http://science-girl-thing.eu) will be established on the FaSMeD website.

As already explained, FaSMeDwill dedicate an exclusive workpackage (WP7) to the engagement and dissemination activities, which will run through the project from the start. Our three main dissemination activities will involve engagement with local stakeholders, scientific dissemination and communication and dissemination to the wider public. Some of the dissemination tools will be common to all (even if we cannot anticipate here the specific details). The strategy of the workpackage will be informed through consultation with a sub-group of the strategic advisory group focused on dissemination.

With respect to the involvement and/or participation (active (when making a presentation of FASMED or presenting results of FASMED) or passive (for networking purposes, gaining of information, knowledge, etc.)) in conferences, seminars, and other relevant events, where the costs are to be charged to the project, the Coordinator will seek the prior approval of the European Commission, and in particular, of the Scientific/Project Officer in charge of FASMED. The coordinator will communicate in written (for example, via emails) the expected added value of such involvement/participation, and provide analytical information/justification, etc.

Special Clause 40
The Commission shall be authorised to publish any foreground disseminated by the consortium in whatever form and on or by whatever medium, in particular via a European level information provider on its behalf. To enhance the accessibility of this foreground for third parties, it may adapt such foreground in any manner, including by making translations thereof. Any third party shall be allowed to utilise this published foreground for free for non-commercial educational purposes. To ensure the above, the consortium, acting through the coordinator, shall upon dissemination of any foreground provide the Commission with an electronic copy thereof and shall ensure that any necessary authorisations have been obtained and that it has not accepted legal obligations which could conflict with this clause.

Research Outputs
Any research outputs will contain an acknowledgement of the funding source as follows: *"The research leading to these results has received funding from the European Community's Seventh Framework Programme fp7/2007-2013 under grant agreement No [612337]."*

Existing networks

A major element for dissemination will be through professional networks for teachers. Some are international such as Teachers Teaching with Technology (T^3) with which partners such as UNEW, PHF, UU, UNITO have links in their national contexts and UNEW has a regular input into the international conference and its website. Other national professional associations will be involved through articles in their publications and presentations at their national conferences.

Dissemination via SCIENTIX (http://www.scientix.eu) the community for science education in Europe will be an important element in the programme. SCIENTIX is the web-based community for Science Education targeted not only at teachers and researchers, but is also open to policy makers, parents and anyone interested in science education. It has been created to provide a user-friendly information platform in order to facilitate regular dissemination and sharing of progress, know-how and best practices in science education across EU Member States and Associated Countries.

With the launch of Scientix II this year, there will be opportunities for engaging and creating links with national teacher communities through the Scientix National Contact points. The use of the proposed 'online meeting tool' may help to facilitate communication with the partners in the project and the facility for publishing small comparative papers (the 'Observatory') will provide an accessible route for participating teachers to share their experience and reflections on their practice.

There will also be the opportunity to engage with the science education community through participation in and contribution to the Scientix European Conference in 2014. Hence the use of SCIENTIX as a tool for communicating with the wider community of science and mathematics educators will be a priority in WP7 for the duration of the project. In particular the use of SCIENTIX to form a community focused on formative assessment will be an important element in this work.

Therefore, for dissemination and communication purposes a link shall be established with SCIENTIX. The European Commission shall receive at regular time-intervals overview and information on the results of this collaboration. In the case that during the implementation of the FASMED it is considered beneficial that further links with other relevant organisations to the overall aim of the project would be established, prior approval from the Commission will be requested. As mentioned before, attempts will be made to identify other projects of the same theme and to communicate with them so as to be aware of and identify possible areas for collaboration in order to create an 'RRI Momentum' early in Horizon 2020. If it is thought beneficial, connections will be established with similar other SiS projects, via memoranda of understanding.

