



## Periodic Report:

Grant Agreement number: 266616

Project acronym: INQUIRE

Project title: **Inquiry based teacher training for a sustainable future**

Funding Scheme: Coordination and Support Action (CSA)

Date of latest version of Annex I against which the assessment will be made: 2010-12-02

Final report: 1st  2nd  3rd

Period covered: from to Month 1 (December 2010) to month 36 (November 2013)

Scientific representative of the project's coordinator:

Dr. Suzanne Kapelari, University Innsbruck, Austria

Tel: 0043 512 507 5943

Fax: 0043 512 507 2715

E-mail: [Suzanne.Kapelari@uibk.ac.at](mailto:Suzanne.Kapelari@uibk.ac.at)

Project website address: [www.inquirebotany.org](http://www.inquirebotany.org)





## Table of Content

1. Publishable Summary (VIA PDF LAYOUT).....	5
2. Core of the report for the first Period: month19 – month 36 (1.6.2012 - 30.11.2013).....	11
2.1 Project objectives for the period.....	11
2.2 Summary of progress on the objectives - months 1-36.....	12
2.3. Details for each task.....	21
2.4. Project management during the period.....	62
2.4.1. Consortium Management tasks and achievements.....	62
2.4.2. Consortium Agreement.....	62
2.4.3. Management Structure.....	62
2.4.3.1. The Management Board.....	63
2.4.3.2. Quality Management.....	66
2.4.3.3. Dissemination Management (DM).....	70
2.4.3.4. Project Coordinator (PC).....	94
2.4.3.5. Work package leaders (WP Leaders).....	98
2.4.3.6. IBSE Expert Consortium.....	98
2.4.3.7. The INQUIRE Advisory Groups (AG).....	103
2.4.3.8. Consortium Partner (LOtC Institution).....	116
2.4.3.9. Communication between beneficiaries.....	118
2.4.3.10. Evaluation Process.....	118
2.4.4. Project Planning and Status.....	119
2.4.4.1. Planning.....	119
2.4.4.2. Cooperation with other EU Projects.....	122
2.4.4.3. Summary of deviations and their possible impact.....	123
3. Tables of Deliverables and Milestone.....	127
4. Explanation of the Use of the resources.....	131
4.1. Major Cost Items.....	131
4.2. Financial administration.....	132





4.2.1 Distribution of money by the coordinator .....	132
4.2.2. Deviations.....	142
4.3. Justification of costs by each partner.....	157
ANNEXE 1: LITERATURE REVIEW ON IBSE PDF	
ANNEXE 2: ETHICAL MANUAL PDF	
ANNEXE 3: INQUIRE COURSE PARTICIPANTS (PIC, IC; Train the Trainer) PDF	
ANNEX 4: SUSTAINABILITY PDF	
ANNEX 5: INQUIRE PROJECT AT KEY EVENTS PDF	



## Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate)<sup>3</sup>:
  - has fully achieved its objectives and technical goals for the period;
  - has achieved most of its objectives and technical goals for the period with relatively minor deviations.
  - has failed to achieve critical objectives and/or is not at all on schedule.
- The public website, if applicable
  - is up to date
  - is not up to date
- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.4) and if applicable with the certificate on financial statement.
- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of scientific representative of the Coordinator: DR SUZANNE KAPEZARI

Date: 29 / 01 / 2014



For most of the projects, the signature of this declaration could be done directly via the IT reporting tool through an adapted IT mechanism and in that case, no signed paper form needs to be sent

<sup>3</sup> If either of these boxes below is ticked, the report should reflect these and any remedial actions taken.



## 1. Publishable Summary (VIA PDF LAYOUT)

*INQUIRE Inquiry base teacher training for a sustainable future*

*Coordinator: [Suzanne.Kapelari@uibk.ac.at](mailto:Suzanne.Kapelari@uibk.ac.at)*

*The EU FP7 INQUIRE Project was developed and implemented to support science literacy in Europe through teacher training courses, focussing on the integration of Inquiry Based Science Education (IBSE) into informal and formal education programmes. Courses were developed and offered in 14 sites across 11 European countries with a cohort of over 570 participants that included both teachers in the formal education system and also education officers in informal education sites (Botanic Gardens, Natural History Museums etc).*

*Botanic gardens and similar LOtC sites are inspirational sites that can provide training for teachers and educators on critical issues such as conservation of our natural resources, sustainability and threats to our future, such as climate change. Integrating these themes into activities using IBSE pedagogy provides an exciting and stimulating programme which encourages teachers and informal educators to develop their proficiency in IBSE and to become reflective practitioners as well as raising awareness of these issues.*

### **Introduction:**

Current science education reform initiatives require fundamental changes in how science is taught and in how teachers are supported to engage in alternative ways of science teaching. One current approach is the incorporation of inquiry based science education (IBSE) into the everyday school science curriculum. To help make this change happen, teachers need opportunities to participate in a variety of professional development experiences that foster an understanding of science and inquiry based science teaching. Research has also shown that learning that includes activities based outside the classroom is highly motivating, not only for children but also for teachers. The UK Government's education manifesto 'Learning outside the Classroom' was launched to emphasis this key issue and Europe has already recognized the potential of Learning Outside the Classroom (LOtC) venues to support the implementation of IBSE methods on a large scale. With more people living in cities, botanic gardens, which provide excellent opportunities for education in major cities worldwide, offer some of the only outdoor learning sites for children to gain first-hand experiences of IBSE.





### ***The INQUIRE project: objectives and achievements.***

The Inquire project was set up to foster the development and implementation of IBSE in both formal and informal education systems by developing, testing and implementing IBSE training courses in 11 European countries. One of the key aspects of this project was the provision of a ‘long-term’ training course (60 hours +) over a prolonged period and a course where there was a real emphasis on reflective practice being developed by both course participants and Consortium Partners. This is a change from short, sharp training sessions that often are the objectives of projects and which, although they may result in high numbers of participants, unfortunately do not actually effect real behavioural and attitudinal change in those participating. Inquire course participants and partners were a smaller cohort but were offered a more intense and in depth training and were encouraged to develop an action research approach, which has been evidenced in both the Quality Management Report and the external evaluation. There has also been a good community of practice developed. All of these outcomes are likely to result in real sustainability of the project aims and objectives going forward and for long-term and profitable collaborative work in the future across the range of participating EU organisations.

The content of the INQUIRE training courses focused on various aspects of biodiversity loss and climate change, drawing on the expertise and inspirational settings for the courses in Botanic Gardens and natural history centres across Europe. The courses were piloted by partners early on in the project and post evaluation of the pilot course, a second course was run. The project partners used reflective practice and evaluation processes to analyse good practice, effectiveness and impact of the courses both with their course participants, through the consortium partnership meetings and through support sessions provided by the Quality Management team and Management Board. The courses were refined and improved through this process, resulting in enhanced courses with more polished delivery and good impact. Throughout the Inquire training courses, teachers and botanic garden educators had also been encouraged to learn with, and from, each other and to develop a shared understanding of how IBSE can be facilitated in class and in botanic gardens and natural history museums. Sustainability was key to the project and this was attained through the community of practice and through the running of ‘Train the Trainer’ courses to cascade knowledge and experiences gained through the project to other LOTC institutions. There was also excellent dissemination of outcomes and practices through a range of media and at conferences, workshops, seminars and promotional events both nationally and internationally.





### ***INQUIRE courses developed and implemented in 11 EU countries***

Two sets of Inquire courses were run over the project period. The pilot courses ran between September 2011 and July 2012 and the second set, building on the initial course content and processes, ran between the autumn of 2012 and the summer of 2013. Using the reflective practice developed throughout the project and supported by partnership interaction and exchange of best practice, partners were able to **refine and enhance** their courses for the second period. Overall the courses **reached a total of 576 participants**; 250 in the pilot courses and 326 in the second set of courses. Course participants included educators in LOtC sites, primary, secondary and student teachers, education authority officers and other staff from LOtC sites. The outcomes and impacts from these courses were explored in the Final Quality Management Plan and the Final External Evaluation Report which draw on the 'Portfolios of Evidence' (PofE) and case studies submitted by partners following the two sets of courses. These partner PofE, in turn, draw on the findings and reflections from participants on individual courses as well as partner course tutor's/ organiser's reflective practice. A sea change in both practice and attitude can be seen in these findings

### ***A Quality Management Plan was implemented and supported***

The Quality Management Plan was developed and agreed in the initial period of the project. The plan outlined how evidence for project outcomes would be collected through surveys, on-line questionnaires, case studies submitted by partners during partner meetings, interviews, observation and Portfolios of Evidence. This plan was implemented and augmented as necessary over the project period. Regular support was provided throughout the project period by both the QM team and the full Management Board including provision of partner visits, support telephone calls, on-line via Glasscubes and through the Inquire website and regular newsletters. **The Final QM Report**, published in month 36 (Deliverable D7.2) provides an analysis of participants and Partner feedback. This was very positive and was further demonstrated by the innovative and stimulating workshops and presentations from partner and course participants at the final **INQUIRE conference**, held at **Kew Gardens, London UK on July 9<sup>th</sup> and 10<sup>th</sup> 2013 and attended by 124 participants from 13 countries**. The **Final External Evaluation report**, submitted in the final month 36 (November 2013) additionally demonstrated very positive outcomes for the project.

### ***Development of a Community of Practice between Partners***

The Consortium Partners quickly developed and maintained an excellent **Community of Practice during the three years of the project**. The success of this was in part due to the very good support from the QM team and full Management Board. Communication was a strong





focus for the project team and was very well managed by BGCI. This was built on regularly through the 5 partner meetings, Train the Trainers course and final conference held during the project period. Many good friendships were established and the opportunities to share best practice face to face, discuss common problems and successes was valued very highly by all partners. Partners are still communicating regularly post project and are actively seeking new inter-European joint project / programme collaborations for the future.

### ***Impact through establishment of National Advisory Groups (NAG)***

The National Advisory Groups (NAG) were established in the early project months and continued to meet and support partners within their countries throughout the project period. Most partners had 2 meetings per year; a few had just one often due to availability of the AG members. Advice included how to integrate the courses into the national teacher training mechanisms, how best to promote courses, on the structure and content of courses and where to find appropriate resources and other support. The NAGs were established with experts in the field of formal and informal science education and were influential in encouraging regional take up and curriculum input through their contact as well as effective at adding value to the partner course delivery and evaluation by sharing their broad expertise with partners.

### ***Snowballing the INQUIRE idea: Train the Trainers and Dissemination***

Besides the partner Train the Trainers course run in Obergurgl, where 57 educators were trained in IBSE delivery and processes, the 15 Train the Trainers courses delivered through the project engaged over 285 participants, snowballing the project aims and objectives further. Participants were from a range of professional backgrounds and included not only educators from botanic gardens, science centres, natural history museums, zoos and environmental NGO's but also secondary teachers, primary school teachers, teacher trainers and representatives of Educational authorities.