Scientific dissemination

Scientific dissemination of the outcomes of this project will be through:

- Participating in relevant conferences and other academic meetings, including the Internationalbiennial EARLI (European Association for Research in Learning

and Instruction) conference in 2015 and the annual conference of the European Educational Research Association in 2014, 2015 and 2016. Also subject specific conferences such as CERME 9 (2015): Congress of the European Society for Research in Mathematics Education;ICME 13 (2016): International Congress on Mathematical Education; ESERA 2015: European Science Education Research Association and conferences in partners' countries.

- Producing academic publications. This will be discussed and agreed with all partners and a publications plan will be designed. FASMED shall produce academic publications based on the factual findings and results throughout the implementation of the project; to this end, discussion shall take place with all partners and agreement shall be reached based on the design of publication plan and follow-up of its implementation.

- Feeding the research work and results into teaching and research programmes at the participating academic institutions.

- With respect to the involvement and/or participation (active (when making a presentation of FASMED or presenting results of FASMED) or passive (for networking purposes, gaining of information, knowledge, etc.)) in conferences, seminars, and other relevant events, the Coordinator will seek the prior approval of the European Commission, and in particular, of the Scientific/Project Officer in charge of FASMED. Written justification for this participation will be sent to the S/PO in charge of FASMED.

Communication and dissemination to the wider public

We will use a range of vehicles for communication with wider publics:

- Annual meetings in each country for local stakeholders to disseminate the plans and outcomes at each phase of the project.
- Setting up and maintaining a website (month 1)which shall be updated at regular time-intervals. The information contained on the website will be available in the languages handled on the consortium. This will include the outputs from WP5 and WP6.
- Launching and developing an electronic newsletter in the languages of the consortium. The newsletter will be compiled 3 times a year (months 4, 8, 12, 16, 20, 24 and 28).
- Producing short articles targeted at decision-makers, practitioners and other relevant actors. The first briefing will summarise the findings of the theoretical and methodological foundations of the study (WP1) in month 6. A similar approach will be taken with all the other WPs.
- Audio-visual materials for use in education, training and raising awareness
- Social media, including local community media (e.g. community radio channels) and others such as Facebook, Youtube, etc.
- Our best effort shall be made (when relevant and applicable) to have references and relevant links to outputs/outcomes in relation to Science Education and low achievement, as they are both – Gender and Science Education – key dimensions of the Responsible Research and Innovation (RRI).
- Local, national, and international media.

3.2.2 Management of Intellectual Property

Special Clause 39: Open Access (OA)

In terms of open access repository, as a university UNEW has to show public benefit and FP7 funded research is also for public benefit. Therefore we must be able to publish the results of the project and make them available on the University's existing public repository maintained by UNEW‟s Robinson Library (http://eprint.ncl.ac.uk/). However, if that publication contained commercially sensitive material then the affected party would have the right to ask that the sensitive material be removed or that publication be delayed by up to 6 months so that IP protection may be sought. The Consortium shall make all the necessary efforts in publishing and disseminating in the best possible way, the project's results and factual findings. UNEW's policy on this is held by the UNEW's Robinson library, from which advice will be taken on all these issues.

IP and publications policies will be part of the Consortium Agreement.

Based on the Special Clause 39, beneficiaries are required to make their best efforts to ensure free access to peer-reviewed articles resulting from FASMED via an institutional or subject-based repository

B4. ETHICAL ISSUES

As co-ordinator, Newcastle University operates to guidelines established by the National Research Ethics Service (NRES). Any research undertaken involving the study of human subjects requires ethical approval from the University and NRES. The University has established an Ethics Committee: a clear statement of our support for this important area. As part of this, we follow a Code of Good Practice in Research which all researchers in the University must familiarise themselves with in order to meet governance responsibilities and standards. Ethical approval for the research will, therefore, be obtained from Newcastle University's Research Ethics Committee and the team will work to the following key principles to ensure that unethical research is prevented from the outset:

• Research should be designed, reviewed and undertaken to ensure integrity and quality

• Research staff and subjects must be informed fully about the purpose, methods and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved.

• The confidentiality of information supplied by research subjects and the anonymity of respondents must be respected.

• Research participants must participate in a voluntary way, free from any coercion.

• Harm to research participants must be avoided.

• The independence of research must be clear, and any conflicts of interest or partiality must be explicit.

In addition, the co-ordinating team are members of BERA (British Educational Research Association) our professional organisation that has excellent ethical guidelines and procedures that we adhere to. BERA's Guidelines unequivocally recognize and celebrate the diversity of

approaches in educational research. They promote respect for all those who engage with it: researchers and participants, academics and professional practitioners, commissioning bodies and those who use the research. They are not rules and regulations but do represent the tenets of best ethical practice that have served our community of researchers well in the past and will continue to do so in the future. See www.bera.ac.uk/system/files/3/BERA-Ethical-Guidelines-2011.pdf

Inevitably, research will be conducted in multiple countries by participating partners. As part of the consortium agreement we will insist that each partner seeks ethical approval for their work from their respective institution. This will be documented and monitored through the management work package. The South African partner will equally adhere to the British Educational Research Association (BERA) guidelines. This is vital in order to have consistency and uniformity in the project and its implementation.

In accordance with ERR recommendations, FASMED will appoint an Independent Ethics Advisor. The role of this Advisor will be to oversee, monitor and report on how the requirements are met and in general on the progress made in order to meet these requirements. The Advisor will prepare two separate Ethical Review reports during the project – The first period: Month 1-18 and the second period: Month 19-36).

Research with children

The legal position regarding the inclusion of children and young adults in research is complex. The very definition of 'child' can be confusing. For the purposes of this project, the following definitions will apply:

- Adults (18 years and over)
- Children (17 years and younger)

Although this research concerns work with children, our previous experience is that in relation to the gaining of consent from children and young people in school or other institutional settings, where the research procedures are judged by a senior member of staff or other appropriate professional within the institution to fall within the range of usual curriculum or other institutional activities, and where a risk assessment has identified no significant risks, consent from the participants and the granting of approval and access from a senior member of school staff legally responsible for such approval can be considered sufficient. We believe that the interventions fall within these cases.

However, on the advice of the independent experts who evaluated the initially submitted proposal, consent forms in the necessary languages will be prepared to conform with the requirements of the participating countries. These will be documented and monitored through the management work package with UNEW as co-ordinators.

There are no identifiable physical or harmful risks associated with this project as we do not intend to work with dangerous or hazardous materials or work with vulnerable groups. There could be a potential significant risk in this case in relation to the ‘labelling’ of children as ‘low attainers’ and thus confirming a fragile self-image. However, the main thrust of the interventions is aimed at challenging the validity of such self-confirming labels and will be one of the initial topics for professional development. Practically, (in WP2) the focus of much of the work across the partner countries is on secondary age school children, who are already ‘setted’ or ‘graded’ in groups in relation to their ability/attainment in sciences and

mathematics and so they (and the staff teaching them, and indeed their parents) are very much aware of their own ability and are taught in these groups. Where partners plan to work with younger children in schools such as primary age or 'middle' schools, we propose that the interventions and research work take place in 'whole class' settings, thus avoiding any insensitive labelling or targeting of specific children. Project briefing/information sheets (and clear, easy to read format) will be designed (translated) and distributed by partners and monitoring of this process will be conducted by the co-ordinators.

Observations of teaching sessions will take place during the project, which is a normal feature of most schools, but part of the project will include some sessions being filmed (where possible) by a sub-contractor in order to capture some of the interactions that take place during the intervention activities. This of course raises issues of privacy for students and teachers alike and we are aware that access to, and permission for, these specific activities would be negotiated and agreed at local level as each school will have its own policy and procedure. This will not be forced upon anyone and due consideration will be taken into account and measures will be taken to ensure permissions are sought and that, for example, filming could take place at the back of a classroom to minimise disruption and avoid direct filming of children's faces if that were specified by the school. UNEW will monitor the partners and ensure that school procedures were followed.