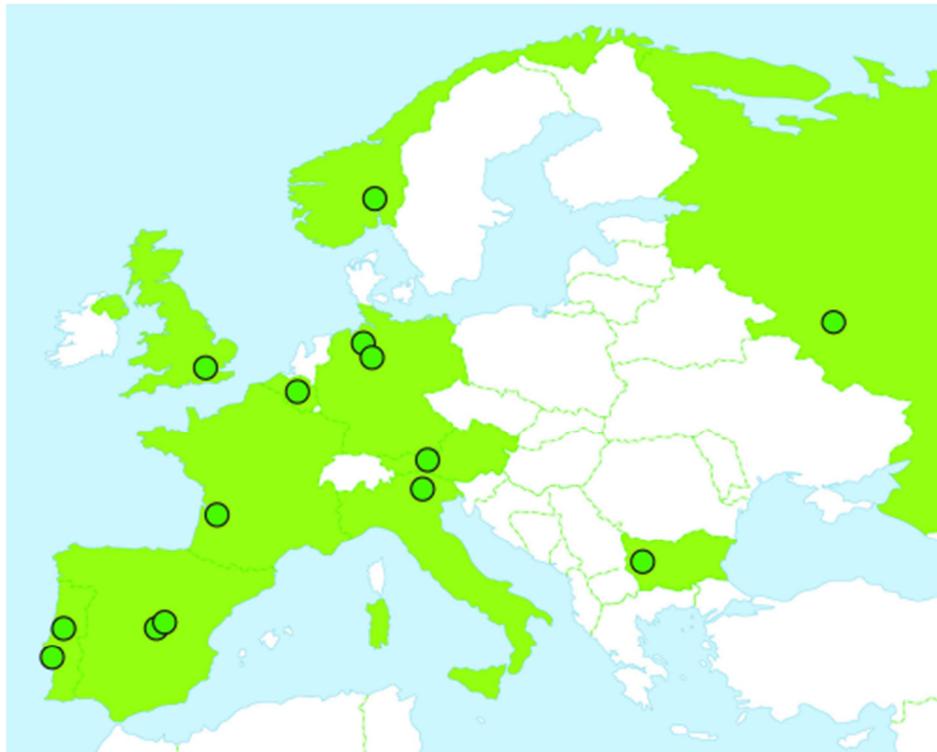
The dissemination of the Inquire aims and objectives was managed through a variety of media across the project period. Besides the many and varied written texts, either published in printed format or on-line, partners attended and offered dissemination activities at 56 International conferences / events and 135 national conferences / events. The Inquire co-ordinator participated in several other IBSE linked EU project meetings and events as well as joining ProConet and was therefore able to ensure cross project dissemination. The conference, organised by BGCI and KEW and held at Kew on 9-10<sup>th</sup> July 2013 also attracted 124 delegates from 13 countries disseminating best practice and project outcomes more





widely. Four other EU funded projects (PATHWAY, Natural Europe, GreeNET and S-TEAM.) were also represented at the conference - broadening the experience of all project partners and opening up new avenues for collaboration in the future. The published Train the Trainers and Inquire course manuals and activity booklet will additionally support this process.

**The following Partners worked on the INQUIRE project:**



- University of Innsbruck, Austria
- Botanic Gardens Conservation International, UK
- Museo Tridentino di Science Naturali, Trento, Italy
- Royal Botanic Gardens, Kew, UK
- University of Bremen, Germany
- University of Sofia, Bulgaria
- Schulbiologisches Zentrum Hannover, Germany
- Jardin Botanique de la Ville de Bordeaux, France
- Moscow State University Botanical Garden, Russia
- Natural History Museum Botanical Garden, Norway
- King's College London University, UK
- University of Lisbon, Portugal
- National Botanic Garden of Belgium
- Coimbra Botanic Garden, Portugal
- Botanischer Garten, Rhododendron-Park, botanika
- Bremen, Germany
- Agencia Estatal Consejo Superior de investigaciones Cientificas, Spain
- Universidad de Alcala, Spain



## Inquire courses

**Aim:** Help reinvigorate IBSE in the formal and the Learning Outside the Classroom (LOtC) educational systems throughout Europe through teacher training courses.



**Activities:** Run by botanic gardens and Natural History Museums in 11 countries, INQUIRE training courses demonstrate to teachers and educators how IBSE can inspire students in science and engage them with issues of biodiversity and climate change. Courses comprise minimum 60 hours of training with a combination of full day sessions and self study. They promote the integration of learning in and outside of the school classroom.

**Achieved:** 28 Pilot and final INQUIRE courses run in the period 2011-2013. The courses took place in 11 countries across Europe engaging in total: 576 teachers, educators and other professionals and reaching more than 16,000 students who experience IBSE in their school and in LOtC. The INQUIRE course manual has been published in 10 languages.

## Advisory groups

**Aim:** Support running and promotion of INQUIRE courses.



**Activities:** advise on development and delivery of INQUIRE courses, recommend resources, advise on dissemination of project and course participants' recruitment, comment on implementation and effectiveness of project outcomes, advise on accreditation of the course.

**Achieved:** A National Advisory group has been established in each country. 122 members in total (Education authorities representatives, teacher trainers, science education researchers, teachers, educators, head teachers, representatives of other LOtC institutions and networks). 49 meetings held in total by the 11 Advisory groups. The meetings were organized to support major developments i.e. establishing, revising and running the INQUIRE course, preparing for the INQUIRE conference and ensuring the courses sustainability

## Quality Management

**Aim:** Ensure implementation of high quality INQUIRE courses by establishing evaluation processes.

**Activities:** Determine and conduct summative and formative evaluation, train Partners to use evaluation tools, support visits to Partners, encourage reflective practice, collect Portfolios of evidence and improve quality of courses.

**Achieved:** Pre- and Post- course questionnaires designed for summative evaluation of courses, used by all Partners. Partners trained to use formative evaluation methods- interviews, concept maps, reflective journals, observations and compiled portfolios of evidence. Quality Management Plan developed. KCL conducted support visits to 14 Partners. The Quality Management team and the Management Board supported Partners through personal contacts, on-line communications via Glasscubes and through workshops during the 4<sup>th</sup> Partner meeting in Lisbon, October 2012. The Final Quality Management Report (Deliverable D7.2) provides an analysis of participants and Partners feedback which was very positive.

## Consortium meetings

**Aim:** Bring Partners together to ensure work is delivered on time and to high standards and develop a Community of practice amongst the consortium.



**Activities:** Discuss deliverables, discuss INQUIRE course structure and evaluation, provide training on evaluation, reflect on running the courses, exchange good practice on IBSE, peer review lesson plans and modules, discuss communication in the project, training on evaluation and website, prepare for INQUIRE conference.

**Achieved:** An Inaugural meeting, five Consortium meetings and a Train the trainers meeting held. Between 30 and 40 people attended each meeting which resulted in preparing the deliverables on time, developing, running and improving the Pilot and Final INQUIRE courses, establishing project evaluation methods, developing Partners' reflective practice and creating a collaborative atmosphere within consortium. 12 Management Board meetings held to plan and prepare Consortium meetings.

## Dissemination

**Aim:** Achieve public awareness about project goals.



**Activities:** develop and run INQUIRE website, distribute newsletters, present work of the INQUIRE project in conferences, produce dissemination resources, distribute press releases, organise INQUIRE conference.

**Achieved:** INQUIRE website [inquirebotany.org](http://inquirebotany.org) live since September 2011 in 10 languages. Monthly e-newsletters have been sent to 1000 subscribers. Partners have presented INQUIRE project in 56 International and 135 National conferences and events. The INQUIRE conference was held at Kew, London on 9-10<sup>th</sup> July 2013 and attracted 124 delegates from 13 countries, stimulating discussion and reflections on IBSE. An INQUIRE leaflet has been produced in 10 languages and an INQUIRE film subtitled in 10 languages.

## Snowballing

**Aim:** Encourage further implementation of IBSE in 11 European countries of the project.



**Activities:** meetings and training seminars for LOtC staff and teacher trainers to inspire them to run INQUIRE courses. Advisory groups promote IBSE through networks.

**Achieved:** The Partner Advisory groups included 16 representatives of education authorities, 8 teacher trainers, and 16 staff from LOtC institutions. All promoted IBSE through their positions. In order to encourage further implementation of IBSE, Partners have been running Train the Trainers courses. Some of these were day seminars while others were run in a similar structure to the INQUIRE course. 15 Train the Trainers courses have been run by 15 Partners. These were attended by 289 participants mainly educators from botanic gardens, science centres, and other LOtC sites.



## 2. Core of the report for the first Period: month19 – month 36 (1.6.2012 - 30.11.2013)

### 2.1 Project objectives for the period

The overall objective of the INQUIRE project is the widespread uptake of inquiry-based teaching and learning in science education across Europe. With this in mind, the overwhelming goals of the INQUIRE project are the following:

*Table 1.: Summary table of INQUIRE objectives (Annex I Grant Agreement p.4) applicable to the second period*

Summary Table	Work packages addressing this issue
<b>1. INQUIRE</b> will link informal and formal education systems as well as the science education research community through assembling an interdisciplinary project team – <b>Completed in 1<sup>st</sup> period</b>	WP2 Levelling
<b>2. INQUIRE</b> will develop a shared understanding of inquiry based learning in formal and informal educational institutions on a European scale - <b>Completed in 1<sup>st</sup> period</b>	WP2 Levelling
<b>3. INQUIRE</b> will develop a rolling one-year training course for practitioners in inquiry-based learning (INQUIRE course manual) Addressing pupils age 9-14 years - <b>Completed in 1<sup>st</sup> period but built upon going forward</b>	WP3 INQUIRE course development
<b>4. INQUIRE</b> will promote already existing best practise models (PLASCIGARDEN, SINUS Transfer, POLLEN, S-TEAM, FIBONACCI) throughout the project in both the formal and informal education system	WP3 INQUIRE course development WP6 Dissemination
<b>5. INQUIRE</b> will develop a course whose subject content will highlight the major global issues of the 21 <sup>st</sup> Century: biodiversity loss and climate change	WP3 INQUIRE course development
<b>6. INQUIRE</b> will promote learning in and outside the classroom	WP3 INQUIRE course development
<b>7. INQUIRE</b> will promote its course through the various national systems that support continual professional development for teachers	WP4 Implementation





<b>8. INQUIRE</b> envisages to implement pilot courses at a local level throughout 11 European countries	WP4 Implementation
<b>9. INQUIRE</b> will ensure that formative assessment encourages the course design to be adapted to the needs of individual countries	WP7 Quality Management
<b>10. INQUIRE</b> will create an interactive website and regularly published electronic newsletters to support a practitioners network	WP6 Dissemination
<b>11. INQUIRE</b> will train teachers and informal educators to carry out their own practitioners research	WP4 Implementation
<b>12. INQUIRE</b> will encourage teachers and educators to participate in website activities through establishing a teacher recognition scheme	WP3 INQUIRE course development
<b>13. INQUIRE</b> will run a final conference to disseminate the project outcomes on a European wide scale	WP6 Dissemination
<b>14. INQUIRE</b> will support other informal learning institutions seeking to gain experience in the area of IBSE techniques and run the INQUIRE Train the Trainer Course.	WP4 Implementation
<b>15. INQUIRE</b> outcomes will be promoted through a range of networks including the EU central information provider for dissemination of best practice	WP6 Dissemination

## 2.2 Summary of progress on the objectives - months 1-36

- 1. INQUIRE** will link informal and formal education systems as well as the science education research community through assembling an interdisciplinary project team

*Achieved*

Consortium Partners shared their knowledge over the period 1-36 months across a wide range of topics (Biodiversity / Climate Change / Plant science), pedagogy, educational research methodologies and engagement techniques for ‘Learning outside the Classroom’ (LOtC). Within the second period, partners built on their experience from the first period, bringing in to Consortium Partner meetings shared knowledge from participants on pilot and second courses, drawing on their own inter-institutional development and on advice from their National Advisory Groups. . Key to this sharing was the face to face communication through the inaugural, 5 partner meetings and the train the trainer session, Glasscubes and the support of the QM team and full management board.