Research with ICPC countries

A major concern relating to research relating to developing countries is in the area of policy and policy recommendations. It is important to avoid ethnocentric policies or policies which might apply in developed countries and simplistically apply them in the developing country. Hence it is the case that the SA partner will have a major role in the development of the strategy for the project and its application and will be able to develop its own approach to the project. This will inform the scientific programme and stimulate debate about the applicability of the recommended approaches. In addition, the second meeting for the steering group will be held in South Africa in order for the participants to have the opportunity of visiting the South African classrooms to develop an understanding of the context for education in developing countries. Ethically there are clear implications as the SA partner is obviously not an EU partner and will be visiting schools similarly as the other EU partners. However, the SA partner is affiliated with Stellenbosch University which has its own ethics policy and procedures to which we expect the partner to adopt. The SA partner will be required to adhere to the same reporting and monitoring procedures and policies thatUNEW put in place in the consortium agreement and will be checked accordingly.

Special Clause 15
The beneficiaries shall provide the Commission with a written confirmation that it has received (a) favourable opinions of the relevant ethics committees and, if applicable, the regulatory approvals of the competent national or local authorities in the country in which the research is to be carried out before beginning any Commission approved research requiring such opinions or approvals. The copy of the official approval from the relevant national or local ethics committees must also be provided to the Commission.

B5. GENDER ASPECTS

There appears to be a significant gender difference in the level of interest in different STEM subjectsand topics, as demonstrated in the survey "Young People and Science N239" (Gallup, 2008) which showed that young men are more likely to consider a course in engineeringor

mathematics, while young women were generally thinking about social sciencesand biology or medicine (clearly there are exceptions to this rule, e.g. Portugal,where there are more women enrolling in maths than men). This report also found that young women were more likely to study natural science or mathematics in order to become a health professional, teacher or public sector researcher – thus demonstrating the importance of ensuring that students are well informed about prospective careers and the importance of science and mathematics in these careers.

Research (Malony et al, 2013) shows that stereotyped attitudes have an impact on achievement in mathematics and this may also be the case for science. Such attitudes may have a disproportionate impact on the choices of young women in relation to science and mathematics. Thus attention will need to be paid to strategies to challenge such attitudes on the part of teachers and students.

For example, another report on gender states:"Gender differences in educational choices appear to be related to student attitudes (motivation, interest) in studying a particular subject rather than their ability and school performance. Gender gaps in performance are smaller than gender gaps in fields of tertiary study, indicating that young women often do not translate their good school performance into field of studies for higher education that offer better employment prospects, such as STEM studies. Furthermore, even when women complete STEM studies they are less likely than men to work in these sectors. While it is difficult to separate innate and learned behaviours and to assess the influence of stereotypes, the effect of this gender imbalance is very clear." (OECD, 2011, p2)

However, some examples of initiatives focused on raising the participation of young women exist:"Spain provides extra-curricular activities aimed at raising girls' motivation to study sciences. Schools and teachers organise extra-curricular science activities with the specific intention of motivating girls to participate in science and encouraging them to pursue science careers. As an example, in the Autonomous Community of Galicia, schools invite female scholars belonging to the University Women's Seminar (SeminarioMulleres e Universidad – SMU) from the University of Santiago de Compostela to share their experiences as women participating in science research with ISCED 3 students."(ECEA/Eurydice, 2011b, p82)

Whether gender differences also exist with low attaining students is not known. Baseline research will determine the gender balance of low attaining students. Such research will involve researchers interrogating existing data and carrying out surveys to elicit information about gender related issues in respect of attitudes and motivation related to mathematics, science and technology in order to inform the design of activities and assessment practices.Existing databases such as the OECD Gender Data Portal (http://www.oecd.org/gender/data/) will be interrogated and will provide a wider international perspective on these issues.

The reports produced will address the gender dimension in order to communicate the outcomes in relation to low achievement in Europe and beyond.Also, our best effort shall be made (when relevant and applicable) to have references and relevant links to outputs/outcomes in relation to Science Education and low achievement, as they are both – Gender and Science Education – key dimensions of the Responsible Research and Innovation (RRI).

References

Ahmed, A. (1987). (Low Attainers in Mathematics Project), Better Mathematics. London: HMSO.

Ahmed, A., & Williams, H. (1991). Raising achievement in mathematics project. London: HMSO.

Alexander, R. (2004). *Towards Dialogic Teaching*. York: Dialogos.

Anthony, G., & Walshaw, M. (2007). Effective Pedagogy in Mathematics/Pangarau: Best Evidence Synthesis Iteration. Wellington NZ: Ministry of Education.

Bell, A. (1993). Some experiments in diagnostic teaching. *Educational Studies in Mathematics, 24*, 115-137.

Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2003). *Assessment for Learning: Putting it into practice*. Maidenhead: Open University Press.

Black, P., & Wiliam, D. (1996). *Inside the Black Box*. London: King's College School of Education.

Boaler, J., Wiliam, D., & Brown, M. (2000). Students' experience of ability grouping - disaffection, polarization and the construction of failure. *British Educational Research Journal, 26*, 631-649.

Bromme, R., & Tillema, H. (1995). Fusing experience and theory: The structure of professional knowledge. *Learning and Instruction, 5*, 261-267.

Carnoy, M., Chishom, L., & Chilisa, B. (2012). *The low achievement trap: Comparing schools in Botswana and South Africa*. Cape town: HSRC Press.

Clark-Wilson, A. (2010). Emergent pedagogies and the changing role of the teacher in the TI-Nspire Navigator-networked mathematics classroom *ZDM, 42*(7), 747-761.

Dweck, C. S. (1999). *Self-theories : their role in motivation, personality, and development*. Philadelphia, Penn: Psychology Press.

EACEA/Eurydice, 2011a. *Mathematics Education in Europe: Common Challenges and National Policies*. Brussels: Eurydice

EACEA/Eurydice, 2011b. *Science Education in Europe: National Policies, Practices and Research*. Brussels: Eurydice

Ernest, P. (1989). The Knowledge, Beliefs and Attitudes of the Mathematics Teacher: a model. *Journal of Education for Teaching, 15*(1), 13-33.

European Union (2012). *Responsible Research and Innovation: Europe's ability to respond to societal challenges*

Gallup (2008): *Flash EB Series #239Young peopleand science*. European Commission. Brussels

Hattie, J. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.

Hegedus, S., & Moreno-Armella, L. (2009). Intersecting representation and communication infrastructures. *ZDM, 41*(4), 399-412.

Hiebert, J., Gallimore, R., Garnier, H., Givvin, K. B., Hollingsworth, H., Jacobs, J., . . . Stigler, J. (2003). Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study. Washington, DC.: U.S. Department of Education National Center for Education Statistics.

Ireson, J., & Hallam, S. (2001). *Ability Grouping in Education*. London: Sage.

Lewis, C., Perry, R., & Murata, A. (2006). How Should Research Contribute to Instructional Improvement? The Case of Lesson Study. *Educational Researcher, 35*(3), 3-14.

Nathan, M., & Knuth, E. (2003). The study of whole classroom mathematical discourse and teacher change. *Cognition and Instruction, 21*(2), 175-207.

Malony, E., Schaeffer, M., & Beilock, S. (2013) Mathematics anxiety and stereotype threat: shared mechanisms, negative consequences and promising interventions. *Research in Mathematics Education, 15(2),* 115-128

OECD. (2011) *Report on the Gender Initiative: Gender Equality in Education, Employment and Entrepreneurship*. OECD. Paris

Philipp, R. (2007). Mathematics teachers' beliefs and affect. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning* (pp. 257-315). United States: Information Age Publishing.

Report, D. o. B. E. (2012). Report on Annual National Assessments 2012 Grades 1 to 6&9. Johannesburg: Department of Basic Education.

Robutti, O. (2010). Graphic calculators and connectivity software to be a community of mathematics practitioners. *ZDM, 42*, 77-89.