**2. INQUIRE** will develop a shared understanding of inquiry based learning in formal and informal educational institutions on a European scale

*Achieved*

Achieved in the first reporting period and built upon during the second period (months 19-36). Deliverable 1.2 was submitted in 2011 documenting the criteria for selection of IBSE material and providing a framework for a shared understanding. Deliverable 2.2, a shared understanding was drawn up by the partners and submitted in April 2011.

Partners worked within their own institutions and with their respective National Advisory Boards (NAB) to define their understanding of inquiry based learning and brought their findings to the first consortium partner meeting at Wakehurst Place. The development process was furthered by workshops for partners, supported by presentations from the pedagogical institutes and Innsbruck Botanic Garden, facilitated discussion and generic agreement on the criteria that can be used to define an IBSE activity. Kew Gardens developed a set of shared 'Questions' that supported understanding of how to move a non-IBSE activity into an IBSE activity and these were shared via the partner IT platform 'Glasscubes'. When the project was initiated, several partners had little or no understanding of IBSE. The Quality Management Report provides solid evidence that all Partners have developed their understanding of IBSE, and that of their course participants, and are able to apply it effectively in Educational Programs run in School /Botanic Garden partnerships.

**3. INQUIRE** will develop a rolling one-year training course for practitioners in inquiry-based learning (INQUIRE course manual) addressing pupils age 9-14 years

*Achieved*

This objective was achieved with the first pilot courses run in all 11 countries and in all delivery partner organisations over the period September 2011-July 2012. Reports on the progress, activities and reflections for each individual course were shared in poster sessions during partner meetings in Bremen and Madrid. Deliverable 2.1 –Course Implementation Plan (CIP) and deliverable 4.1, the pilot course manual, (PIC Manual) showing the course implementation and detail were submitted on schedule.

This objective was further developed and refined over the second period with the second inquire course being run in all 11 countries and in all delivery partner organisations over the period September 2012-Summer 2013. In the partner meeting in Lisbon (October 2012), partners reported on changes and improvements to their courses, developed following





feedback from course 1 participants, internal review meetings and advisory sessions from their national advisory boards (NAB). Partners were paired to discuss and reflect on changes to their course design and content, and, where appropriate, to suggest further amendments or adaptations. These changes are noted in the final Inquire Course Manual (Deliverable 5.1) and reflected in the Final QM Plan D7.2.

- 4. INQUIRE** will promote already existing best practice models (PLASCIGARDEN, SINUS Transfer, POLLEN, S-TEAM, FIBONACCI) throughout the project in both the formal and informal education system

#### *Achieved*

The INQUIRE MB regarded it as essential to draw on already existing knowledge from EC funded projects and to learn from, and adopt, appropriate good practice. Throughout the project, the INQUIRE coordinator and MB members endeavoured to contact other EU project coordinators and partners and to attend various project based conferences. These events bring together a wide range of key players in the field and provide valuable opportunities to learn from each other, as well as to critically reflect on one's own project development and delivery. Partners had access to a list of web resources and information for Key projects (e.g. those listed above and others of a similar nature). Partners from Kings College, London University, Bremen University, MTSN, Innsbruck and Kew participated in several of the projects listed above and were able to share models and techniques from their experiences. Dissemination of the INQUIRE project was also fed into other project workshops and conferences (see deliverable 6.1 dissemination plan); e.g. a presentation on the INQUIRE project was given at the recent Fibonacci Conference in Leicester in April 2012 or the SECURE Conference in October 2013.

In the Grant agreement it was envisaged that participants in the INQUIRE project would participate in 5 European Project related conferences; this was surpassed. In this 2nd project period (months 19-36), 2 partners attended and gave a workshop at the 5th biennial Science and Mathematics Education Conference (SMEC 2012) in Dublin City University, Dublin, Ireland; 'Teaching at the heart of learning' - a joint conference of the Science and Mathematics Education Conference (SMEC) series and the FP7-funded project ESTABLISH. In addition the coordinator attended network meetings of ProCoNet (a network of coordinators of EU 'Science and Society' projects between June and November 2013 as well as attending the inaugural meeting in March 2011. One key outcome of attending is that LFU is now a partner in the INSTEM project which will support INQUIRE implementation activities post project completion. Other engagement with EU projects and networks included





attendance and workshops at the First Fibonacci Conference in Bayreuth, Germany in September 2010 as well as the 2<sup>nd</sup> one in Leicester in April 2012, the Scientix conference in May 2011 in Brussels, the ECSITE annual conference in May 2011 in Warsaw, Poland, the INSTEM conference in March 2013 (Netherlands) and the SECURE Conference in October 2013 (Belgium). Feedback from other EU funded projects and initiatives was also brought into the INQUIRE project through the partner national advisory board members and through attendance at many other educational research conferences held in Europe, as well as ones in Mexico and New Zealand. Several INQUIRE partners also represented INQUIRE at European Commission Public relation events; in June 2012, 'Science; it's a girl thing' (Brussels) and the 'EC Open day', May, 2013, (Brussels) (see Dissemination Section p.71ff and Deliverable 6.3 Dissemination Summary)

**5. INQUIRE will develop a course whose subject content will highlight the major global issues of the 21st Century: biodiversity loss and climate change**

*Achieved*

Achieved in the 1<sup>st</sup> reporting period. An exemplar of a course enrichment lecture for participants on the UK course was 'Climate Change' given by the chief scientist of the Meteorological Office for the UK. An exemplar presentation by the Spanish team on their course content and delivery for the pilot course is also given below.



The course content for the second course set in the second reporting period continued to emphasise aspects of biodiversity, sustainability, and threats to the natural world, in particular Climate Change. At the partner meeting in Lisbon (October 2012) and in Trento (October 2013), as well as at the final conference in Kew (July 2013), there were a number of





opportunities for participants to engage with new activities highlighting these topics, in particular demonstrating how they could be implemented in an outdoor setting. Examples included: ‘Bromeliad meets Pollinator’ – an activity demonstrated by Bremen partners at the INQUIRE conference in July; ‘Will the sea level rise with Climate Change’ – an activity developed by Hannover and demonstrated at Kew; ‘A plant hunt challenge’ demonstrated by the Italian partner in Trento.

A portfolio of activities on these topics that can be used and adapted across the partner institutions is currently being developed. It will include the initial examples previously given in the PIC manual (Deliverable 4.1) as well as extra exemplar best activity / favourite lesson plans written up and submitted by each partner. These have been edited by Kew and each activity has been uploaded onto the INQUIRE website and onto SCIENTIX for others to use. They will later be collated into one booklet, published electronically and distributed to partners, relevant websites for upload and to other appropriate educational networks and organizations globally.

## 6. INQUIRE will promote learning in and outside the classroom

### *Achieved*

All course programmes and programme resources were developed to promote learning outside the classroom. Botanic gardens and environmental education centres are centres of excellence for the delivery of informal learning using the natural and built landscape and local, regional and global biodiversity. This was initially evidenced through Partner poster presentations in Obergurgl, Bremen and Madrid (see Annexe 1 and List of Consortium Meetings p. 64 in the 1st. project Report).

Course programmes and programme resources continued to be developed throughout the project duration (see previous section 5 above). For example, in the UK, a number of Botanic Garden educators who participated in the courses will be integrating IBSE into their own institutional educational programme delivery (e.g. Westonbirt, Wetland and Wildlife Centres in the UK) or running their own local courses (e.g. Edinburgh Botanic Garden, UK) (see details in WP5.2 in task implementation table), ensuring that IBSE is being promoted ‘outside’ the classroom. Findings reported in the Quality Management Report conclude that the status and role of botanic gardens was broadened in the eyes of the teachers, and that they were ‘viewed now as *‘privileged spaces for learning’* as a result of the INQUIRE project’. The QM Report additionally summarises that ‘the significance of botanic gardens as learning spaces, centres of scientific excellence and teacher-training, locations for learning outside of the





classroom and IBSE activities was recognised by the course participants’ and that ‘Enjoyment of the garden as a learning space was also noted, resulting in increased school bookings and visits to the gardens by teachers with their classes’.

- 7. INQUIRE** will promote its course through the various national systems that support continual professional development for teachers

*Achieved*

The initial report noted that this had been evidenced in Deliverables 2.1 and 3.1, discussing how partners promoted their courses through the various national systems that support CPD for teachers e.g. pedagogical institutes, through contacts in their National Advisory Boards, teacher training institutes and networks such as the Association of Science Education in the UK. During the second reporting period, all consortium partners additionally developed and implemented a Train The Trainers course to promote the course and disseminated initial evaluations e.g. via the Botanic Garden Education Network (BGEN) in the UK; several partners also contributed to Student Teacher Training programmes e.g. University of Bremen or University of Innsbruck. The Dissemination Summary (Deliverable 6.3) demonstrates that the Inquire course was promoted across a range of 135 national events (conferences, workshops and seminars) where teachers or trainee teachers were present and where they were able to engage in short workshops, activities and ‘taster sessions’ for implementing IBSE in their teaching practice.

- 8. INQUIRE** envisages to implement pilot courses at a local level throughout 11 European countries

*Achieved*

The Pilot Inquire Courses were all completed by the end of July 2012 (month 20). Evaluation of the courses was reported on at NAB meetings held in each country and through partner Portfolios of Evidence submitted to Kings College for evaluation as part of the final QM report D7.2. Impacts of the course and amendments to course structure and content, as recommended by participant feedback, were discussed at the Lisbon partner meeting (October 2012) and a summary of participant feedback was provided in deliverables D4.4 and D4.5. The Train the Trainers manual, D4.2 was developed and published post completion of the Pilot Inquire Courses (PIC), to ensure that all analysis of findings from the PICs, and the recommendations that came out of the analysis, could be incorporated into the published TTC Manual.





9. **INQUIRE** will ensure that formative assessment encourages the course design to be adapted to the needs of individual countries

*Achieved*

The course design of individual countries was discussed during the Consortium Partner Meetings in Wakehurst Place and in Obergurgl (Train the Trainers meeting). During the Bremen Consortium Meeting there were also presentations, discussions and workshop sessions to analyse individual current course and training provision and reflect on best practice for delivery in each country. Sharing of best practice has been key to the development process and successful outcomes. Kings College, London University staff provided one to one advisory and mentoring sessions to additionally support individual course development (see Annex 1 and List of Consortium Meetings p.64).

Sharing of best practice was key to the development process and to successful outcomes throughout the duration of the Inquire project. Kings College, London University staff provided continual one to one advice, as required, for partners. Reflections on course structure and content were discussed at the Lisbon partner meeting (October 2012), developed through participant feedback sessions for individual PIC courses (evidenced in Deliverable 4.4) and NAB discussions.

10. **INQUIRE** will create an interactive website and regularly published electronic newsletters to support a practitioners network

*Achieved*

The Inquire Website was developed and is in operation in 10 languages and remains a key communication platform going forward ([www.inquirebotany.org](http://www.inquirebotany.org)). Newsletters are produced monthly populated by BGCI staff and in country consortium partners, with additional materials from appropriate experts/organizations and suggested materials by course participants. Aimed at teachers and educators, the course pages provide information on sites in their countries where INQUIRE courses are running, together with an overview and details about each course. The website provided (and will continue to provide) resources and will continue to enable trainers to keep in touch with participants on any new courses in the future, as it did for the project period, during periods when there were no sessions at the gardens/LOtC sites. The website provided the main platform to disseminate project





updates, project deliverables and other outputs of INQUIRE Partners' work. The website has been supported by the monthly newsletters, Facebook, Twitter and Youtube accounts. As an indication of usage, in the last 2.5 months of the project the INQUIRE website received a total 5,794 visits. Out of these visits, 77.9% were unique visitors while 22.1% returning visitors.

E-newsletters were disseminated monthly from month 14 onwards and this regular dissemination of the newsletter in all Partner languages complemented the dissemination of news through Facebook and Twitter and substituted the press releases. The INQUIRE newsletters collectively (in all ten languages) reach 1000 subscribers every month.

**11. INQUIRE will train teachers and informal educators to carry out their own practitioners research**

*Achieved*

All Partner Inquire courses contained an element on reflective practice and research. During the partner meetings there were sessions on reflective practice and many discussions in Partner meetings explored how reflective practice was developing. As part of this reflective practice, course participants, as well as individual consortium partners, produced portfolios of evidence reflecting on their learning, the course delivery and outcomes and impacts. These portfolios were submitted to the QMT in autumn 2012 for analysis as part of the QM Plan (D7.2). Submission of a second set of portfolios and / or case studies was invited from Consortium Partners to further evidence reflective practice. The External Evaluation report (D8.3) also evidences reflection by partners.

**12. INQUIRE will encourage teachers and educators to participate in website activities through establishing a teacher recognition scheme**

*Achieved*

Each partner invited a minimum of one teaches and/or one educator who participated in the pilot course and developed a portfolio of evidence or case study to come to the Final INQUIRE Conference at Kew Gardens London. Criteria for selecting this particular person were published via the Inquire Website, where potential invitees were also told about financial support on offer. This incentive was motivating for many teachers and resulted in good case studies being submitted. Selected teachers and educators from each Partner attended the Final INQUIRE Conference at Kew Gardens, London UK, 9<sup>th</sup>-10<sup>th</sup> of July 2013. Conference participants and registered teachers for the website continued to access the website and e-newsletters for information after the project has finished.





**13. INQUIRE** will run a final conference to disseminate the project outcomes on a European wide scale.

*Achieved*

The final conference was run on July 9<sup>th</sup> and 10<sup>th</sup>, 2013 in Kew Gardens, London, UK. 124 delegates from 13 countries attended the INQUIRE conference, participating in discussions, workshops and reflections on IBSE. The programme comprised four keynote speeches, 60 workshops, paper and poster presentations and a networking session. Following the conference, 35 delegates participated in a one-day tour to Oxford, to learn about the education programme run at the University of Oxford Botanic Garden. Conference Proceedings have been published on the INQUIRE website and all conference participants received a data stick with the book of abstracts at the beginning of the conference.

**14. INQUIRE** will support other informal learning institutions seeking to gain experience in the area of IBSE techniques and run the INQUIRE Train the Trainer Course

*Achieved*

All INQUIRE courses run by partners included participants from a range of LOtC sites; although the majority were from Botanic Gardens, educators from Natural History Museums, Environmental Education centres and Zoos also attended, broadening the reach of the INQUIRE project objectives.

All Partners ran Train the Trainers courses and contributed to further workshops and educational events where they could liaise with other organizations interested in developing IBSE pedagogy. (see objective 7 above), reaching 153 officials from LOtC sites . During conferences both national and international, as well as the final Kew Inquire Conference there were also many LOtC site educationalists who attended workshops and dissemination activities (See also separate Dissemination Summary, D6.3 and the Dissemination section in this report).

**15. INQUIRE** outcomes will be promoted through a range of networks including the EU central information provider for dissemination of best practice

*Achieved*

Points 5,6 and 7 above note many networks, including EU networks such as Proconet where promotion of the Inquire project principles and outcomes have been promoted. Appropriate deliverables and resources have been uploaded onto SCIENTIX and are also available via the INQUIRE website [www.inquirebotany.org](http://www.inquirebotany.org) . BGCI, the botanic garden





network organization, has been promoting INQUIRE outcomes through its global network e.g. 8<sup>th</sup> International Congress on Education in Botanic Gardens, Mexico, November 2012 and its educational magazine 'Roots' (Volume 9.2 Nov. 2012; Volume 10.1., April 2013). Partner organizations have been promoting INQUIRE outcomes through national or regional networks e.g. the local authority World Heritage Forum in the UK and through EU research networks such as ESERA, EERA and EU science collaborator meetings e.g. ECSITE see Dissemination Summary, Deliverable D.6.3 and Annexe 3.

## 2.3. Details for each task

### 2.3.1. Significant results

The project objectives have been achieved in full.

All tasks were fulfilled by all partners in all work packages. All deliverables were completed and delivered on time. Evidence for completion of the tasks was collected via management board meeting minutes, analysis of 'Portfolios of Evidence' and individual partner interviews provided in the Final QM Report Deliverable D.7.2 as well as posters, presentations and assignments delivered during partner meetings. An interim and final External Evaluation Report was conducted and delivered on time (Deliverable D. 8.1. ad 8.3.)

### Highlights of the Project

- 28 high quality, long term INQUIRE training courses delivered in 11 European countries, reaching 576 participants (see table below). These courses provide evidence that they were successful in supporting participant to implement IBSE in their classroom and out door learning settings.
- 15 Train the Trainer courses delivered in 11 countries and reach – to disseminate INQUIRE ideas in LOTC sites.
- Monthly e-newsletters established for INQUIRE website [www.inquirebotany.org](http://www.inquirebotany.org) reach users in 10 languages.
- Final INQUIRE Course Manual was published in 10 languages plus an additional booklet on IBSE activities for LOTC (available at: [www.inquirebotany.org](http://www.inquirebotany.org))
- INQUIRE Quality Management Report completed and delivered
- INQUIRE External Evaluation Report completed and delivered
- Promotional film produced and available at: [www.inquirebotany.org](http://www.inquirebotany.org))
- Successful final conference held with 124 participants from 13 countries





- Exelent dissemination of the project processes and outcomes by partners, nationally and internationally.

In the Grant Agreement, Annexe 1, p99 we envisaged to train approximately 560 teachers and educators. This number was surpassed. Between September, 2011 and the October, 2013, 15 INQUIRE partners across 11 countries ran 28 INQUIRE courses. These courses were attended by a total of 576 participants from various professional backgrounds. See Table below. The most represented group was secondary school teachers- contributing 273 of the participants - followed by the attendance of 145 educators from various museum and Learning Outside the Classroom (LOtC) institutions. 87 primary school teachers and 47 trainee teachers participated. Other professionals include librarians and scientists (24). The table below provides an overview of the professions of those who attended each course. Full details see Annexe 3.

The table 2 below provides insight into the number and the qualification of all INQUIRE course participants.





Table 2. Overview of Pilot INQUIRE courses and INQUIRE courses participants (28 courses)

Pilot and Final INQUIRE course	Primary school teachers	Secondary school teachers	Educators	Trainee Teachers	Other	total
LFU	8	5	17	0	3	33
MUSE	14	18	40	0	0	72
KEW	2	20	13	0	2	37
CSIC & UAH	9	40	6	0	4	59
UniHB&BGRHB (they run together the Pilot INQUIRE course and then run individually the Final INQUIRE courses)	0	26	4	46	1	77
UBG	9	14	4	0	1	28
NBGB	9	4	17	1	2	33
SBZH	0	28	8	0	2	38
BORD	10	33	16	0	9	68
FCTUC	0	28	8	0	0	36
MSU	1	26	2	0	0	29
NHM	25	0	2	0	0	27
UL	0	31	8	0	0	39
Total	87	273	145	47	24	576





### 2.3.2. Final Report Month 1 – Month 36

Work Package <b>1</b>	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from tasks
Months 1-4	<ul style="list-style-type: none"> <li>• Inaugural meeting</li> <li>• Install Advisory Groups</li> <li>• Quality Management Frame</li> </ul>	1.1 Inaugural meeting	<p>✓ The Inaugural meeting took place from 20-21 January 2011 at the National Botanic Garden of Belgium. In total 30 people attended representing all Partners of the project. Communicating channels within management structure of the project were discussed to ensure clear communication between Partners. A draft dissemination plan for how Partners could disseminate information about the INQUIRE project was presented and Partners discussed how they would contribute to this plan. The session on ethical issues promoted a great deal of discussion among partners and this was instructive for the development of the guidelines. During the second day there was a discussion about possible models Partners could use to deliver their INQUIRE courses and a session was run to discuss criteria for selecting IBSE materials for their courses. Teresa Cuartero Lausin from the European Union Commission presented an overview of Framework 7 and informed Partners about how the INQUIRE project fits within the context of EC science education policy.</p> <p>During the meeting a website brief was distributed and discussed and the level of experience Partners had in website management and social media was</p>	





			requested to determine training needs.	
		1.2 Preparation of document listing materials for in Pilot INQUIRE course	✓ A document was prepared that identified materials suitable for the INQUIRE course and included criteria to aid Partners in the selection of materials. This document formed Deliverable 2.1 and was delivered on time.	
		1.3 Advisory groups established in each country	✓ Each Partner has established an Advisory Group in their country. As there are two Partner gardens each in Germany, Portugal and Spain, they have established joint advisory groups in each country. These groups consist of head teachers, teachers, representatives of the local and national education authorities, science education researchers, science researchers and botanic garden educators and staff from other Learning Outside the Classroom (LOtC) institutions	
		1.4 Quality Assurance Manual framework	✓ During the Inaugural meeting the concept of quality management was introduced. It was explained that the objective was not to impose a uniform standard on all partners, rather to support them in improving their practice and meeting the objectives of the project. A short questionnaire was distributed to assess partners' understanding about IBSE. The intention was not to impose a QMP on the Partners. It was therefore agreed that it was too early to present a plan and that this would be developed in consultation with Partners.	