Rocard, M., Csermely, P., Jorde, D., Lenzen, D., Walberg-Henriksson, H., & Hemmo, V. (2007). Science Education NOW: A renewed Pedagogy for the Future of Europe. Luxembourg: Office for Official Publications of the European Communities.

Ruthven, K. (2011). Using International Study Series and Meta-analytic Research Syntheses to Scope Pedagogical Development Aimed at Improving Student Attitude and Achievement in School Mathematics and Science. *International Journal of Science and Mathematics Education, 9*(2), 419-458.

Ruthven, K., Howe, C., Mercer, N., Taber, K., Luthman, S., Hofmann, R., & Riga, F. (2010). *Effecting Principled Improvement in STEM Education: Research-based pedagogical development for student engagement and learning in early secondary-school physical science and mathematics.* Paper presented at the The British Society for Research into Learning Mathematics.

Schagen, I., & Hodgen, E. (2009). How much difference does it make? Notes on understanding, using and calculating effect sizes for schools. Retrieved from http://www.educationcounts.govt.nz/publications/schooling/36097/36098 website:

Schroeder, C. M., Scott, T. P., Tolson, H., Huang, T.-Y., & Lee, Y.-H. (2007). A meta-analysis of national research: Effects of teaching strategies on student achievement in science in the United States. *Journal of Research in Science Teaching, 44*(2), 1436-1460.

Seidel, T., & Shavelson, R. J. (2007). Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis research. *Review of Educational Research, 77*(4), 454-499.

Shavelson, R. J., Phillips, D. C., Towne, L., & Feuer, M. J. (2003). On the science of education design studies. *Educational Researcher, 32*(1), 25-28.

Shaw, S., Johnson, M., & Warwick, P. (2012). The Assessment for Learning in International Contexts (ALIC) Research Project. *Research Intelligence*(119), 14-15.

Shayer, M., & Adey, P. (2002). *Learning intelligence : cognitive acceleration across the curriculum from 5 to 15 years*. Buckingham: Open University Press.

Shayer, M., & Adhami, M. (2007). Fostering cognitive development through the context of mathematics: Results of the CAME project. *Educational Studies in Mathematics, 64*(3), 265-291.

Shirley, M. L., Irving, K. I., Vehbi, A. S., Pape, S. J., & Owens, D. T. (2011). The Practicality of Implementing Connected Classroom Technology in Secondary Mathematics and Science Classrooms. *International Journal of Science and Mathematics Education, 9*(2), 459-481.

Sinclair, N., & Jackiw, N. (2005). Understanding and projecting ICT trends in mathematics education. In S. Johnston-Wilder & D. Pimm (Eds.), *Teaching Secondary Mathematics with ICT*. Maidenhead: Open University Press.

Slavin, R., & Lake, C. (2008). Effective programs in elementary mathematics. *Review of Educational Research, 78*(3), 427-515.

Slavin, R., Lake, C., & Groff, C. (2009). Effective programs in middle and high school mathematics. *Review of Educational Research, 79*(2), 839-911.

Swan, M. (2000). Improving Learning in Mathematics: Challenges and Strategies. from http://www.nationalstemcentre.org.uk/elibrary/collection/282/improving-learning-in-mathematics

Swan, M. (2006). *Collaborative learning in mathematics: a challenge to our beliefs and practices*. Leicester: National Institute of Adult Continuing Education.

Thompson, A. G. (1992). Teachers' beliefs and conceptions: A synthesis of the research. In D. Grouws (Ed.), *Handbook of research on Mathematics teaching and learning* (pp. 127-146). New York: Macmillan.

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher Professional Learning and Development: Best Evidence Synthesis Iteration [BES]*. Wellington, New Zealand: Ministry of Education.

Watson, A., & De Geest, E. (2005). Principled Teaching for Deep Progress: Improving mathematical learning beyond methods and materials. *Educational Studies in Mathematics, 58*(2), 209-234.

Watson, A., De Geest, E., & Prestage, S. (2003). *Deep Progress in Mathematics*. Oxford: University of Oxford Department of Educational Studies.