Work Package <b>2</b>	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from tasks
Months 2-5	<ul style="list-style-type: none"> <li>Shared understanding of IBSE</li> <li>Acquisition of knowledge for pilot course</li> </ul>	2.1 Partners collect national information with support from Advisory Groups (AGs)	✓ Partners collected national information about how their INQUIRE training course would meet the requirements of the national school curriculum in their country. The Advisory Groups were very helpful in supporting this process. This information was included in Deliverable D2.1 which was delivered on time.	
		2.2 Meetings with AGs	✓ Partners have held meetings, as planned (at least one per year and two if possible), with their Advisory Groups, which have proved invaluable. See Section p.99ff on Advisory Groups.	
		2.3 Meetings with other LoTC institutions	✓ Partners continued to meet with LoTC institutions beyond the end of the reporting period for this task. This was because many partners reported that it was extremely useful for supporting their recruitment drives for the second Inquire courses and Train the Trainers courses. Additionally this helped promote the INQUIRE project (See Annexe 3: Task 4.9. Run the Train the Trainer Course, List of LoTC institutions contacted)	
		2.4 First	✓ The First Consortium Meeting was held from 3-4 May 2011 at Wakehurst Place,	





		<p>Consortium Meeting</p>	<p>Royal Botanic Gardens, UK. Thirty one people attended representing all Partners of the project. The External Evaluator also attended. During the meeting, Partners were introduced to Glasscubes, an internet platform that is used in the project to ensure good communication. A presentation on “IBSE teacher training for a sustainable future” was given and a discussion held on IBSE. This discussion contributed towards building a shared understanding of IBSE which was documented in Deliverable 2.2 delivered in month 5. During the meeting, each Partner presented a poster explaining the structure of their training course, the content, the aims and outcomes and evaluation techniques. Following the poster presentations a lengthy discussion was held about the evaluation of the INQUIRE teacher training courses and how Partners would know that their courses were effective. The comments from this session are documented in the minutes of the meeting.</p> <p>During the second day of the meeting, Partners presented lesson plans they use in their gardens and may use for their INQUIRE teacher training course. Partners commented on their plans and suggested ideas for evaluation. A draft document on the ethical guidelines was presented and a discussion was held to clarify various points. It was clear that Partners held a wide range of views about their interpretation of ethical issues and that finding common ground was going to be a challenge. Two logos for INQUIRE were presented and Partners were to select their favourite and offer any comments. The wire frames for the website were also presented and feedback requested.</p>	
--	--	---------------------------	--	--



		2.5 Strategy Plan for implementation	✓ All Partners produced an implementation plan for their INQUIRE course. This included information on how Partners planned to advertise the course in their countries, what institutions (eg. School authorities) they would inform about the courses and a draft outline of the structure of their course together with a timeline. This is documented in Deliverable 2.1 which was delivered in month 5.	

Work Package <b>3</b>	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from tasks
Months 4-12	<ul style="list-style-type: none"> <li>Pilot INQUIRE course design is developed</li> </ul>	3.1. Second Consortium Meeting	✓ The Second Consortium Meeting was held from the afternoon of 26 <sup>th</sup> to lunch time on 28 <sup>th</sup> September 2011 at Schulbiologiezentrum Hannover and Rhododendron Park, Bremen. Thirty six people attended representing all Partners in the project. During the afternoon of the first day, Partners participated in several IBSE best practice sessions focusing on climate change and biodiversity. Following which there was a short presentation on lessons learnt by UAH, CSIC and NHM who had already begun their INQUIRE courses. Prior to the meeting, Partners were asked to develop a module for their INQUIRE course. They were	

			<p>then paired off to peer review each other's modules.</p> <p>On Day 2, Partners summarized the positive elements of each others' modules and highlighted elements that could be developed further. Partners reported that this was an effective method for developing their course modules. The outline for the INQUIRE project manual was presented and Partners were informed about which parts of the PIC Manual they needed to complete. This was followed by a discussion about the Quality Management Plan and how Partners would contribute to its development. A presentation about portfolios of evidence involved looking at the types of evidence Partners would collect from their teachers, including the pre-course questionnaires. Two activities were then run on assessment, one in which Partners were asked to write a reflective piece and assess how useful this tool was for developing reflective practitioners and the other on using concept maps. The final day of the consortium meeting included a presentation on the INQUIRE website and a session on interview techniques as an evaluation tool.</p>	
		3.2. Develop INQUIRE course modules	<p>✓ All Partners have developed their pilot INQUIRE course modules. These were discussed during the Second Consortium Meeting and subsequently refined following peer review from Partners.</p>	
		3.3 Adapt teaching material	<p>✓ INQUIRE course materials were developed and adapted on the basis of Partners' existing materials and practice – many Partners have adapted materials from SCIENTIX, POLLEN, PLASCIGARDEN , S-Team, FIBONACCI and BGCI. Partners identified the lack of IBSE outside the classroom lessons and for that reason they</p>	<p>A positive deviation enhancing the</p>



			<p>developed new educational resources. The resources are now available on the INQUIRE website and disseminated through SCIENTIX. They have also been compiled into a booklet complementing the INQUIRE Course manual. Each Partner developed at least one lesson plan in their own language, which has been translated in English. Over 20 new IBSE lessons have been developed as part of the INQUIRE project. Several lesson plans were submitted from participants on the course demonstrating their understanding of IBSE and their ability to develop IBSE teaching materials.</p> <p>Examples include</p> <ul style="list-style-type: none"> <li>• -“Why do flowers have different colours?” (Flowers and pollinators – Flower-Ecology) developed by LFU</li> <li>• “Gone with the water” adapted from a participant of the Pilot course in UAH</li> <li>• “By land, sea and air” UAH</li> <li>• “Do we know what we eat?” – UAH</li> <li>• ‘Sustainable Chocolate’ -KEW</li> <li>• ‘From Bromeliad to pollinator’ - Bremen</li> </ul> <p>Courses and teaching materials have been further developed and refined over the second period with the second inquire course being run in all 11 countries and in all delivery partner organisations over the period September 2012- Summer 2013. In the partner meeting in Lisbon (October 2012), partners reported on changes and improvements to their courses, developed following feedback from course 1 participants, internal review meetings and advisory</p>	<p>resources available for IBSE users in the LOTC context</p>
--	--	--	--	---





			<p>sessions from their national advisory boards (NAB). Partners were paired to discuss and reflect on changes to their course design and content, and, where appropriate to suggest further amendments or adaptations. These changes are noted in the final Inquire Course manual (Deliverable 5.1) and reflected in the Final QM Plan D7.2</p>	
		3.4 Pilot INQUIRE course manual	<p>✓ Each Partner prepared a PIC course manual in their language. The manual includes the theoretical understanding for teaching IBSE courses, the Partners' INQUIRE course modules and evaluation and data collection techniques. The content outline of the PIC manual was prepared by the Management Board who wrote the introduction text and parts one and three – 'IBSE explained' and 'Reflective practice: evaluation and data collection techniques'. Partners wrote part 2 – 'Guide to the INQUIRE course' and translated the sections written by the Management Board into their own language. A design template and guide were prepared and all Partners have uploaded their PIC Manual to the INQUIRE website. The PIC manuals are also included in Deliverable 3.2 which was delivered in Month 8.</p>	
		3.5 Train the Trainers seminar	<p>✓ A Train the Trainers course was held in Obergurgl, Austria from 23<sup>rd</sup> to 25<sup>th</sup> June 2011. 39 people attended representing all Partners in the project. On the first day, there was a presentation about the Quality Management Plan and a list of ideas and tools were provided on how to evaluate the outcomes of an IBSE lesson. An IBSE lesson was demonstrated during which Partners were asked to try out their observation techniques. Partners decided on the focus of their observations and designed their own observation sheets. Following which, their</p>	





			<p>experiences were discussed. At the end of the morning, there was a talk on Biodiversity change in Oberurgl linked to climate change.</p> <p>On day two, a market stall was held during the morning. Partners had been asked to bring the educational resources they will be using in their INQUIRE courses to share with other Partners. A wide variety of resources were on display, including books, lesson plans, plant materials and artefacts. An activity session followed on how to develop good IBSE questioning. Many Partners have subsequently used this activity in their INQUIRE courses. Prior to the course, Partners were asked to prepare an IBSE lesson plan and then peer-review another Partner’s lesson plan. Partners found this task valuable learning from the review process and from the feedback on their own lessons.</p> <p>A poster session on INQUIRE course outcomes and assessment methods was held on the final morning of the course. Partners each gave a five minute presentation and answered questions. The final session involved an overview of different assessment techniques that Partners could use to evaluate the courses/lessons.</p>	
		<p>3.6 Development of Train the Trainer Course Manual</p>	<p>✓ An outline for the Train the Trainer Course Manual has been prepared and a number of sections have been written.</p> <p>The publication of this manual has been postponed as it was felt that it made more sense to publish the manual following the completion of the PIC courses in order to include materials that have been tried and tested.</p> <p>The <u>Deliverable 4.2</u> 'Train the Trainer Course (TTC) Manual', was delivered on 24<sup>th</sup> of December 2012 – Month 25.</p> <p>Justification for the deferment was provided in 1<sup>st</sup> reporting period in Task 4.10 already. First email communication: 19.12.2011 ; Second email: 13.01.2012; Third</p>	



			email: 24.02.2012; In this email I sent the outline for the TTC manual; Final 16.11.2012; Emails attached in ANNEX 1: First Interims Report, ADDS ON 2 <sup>nd</sup> Version	
		3.7 Strategy Plan for Course Promotion	<p>✓ All Partners prepared a Strategy Plan for promoting their INQUIRE courses. This included which areas the Partners intended to recruit teachers and educators from (eg. Local, regional, national), how they planned to recruit them (eg. Contacting schools directly, websites, media, botanic gardens, etc),</p> <p>The INQUIRE Strategy Plan was submitted as a Deliverable in month 8.</p>	
		3.8 Criteria for Teacher recognition scheme	<p>✓ All Partners decided on their selection criteria for the teacher recognition scheme which will support two participants from each course to participate in the INQUIRE conference in July 2013. Each partner presented their criteria at the 3<sup>rd</sup> Partners meeting in Spain. They were subsequently collated and submitted as Deliverable 4.3 in month 17.</p>	
		3.9 Advisory Group meetings	<p>✓ All Partners have held at least one Advisory Group meeting annually and several held two annually. The NAB members have supported Partners in advising on recruitment strategies, reviewing content and structures of courses, recommending dissemination routes for Inquire course promotion and outcomes. Across the 11 advisory groups set up for the 11 countries participating, 49 Advisory Group (NAB) meetings have been held in the second period and 122 expert NAB representatives have advised at these meetings. See section on Advisory Groups p. 99ff.</p>	



		3.10 Publish document with links to selected materials for inclusion in PIC	✓ Each Partner identified the resources they intended to use in their Pilot INQUIRE course, eg. Books, educational activities, websites, videos, etc. Partners provided titles and summaries of each resource together with information on how to find them. These resources were collated and submitted as Deliverable 3.2 in month 8.	
--	--	---	---	--

Work Package <b>4</b>	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from tasks
Months 10-36	<ul style="list-style-type: none"> <li>• Pilot INQUIRE course is implemented in 11 countries</li> <li>• Formative assessment of Course leads to final design</li> <li>• Reflective</li> </ul>	4.1 Third Consortium Meeting	<p>✓ The Third Consortium Meeting was held from the afternoon of 29<sup>th</sup> February to lunch time on 2<sup>nd</sup> March 2012 at Royal Botanic Garden Juan Carlos I, Alcála and Royal Botanic Garden, Madrid. 34 people attended representing all Partners in the project. The first afternoon kicked off with an IBSE activity developed by UAH followed by a poster session on the update of Partners' INQUIRE courses (number of participants, three things that worked well, three challenges and strategies for overcoming them). Partners were invited to raise issues about the INQUIRE project for discussion. Topics discussed included recruitment of teachers, communities of practice, reflective practice; INQUIRE newsletter and dissemination, course standards.</p> <p>On day two, there was a presentation about the requirements of the interim report for the EU with discussion about the information required from each</p>	





	<p>practice of practitioners supports development of teachers</p>		<p>partner. This was followed by an IBSE activity run by CSIC focusing on carbon dioxide and its link to climate change. Partners were asked for their feedback to develop the experiment. The remains of the morning focused on Partners practicing and analyzing interviews. Partners used semi-structured interviews to discuss what they thought went well in their courses and what they would improve. They then worked in pairs to analyse a transcribed interview, identifying categories and looking for themes and evidence. During the afternoon, Partners looked at how they could plan and structure their portfolios of evidence.</p> <p>On the final morning of the meeting, web clinics were held for each language area of the INQUIRE website. This was to ensure Partners knew how to update news, discussions, resources and images and to discuss how Partners sharing the same language can coordinate responsibilities. In the final session, Partners presented their criteria for selecting teachers for the teacher recognition scheme.</p>	
		<p>4.2. Run pilot INQUIRE courses</p>	<p>✓ In the 1st reporting period, it was reported that the number of participants on PIC courses was 181 teachers and 57 educators (238 participants in total) however, when the lists of names were finally submitted it transpired that there had been more participants on the courses – the numbers are 180 teachers and 70 educators /others (totaling 250). Partners were aware that long-term training activities share the established fact that they do not address a huge target groups. Strategies have been discussed during the third Consortium meeting how to motivate more teachers to sing up</p>	





			for the second INQUIRE course. Courses have been advertised much earlier that time time. The matter was discussed in various advisory group meetings all over Europe. This resulted in an extra 16 participants attending long-term courses over and above the 560 originally envisaged in the Grant Agreement Annex 1 p.99. reaching a total number of 576 participants.	
		4.3 Summary table of PIC participants in all countries	✓ A list of PIC participants in all participating countries has been produced. This list confirms the number of teachers and LOtC educators participating in INQUIRE courses all over Europe.	
		4.4 Support practitioners development – meetings, forum for sharing, e-newsletters	<p>✓ Partners provided personal support as well updates in news and resources published on the INQUIRE website. Monthly INQUIRE e-newsletter as well as an INQUIRE facebook page and twitter account was established.</p> <p>Training in the form of workshops have been provided by members of the MB in areas such as conducting interviews, concept maps, diaries as a reflective tool, analysing interview data, portfolios of evidence and use of the INQUIRE website..All second Inquire courses contained elements on reflective practice and action research, so that teachers and educator participants on the courses felt supported in their development of this aspect. Partners also set up a number of mechanisms to further support this aspect. Examples include:</p> <ul style="list-style-type: none"> <li>• LFU ran five INQUIRE Cafés, where teachers and educators could drop in for</li> </ul>	





			<p>discussion, reflection and Q&amp;A sessions (5.12.12/6.12.12/19.2.13/24.4.13/23.5.13)</p> <ul style="list-style-type: none"> <li>• Kew - participants were set assignments to complete between course contact days. The participants completed their assignments (usually a critical reflection piece) and submitted them for feedback both individually and in group reflective sessions.</li> <li>• Coimbra held 2 INQUIRE Fora to support discussion and promote digital media e.g. newsletters ( 20 / 21<sup>st</sup> November 2012 and next 4<sup>th</sup> / 5<sup>th</sup> October 2013.)</li> <li>• SBZH Inquire website was also used <a href="http://www.schulbiologiezentrum.info">www.schulbiologiezentrum.info</a> to maintain regular contact with the course participants</li> <li>• MSU and BGHRG held round table discussions regularly</li> <li>• KCL offered personal email and Skype sessions as well as partner visits</li> <li>• BGHRG set up an internet blog</li> </ul> <p>The management board continued to support training for partners in this area so they could cascade their learning to course participants. Partners were also encouraged to ask for further support, as appropriate, during partner calls.</p> <p>Each member of the management board phoned 2 partners during the ‘non face to face contact’ period between the end of the partner meeting in Lisbon and the Final Inquire conference in July 2013.</p> <p>The e-newsletters were provided on a monthly basis from Month 14 onwards, and all partners reported that they promoted and valued the resource. Based on data compiled, the Italian, English and Portuguese registered users are more</p>	
--	--	--	---	--





			highly subscribed to newsletters and the most successful language newsletters have been the Russian, Portuguese and Bulgarian, which achieved the highest rates of engagement with the users.	
		4.5 Formative and summative assessment	<p>✓ The management board, supported by KCL, developed a pre- and post-course questionnaire for partners. INQUIRE course participants completed these formative assessments in paper and online formats (using QUESTBACK).</p> <p>During the 2nd Partner's meeting in Bremen, the team led a workshop on the use of diaries as a reflection tool.</p> <p>During the 3rd Partner meeting in Spain each partner was interviewed by the KCL team as a further formative assessment strategy focusing on how partners were using assessments within their own practices. The team also led workshops with partners to prepare them for the development of their portfolios of evidence and techniques for the analysis of interview data.</p> <p>The KCL team has worked closely with the external evaluator to devise and administer questionnaires and an interview strategy for the external evaluation.</p> <p>In the second half of the project, partners continued to develop and conduct formative and summative assessments. All partners used pre-and post questionnaires for their 2<sup>nd</sup> course participants, developed according to the QM Plan submitted earlier. All partners also produced partner Portfolios of Evidence</p>	





		<p>that were submitted to KCL in September 2012 for analysis for the final QM Report.</p> <p>A further set of either portfolios or case studies were submitted in September 2013 to provide further assessment data. During their second courses, many partners employed several of the other formative and summative assessment techniques that they had been trained in. The following examples are other techniques that were used:</p> <ul style="list-style-type: none"><li>• LFU: Semi-structured Interviews with participants; - PRE- and POST-Concept Maps (Novak 1990);- Analysis of social network.</li><li>• UAH: questionnaires for students; discussions; direct observation of activities in class and comments from teachers and students.</li><li>• FCTUC: 2 published papers specifically on Coimbra INQUIRE course assessments, reflections and evaluation. (ICERI2013: <a href="http://iated.org/iceri2013">http://iated.org/iceri2013</a>).</li><li>• NBGB and KEW: Interviews; evaluation and oral / group feedback of assignments. Assignment observation sheets reflecting on teacher / educator learning after self-led activity; photographs.</li><li>• SBZH: Filming; Concept maps</li></ul>	
--	--	--	--



			<ul style="list-style-type: none"> <li>• MSU; selected semi-structured interviews; Evaluation of lessons with schoolchildren; Summary based on protocols; videos.</li> <li>• BGHRG: An evaluation based on the Concerns Based Adoption Model (CBAM) ( includes a Pre and Post questionnaire, one interview and one course observation).</li> <li>• UniHB: three master theses about the assessment of the courses</li> <li>• MTSN: run world café's additional PhD Student evaluating the course</li> </ul>	
		4.6 Develop final INQUIRE course design	<p>✓ Following the end of the Pilot INQUIRE courses in 2012 all Partners refined and finalized the INQUIRE course design. During the 4<sup>th</sup> Partners' meeting in Portugal (3-5 October, 2012) each Partner presented the changes they introduced to their INQUIRE courses.</p>	
		4.7 Run 2 <sup>nd</sup> INQUIRE course	<p>✓ Between 12<sup>th</sup> September, 2012 and the end of October, 2013, the INQUIRE partners across 11 countries ran 15 INQUIRE courses. These courses were attended by, a total of 326 participants from various professional backgrounds. Feedback from participants was collated and provided in Deliverable D4.5.</p>	
		4.8 Produce a list of participants	<p>✓ All Partners have submitted the list of their INQUIRE course participants. The lists have been compiled into one document by BGCI. (See participant numbers above). Tables of all participants, their roles and locations can be found in the</p>	



			overall 1-36 month report. See ANNEX 3	
		4.9 Run a train the trainers course	✓ All partners ran a ‘Train the Trainers’ course; UniHB additionally ran a course for educators; FCTUC ran 2 courses. See separate section on ‘Train the Trainers’ in Snowballing, Section p.89 and in Annexe 4	
		4.10 Publish Train the trainers course manual	✓ The manual (D4.2) was completed and submitted to the EU on 24 <sup>th</sup> of December 2012 (month 25) with contributions from BGCI Education staff amongst other Partners. The manual is now published on the INQUIRE website and has been also disseminated through SCIENTIX. <a href="http://www.inquirebotany.org/en/resources/train-the-trainer-manual-234.html">http://www.inquirebotany.org/en/resources/train-the-trainer-manual-234.html</a>	
		4.11 Publish teacher recognition scheme on INQUIRE website	✓ All Partners have published their selection criteria for the teacher recognition scheme on the INQUIRE website.	
		4.12 Fourth Consortium meeting	✓ The fourth partner meeting was held Portugal from 3 <sup>rd</sup> to 5 <sup>th</sup> October 2012. 39 partner personnel attended. The Key activities in the meeting included: <ul style="list-style-type: none"> <li>• Each partner reporting on their successes from their PIC course</li> <li>• Each partner reflecting on, and justifying any changes to content and structure for their 2<sup>nd</sup> Inquire course.</li> <li>• Partner demonstrations of different evaluation and assessment techniques e.g.: LFU-Concept maps, SBZH – Filming, MTSN - World Café</li> </ul>	





			<ul style="list-style-type: none"> <li>• Presentations on 4 TT courses (structure / content) by KEW, FCTUC, BGRHB-SBZH and LFU</li> </ul> <p>In the management Board meeting the following items were discussed;</p> <ul style="list-style-type: none"> <li>• Final editing of TT course manual</li> <li>• Development of Final IC manual</li> <li>• External Evaluation report (with Alan Morgan)</li> <li>• Supporting partners to sustain a community of practice by a) e-fora on a number of topics b) pairs moderating at conferences c) conference calls</li> <li>• How to support partners in non face to face contact time (Oct.12-July13); it was decided that the MB members would phone partners to check on progress, advise on any issues etc.</li> <li>• Dissemination developments including a) potential conferences / events etc. and b) the Video on Inquire</li> <li>• Ethical guidelines</li> <li>• Portfolio submissions</li> </ul>	
--	--	--	--	--





Work Package 5	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from tasks
Months 32-36	<ul style="list-style-type: none"> <li>Round up work</li> <li>Look forward</li> </ul>	5.1 Present Quality Management Report	<p>✓ The Quality Management Report has been completed by KCL, with review from the MB, and has been submitted as Deliverable D7.2. It was uploaded onto the INQUIRE Website and onto SCIENTIX.</p>	
		5.2. Finalize steps to implement INQUIRE course on a local level	<p>✓ At the Partner meeting in Trento (October 2013), all partners submitted a report about the sustainability of the Inquire courses in their country and 3 partners gave presentations about the future of Inquire at their institution / in their country – MSU, UAH and KEW. Future plans included:</p> <ul style="list-style-type: none"> <li>LFU: From October 2014 there will be a training course based on the 2nd INQUIRE course</li> <li>Kew: An Inquire course will be run 2014-5 and annually after that; Edinburgh BG will run a course in 2014; 3 wetland and wildlife centres (LOtC sites across UK) are considering running courses; IBSE integrated into International Diploma in BG Education course.</li> <li>UBG and FCTUC; planning to run a follow-up 60 hr Inquire course next year</li> <li>NBGB :INQUIRE will be run in 2013-2014 at the Botanic Garden Meise</li> <li>SBZH: A 3 day IBSE training course has been integrated into the annual training offer</li> </ul>	