Websites

BES (Iterative Best Evidence Synthesis Programme - What Works Evidence) (http://www.educationcounts.govt.nz/topics/BES (last visited 10/09/13))

CASE/CAME (Cognitive acceleration in science/mathematics) (http://www.letsthink.org.uk/ (last visit 10/09/13))

CfLAT (Research centre for Learning and Teaching, Newcastle University) (http://www.ncl.ac.uk/cflat/# (last visited 10/09/13))

EDUmatics (The EdUmatics project aims to provide teachers of secondary mathematics with support to learn to use and integrate technology within their classrooms)

(http://www.edumatics.mathematik.uni-wuerzburg.de/en/index.html (last visited 10/09/13))

epiSTEMe project (Effecting Principled Improvement in STEM Education *(epiSTEMe)*: Student Engagement and Learning in Early Secondary-School Physical Science and Mathematics)
(http://www.educ.cam.ac.uk/research/projects/episteme/ (last visited 10/09/13))

IAMP (Improving attainment in mathematics project)
(http://www.nationalstemcentre.org.uk/elibrary/resource/8019/deep-progress-in-mathematics-the-improving-attainment-in-mathematics-project (last visit 10/09/13))

Improving learning in mathematics project
(http://www.nationalstemcentre.org.uk/elibrary/collection/282/improving-learning-in-mathematics (last visit 10/09/13))

iTEC (Designing the future classroom)
(http://itec.eun.org/web/guest/home (last visited 10/09/13))

LAMP (Low attainers in mathematics project)
(http://www.nationalstemcentre.org.uk/elibrary/resource/5448/better-mathematics (last visit 10/09/13))

LEMA (Learning and education in and through Modelling and Applications)
(http://www.lema-project.org/web.lemaproject/web/eu/tout.php (last visited 10/09/13))

MASCIL (Mathematics and Science for Life)
(http://www.mascil-project.eu/index.html (last visited 10/09/13))

OECD Gender Data Portal
(http://www.oecd.org/gender/data/ (last visited 10/09/13))

Promethean ActivVote - (ActiVote is a student response system)
(http://www.prometheanworld.com/gb/english/education/products/assessment-and-student-response/activote/ (last visit 10/09/13))

RAMP (Raising achievement in mathematics project)
(http://www.nationalstemcentre.org.uk/elibrary/resource/6570/raising-achievement-in-mathematics-project (last visit 10/09/13))

SAILS (Strategies for Assessment of Inquiry learning in Science)
(http://www.sails-project.eu/portal (last visited 10/09/13))

Science: It's a Girl Thing! (Gender Campaign)
(http://science-girl-thing.eu (last visited 10/09/13)

Scientix (The community for science education in europe)
(http://www.scientix.eu (last visited 10/09/13))

Smart Response (Smart response is a student response system)
(http://smarttech.com/response (last visit 10/09/13))

Smart test system (Specific mathematics assessments that reveal thinking)
(http://www.smartvic.com/smart/index.htm (last visited 10/09/13)
STELLAR (Sustaining Technology Enhanced Learning at a LARge scale)
(http://www.stellarnet.eu/ (last visited 10/09/13))

The mathematics assessment project
(http://map.mathshell.org/materials/index.php (last visited 10/09/13))

The Russell Group (24 research intensive UK universities)
(http://www.russellgroup.ac.uk/ (last visited 10/09/13))

TIMSS (Trends in International Mathematics and Science Study)
(http://timssandpirls.bc.edu/ (last visited 10/09/13))

TI Navigator (TI Navigator is a student response system)
(http://education.ti.com/en/us/products/ti-navigator-systems/ti-nspire-cx-navigator-system/features/features-summary (last visit 10/09/13))

TODDLER (Towards Opportunities for Disadvantaged and Diverse Learners on the Early-childhood Road)
(http://www.uis.no/category.php?categoryID=11373 (last visited 10/09/13)

T^3 (Teachers teaching with technology)
(http://education.ti.com/en/us/pd/community/t3-ww (last visited 10/09/13))