			<ul style="list-style-type: none"> <li>• MSU: An Inquire course will be run in 2014</li> <li>• BGRHG: IBSE modules in regular activities; the possibility of a short (1 day) course or a regular 'round table' discussion group set up</li> <li>• UniHB and CSIC :The INQUIRE course is now included in their regular teacher education programme at Uni Bremen and CSIC</li> <li>• MTSN – will run a new course in 2014, and possibly one will be run in Bergamo; During the TTC at least 5 participants committed to run an INQUIRE course in different Italian region during 2014 - plans are well ahead in at least 2 of them.</li> <li>• NHM: are hoping to run a course in 2014</li> </ul>	
		5.3 Optional Final Project Consortium Meeting	<p>✓ At the fifth and final Partner Meeting was held from 29.09.- 01.10.2013 in Trento, Italy. 27 partner personnel attended. This provided an opportunity to reflect on final outcomes of the 2nd Inquire courses; share and celebrate latest Inquire experiences; look forward to future activities and reflect on the sustainability of the Inquire project outcomes. The meeting was held in Trento to reflect on activities offered in the new MUSE science museum and glasshouse that opened recently and to support educator training for Science education staff at MUSE and other Italian Science Centres (workshops held on 2nd October 2013 with tutoring from partners from LFU, BGCI, KEW, MUSE, UAH and SBZH.)</p> <p>Activities at the meeting included:</p> <ul style="list-style-type: none"> <li>• Presentations on 'Your best IBSE activity'</li> <li>• A diamond ranking activity exploring the qualities of a good education officer</li> <li>• A brainstorm session on future projects / joint developments</li> </ul>	



			<ul style="list-style-type: none"> <li>• Exploring further dissemination channels for Inquire</li> <li>• Discussions / presentations on sustainability of Inquire through partner countries and the wider EU community</li> </ul>	
		5.4 Work on publications with teachers/educators	<p>✓ Partners encouraged and supported course participants to publish their activities, experiences and findings over the 2nd period. Publications included blogs and news on line on the Inquire and on institutional websites, articles and papers in Journals such as 'Roots', presentations and proceedings in conferences and workshops, and sections within the IC manual, TtT manual and the IBSE activity booklet; examples include:</p> <ul style="list-style-type: none"> <li>• UAH published news with 2 teachers:  <a href="http://www.youtube.com/watch?v=9XXx3QXJcLo">http://www.youtube.com/watch?v=9XXx3QXJcLo</a>  <a href="http://www.inquirebotany.org/es/discussions/what-do-students-think-about-ibse-670.html">http://www.inquirebotany.org/es/discussions/what-do-students-think-about-ibse-670.html</a></li> <li>• and UAH participant teachers and students wrote about their experiences with IBSE activities in their blogs:  <a href="http://mutantesgurke.blogspot.com.es/">http://mutantesgurke.blogspot.com.es/</a>  <a href="https://fitoatocha.wikispaces.com/">https://fitoatocha.wikispaces.com/</a></li> <li>• MTSN - the best IBSED activities produced by the course participants have been collated and are available on the project e-forum <a href="http://inquire.italiaforum.net">http://inquire.italiaforum.net</a> (only in Italian) A selection of these might be reformatted and published</li> </ul>	





			electronically next year (See full Publication List in section p 71ff)	
		5.5 Develop future dissemination and activity plan	<p>✓ All partners completed an assignment for the Trento Partner meeting in October 2012, on how the Inquire Project principles, outcomes, activities and training could be sustained going forward in their country. Most partners had already had agreement from their institutional management board that they would continue to run Inquire courses in a format similar to that which was developed during the project period (see 5.2 and 5.3 above). Several other mechanisms are being pursued and adopted by partners including the following arrangements:</p> <ul style="list-style-type: none"> <li>✓ Integrating IBSE course work into student teacher training courses (FCTUC, UniHB, LFU, UL)</li> <li>✓ Student Teacher and Teacher (CPD) short workshops / training sessions (LFU, UAH, CISC, SBZH, MSU, KEW, NHM (+other Norwegian LOTC sites))</li> <li>✓ Presentations on IBSE/ Round table discussions to educational authorities to encourage integration into more curricular areas (NBGB, MSU, UBG and UL)</li> <li>✓ Integrating IBSE into institutional education programmes (all partners)</li> <li>✓ Working with local science institutes and Botanic garden / LOTC site network to broaden IBSE programme delivery (KEW, MSU, UAH, CISC, MUSE, Bordeaux, LFU)</li> <li>✓ Supporting Master and PhD Theses on IBSE (UniHB, LFU)</li> <li>✓ Providing web-based challenges / resources for use by other partners / schools (SBZH, Bordeaux)</li> <li>✓ Disseminating IBSE articles / resources via regional / national Science</li> </ul>	





			<p>Education and research websites and events (BGCI, NHM, KCL)</p> <p>✓ Integrating IBSE modules into current CPD or University training programmes (SBZH, KEW, UniHB, LFU, MSU, CISC)</p>	
		5.6 The final INQUIRE Course Manual is produced and published	<p>✓ Based on feedback from the Pilot INQUIRE Course participants and comments from Partners and the external evaluator, the MB reviewed the Pilot INQUIRE Course Manual. The changes were embedded in the final INQUIRE Course Manual. 14 manuals have been produced in 10 languages. The manuals all share the same content in Parts 1 and 2 and most Part 3s focused on the particular structure of the INQUIRE courses for each individual (LFU did not include this). All the final INQUIRE Course manuals (in 10 languages) were compiled into the Deliverable D5.1 Final INQUIRE Course Manual and submitted to the EU on the 30<sup>th</sup> of November, 2013. The manuals have also been published on the INQUIRE website. See also 3.3 above.</p> <p>Following discussions on the Inquire Manual structure, all participants agreed that they would additionally like a separate booklet highlighting and explaining best LOTC IBSE activities. Each partner submitted at least one new lesson plan / activity and these have been edited, uploaded onto the Inquire website and onto SCIENTIX. A complete booklet will be produced and published in its entirety</p>	



Work Package <b>6</b>	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from tasks
Months 1-36	<ul style="list-style-type: none"> <li>Reach a high public awareness about project goals and activities</li> </ul>	6.1. Publish an E-newsletter	<p>✓ An automatic electronic newsletter in each language was published every month with updates in news and discussion from the INQUIRE website. This was initiated in Month 13 and began in Month 14. One newsletter had been distributed in Month 9 however, it was felt that the most effective way of sending out the newsletter would be via the website. Partners are required to create one piece of news and one discussion each month and to select at least two other pieces of news and/or discussions to translate into their own languages. Ten language templates were created and each language area on the website was set up to enable newsletter signups to be directed to MailChimp, through which the newsletters are distributed.</p>	.
		6.2. Production and distribution of INQUIRE leaflet in 10 languages	<p>✓ The text for an INQUIRE information leaflet was written and translated into the 10 languages of the project. Images were collected from Partners and the leaflet was designed and printed. It was submitted as Deliverable 6.2 in month 13. Partners are using the leaflets to distribute to teachers and LotC institutions in their own countries as well as at national and international conferences.</p>	



	6.3 Present INQUIRE to national and international meetings	Inquire Consortium Partner personnel carried out dissemination activities at a large number of conferences/events such as papers, presentations and workshops ; 56 international and 135 national . The International events included countries as far away as New Zealand and Mexico, as well as countries across the EU. See Dissemination tables in section p.123	
	6.4 Author dissemination reports	✓ Partners completed a dissemination plan at the beginning of the project documenting how they planned to promote and disseminate information about the INQUIRE project. This plan was submitted as Deliverable 6.1 in Month 4. In Month 13, Partners update this plan. Final Dissemination Summary D6.3.gives insight into all these activities.	
	6.5 Organise INQUIRE conference in 2013	<p>✓ The INQUIRE conference was held at Royal Botanic Gardens, Kew on 9-10<sup>th</sup> July, 2013, with 4 keynote talks, 60 workshops, paper and poster presentations and a networking session. Attended by 124 delegates from 13 countries, sessions stimulated discussions and reflections on IBSE. Four other EU funded projects related to Science Education and professional development were represented at the conference i.e. PATHWAY, Natural Europe, GreeNET and S-TEAM. A post congress event organised at the University of Oxford Botanic Garden was attended by 35 delegates.</p> <p>Proceedings of the conference are published on the Inquire website and will be disseminated to all participants.</p>	
	6.6 Press	✓ A detailed list of publication has been published in the Dissemination Summary	





	releases about INQUIRE project – national level	Deliverable D6.3 and Dissemination section 71ff	
	6.7 Press releases about INQUIRE project – international level	<p>✓ Two press release have been prepared.</p> <p>1. Press release about the launch of the INQUIRE project. Month 4, March, 2011            2. Press release about the launch of the INQUIRE website. Month 17, April, 2012            They have been distributed at an international level and given to partners for translation and distribution at a national level.</p> <p>The project proposal stated that two press releases would be distributed each year. During the Management Board Meeting in Month 22 BGCI reported that these two press releases about the INQUIRE project have not been successful in generating press coverage. It was therefore decided that BGCI would send out more frequent newsletters from the website and set up a Facebook and Twitter account which BGCI would manage.            See Dissemination Summary Deliverable D6.3 and Dissemination in section 71ff</p>	
	6.8 Support project	<p>✓ BGCI has fully supported the organization of the Inaugural Meeting, the 5 Partners Meetings and the Train the Trainers course and 12 Managementboard</p>	



	consortium meetings	<p>meetings. This has involved liaising with the Partners hosting the meetings about local arrangements (facilities for hosting the meeting, accommodation, restaurants, budgets) and with Partners about logistics (accommodation, food, travel, visas, preparation of work for meetings - speakers, posters, presentations, resources, etc). Host institutions - NBGB, KEW, LFU, Uni-HB, SBZH, BGRHB, CSIC, UAH, UL; FCTUC, MTSN – have very professionally organized the on-the-ground logistics and all meetings have run smoothly.</p> <p>(See Project Management section p.63ff.</p> <p>BGCI personnel are highly respected by all partner personnel and have provided, effective and very professional organization both on the ground and through the various communication channels. All logistics and all meetings have run very smoothly.</p>	
	6.9 Literature review of IBSE	<p>✓ Consortium partners used a wide range of educational research material advised by KCL and BGCI via Glasscubes to support their course delivery. In Addition a Review was done by BGCI and Published on the website (See ANNEX 1)</p>	
	6.10 Support practitioners to get in contact with each other	<p>✓ Achieved through Inquire website (accessible in 10 languages). The course area on the Inquire website is now open access. In Italy practitioners were additionally supported via e-mails (national listerver inquire2@freelist.org), newsletters, social media (facebook and twitter see Inquire Italia fb account)</p>	



		<p>6.11 Launch and update INQUIRE website</p>	<p>✓ The INQUIRE website was launched in month 10 and is in 10 languages – Bulgarian, Dutch, English, French, German, Italian, Norwegian, Portuguese, Russian and Spanish. The website is aimed at teachers and educators and contains news and discussions, resources. All appropriate deliverables and publishable reports have been uploaded onto the website. Each Partner was responsible for uploading their language information and images to the website with support from BGCI. Training in the content management system of the website has been carried out individually with Partners via Skype and face-to-face. BGCI has trained CSIC, UAH, UL, FCTUC, BORD, UBG, MTSN via Skype and KEW, NHM and MSU face-to-face.</p>	
		<p>6.12 Results on Scientix</p>	<p>✓ Achieved. More than 30 items have been uploaded onto Scientix.</p>	
		<p>6.13 Support project management in preparing deliverables and documents for publication</p>	<p>✓ BGCI and the management board supported the preparation of all deliverables and publishable materials throughout the whole project. Support has been given by BGCI to LFU for preparing all deliverables. This has involved developing templates, requesting information from Partners and following receipt, collating and formatting the information into a document.</p>	





Work Package <b>7</b>	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from the Task?
Months 1-36	<ul style="list-style-type: none"> <li>Achieve a high degree of course quality with all participants, addressing formal requirements in an effective, timely and responsible manner.</li> </ul>	7.1. Development of a Quality Management Plan (QMP)	<p>✓ Deliverable D7.1. was delivered as planned Month 12</p>	
		7.2. Management and implementation of QMP	<p>✓ All participants completed and delivered their Portfolios of Evidence on their PIC courses to KCL for analysis within the final QM report. Partners additionally contributed findings and reflections on their PIC courses and changes to future course provision during the Lisbon Partner meeting in October 2012 (see point 4.12 above).</p> <p>The partners also contributed 2<sup>nd</sup> portfolios of evidence and / or case studies reflecting the 2<sup>nd</sup> INQUIRE courses run between October 2012 and October 2013. Interviews were held with partners by KCL QM staff at the 3<sup>rd</sup> Meeting in Spain (February-March 2012) and the final 5<sup>th</sup> meeting in Trento (October 2013) to</p>	





			<p>discuss progress across the 2<sup>nd</sup> Inquire project period.</p> <p>The Management Board additionally instigated a series of phone calls to partners for progress / feedback to ensure that QM was maintained throughout the non-face to face period (October 2012 –July 2013). KCL continued to support through Skype and emails to individuals. BGCI kept up a constant delivery of timely reminders on Glasscubes for tasks, feedback, data and reports to ensure that the project was on track.</p>	
		7.3. Support partners to fulfil tasks	<p>✓ See 7.2 and 7.4 above Section p. 63ff</p>	
		7.4 Updates of QMP	<p>✓ The QM team and Partners were in constant contact across the whole project duration and the QM plan was developed as the project progressed (see 7.2 above)</p>	
		7.5 Partners report to Quality Management Team	<p>✓ Achieved. See 7.2 and 7.4 above and section Quality Management p.63ff</p>	



Work Package 8	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from the Task?
Months 1-36	<ul style="list-style-type: none"> <li>Ensure optimal use of resources available for the project</li> </ul>	8.1 First Management Board Meeting	✓ Achieved. Completed during the 1 <sup>st</sup> reporting period	
	<ul style="list-style-type: none"> <li>Ensure timely execution of all project relevant activities</li> <li>Ensure smooth and effective communication and integration between all partners</li> </ul>	8.2 Organisation of consortium meetings	✓ During the whole project duration 5 consortium partner meetings have been organised. Additionally the final conference in Kew, UK 9 <sup>th</sup> -10 <sup>th</sup> of July 2013, offered partners the opportunity to discuss and reflect on progress. Notification of meetings from BGCI has been given to all partners in a timely fashion and lists of tasks, activities and reports required for the meetings have been planned and requested through Glasscubes in an efficient and effective manner. All meetings have run smoothly and on time and no substantive issues have emerged. (See section p.95 on Consortium meetings).	
		8.3 Web based exchange platform	✓ The Project used Glasscubes ( <a href="http://www.glasscubes.com">www.glasscubes.com</a> ). Where appropriate news from the project or Management Board has additionally been published on the Inquire website. INQUIRE partners will use a free version of glasscubes (only limited data volume is provided) to stay in contact after the project has finished. All Data stored on glasscube will be transferred to a website hosted by the coordinator (LFU) and will be available for partners within the following years.	

	<ul style="list-style-type: none"> <li>Internal assessment of the work done during the course of the project</li> </ul>	8.4 Conflict management	<p>✓ Through out the whole project onl one minor conflict arose. This was sovelid in the first reporting period. No further conflicts had to be managed</p>	
		8.5 Internal and External Reporting	<p>✓ Achieved. See section p.63 ff on Project Management</p>	
		8.6 Financial administration	<p>✓ Achieved. See section p.63ff on Project Management</p>	
		8.7 Project Coordination	<p>✓ All Work Package deliverables have been completed in a timely manner. Through Consortium Meetings and Glasscubes, Partners have been kept fully informed of what is required of them in providing information for deliverables. All Partners have submitted their contributions on time for the Deliverables to be prepared and submitted to the EU on the months agreed in the grant agreement. Consortium meetings and Management Board meetings have been well organized (agendas, venues, logistics, accommodation, etc) and minutes have been made available in a timely fashion following meetings.</p> <p>Discussions about the quality of WP outcomes have been discussed in Management Board meetings with WP leaders with the coordinator also keeping a close eye on the quality of Deliverables.</p>	

			See Project Management section p. 63ff .	
		8.8 support for Management Board	<p>✓ The Management Board consists of Partners from LFU, BGCI, KEW, MTSN and KCL. 12 Management Board meetings have been held (5 prior to or after the Partner Consortium Meetings, prior to Inaugural Meeting, the Train the Trainers Course, after the Final Conference and 4 in between meetings). A separate area on Glasscubes was used for communication between Management Board members to discuss any issues arising in the project and deliverables.</p> <p>The WP leaders and co-ordinator supported the MB for meetings, deliverables, reports and any QM issues. See section p. 63ff on Project Management.</p>	
		8.9 External evaluation report	<p>✓ LFU and the Project Management Board supported the External Evaluator as needed. The External Evaluation Report was handed in on time. Deliverable D8.3</p>	

Work Package	Objectives (as stated in Annex 1)	Tasks	Report on progress	Deviation/s from the task
<b>9</b>				
Months 1-36	<ul style="list-style-type: none"> <li>Meet ethical concerns</li> </ul>	9.1 Present dimensions of	<p>✓ At the Inaugural meeting in Meise UniHB presented various dimensions of ethical issues and presented a draft version of guidelines and discussed this draft with the consortium.</p>	



	<p>addressed in Ethical Review Report date 16.09.2010</p>	<p>ethical issues for INQUIRE project</p>		
		<p>9.2 Comments on ethical issues during meetings</p>	<p>✓ The ethical issues had been addressed in the first three meetings and no further issues needed to be raised during the following partner meetings.</p>	
		<p>9.3 Develop guidelines on ethical issues in relation to plants</p>	<p>✓ UniHB (in cooperation with the Partner Kew and the MB) developed guidelines regarding ethical issues in relation to the INQUIRE project. These guidelines were considered for the development of INQUIRE materials and the INQUIRE courses</p> <p>Draft guidelines were sent to the Partners and they were asked for comments and further development. The ethical guidelines appropriate for plants were provided from KEW and are in line with EU and global conservation legislation regarding plant materials i.e. CITES, The Convention on Biological Diversity (CBD) and the Global Strategy for Plant Conservation (GSPC). These were adopted by all partners. See ANNEXE 2 Ethical Guidelines.</p>	





	9.4 Develop guidelines on ethical issues in relation to child protection, safety and data protection	✓ See deliverable D9.1 submitted Nov. 30th, 2011. The Final INQUIRE Ethical Guidelines can be found ANNEXE 2	
	9.5 Partners recover permissions of parents	✓ Achieved as appropriate for each country.	
	9.6 Partners recover permissions of school authorities	✓ Achieved as appropriate for each country.	





		9.7 Partners recover permissions of school head teachers	✓ Achieved as appropriate for each country.	
		9.8 Progress of compliance with the requirements will be described in the periodic and final report	✓ All partner reported that they were compliant with their ethical and health and safety guidelines within their national context. See INQUIRE Ethical Guideline ANNEXE 2	





### 2.3.3. Statement on actual and planned person month per work package

The table below shows the allocated person months (white column) per Partner per Work Package (WP) and the person months actually spent (green column) on implementing the project during the whole project duration (month 1-36). There were some disparities in the planned person months per WP and the actual person months spent. Most partners spent more PM on the project than they will finally get reimbursed based on the ambitious goals they set themselves.

Table 3.: Actual and planned person months for the total period (Month 1-36+2months for MB)  
Actual months are the months you actually spent for each WP during the whole period of the project (green column).  
Planned months regard the person months you were supposed to spend for each WP based on the project proposal (white column)

	WP 1	WP1 a	WP 2	WP2a	WP 3	WP3a	WP 4	WP4a	WP 5	WP5 a	WP 6	WP6 a	WP 7	WP7 a	WP 8	WP8 a	WP 9	WP9 a
LFU	4	2,1	3	1,7	2	2,6	8	12,8	3	3	2	5,8	2	2,6	13,5	13,9	0	0,1
BGCI	3	3	2	2,2	2	2,1	2	2,8	2	1,8	10	15,8	1	0,9	8	10,3	0	0,2
KCL	3	1	2	1	2	2	2	4	1	2,5	1	2,5	11,5	13	1	2,9	0	0,5
MUSE	3	0	2	0,15	2	6,01	8	14,91	3	1,73	1	6,68	2	1,14	1	1,81	0	0
KEW	2	2,21	2	3,09	2	4,03	8	8,73	3	1,74	1	1,71	2	1,98	1	1,37	0	0,04
CISC	4	3,73	4	4,09	4	4,11	15	15	5	5,08	2	2	2,5	2,5	0,5	0,5	0	0
UniHB	3	1,3	2	6,77	3	2,9	4	1,75	3	0,9	1	2,56	5	2,99	1	1,95	1	1,74
UBG	2,5	1,2	2	1,1	2	3,6	8	11,4	3	1,6	1	0,9	2	1	0,5	0,5	0	0,04
NBGB	2	0,5	2	0,5	2	2,5	8	14,5	3	4	1	4	2	1	0,5	1,5	0	1
SBZH	2	1,99	2	2,06	2	2,41	8	10,75	3	3,24	1	1,34	2	2,02	0,5	0,52	0	0,05
BORDEAUX	2	1,99	2	2,07	2	3,11	8	9,44	3	2,41	1	3,36	2	1,1	0,5	4,6	0	0,05
FCTUC	2	2	2	2,1	2	2,2	8	9,6	3	3	1	1,6	2	2,3	0,5	1	0	
MSU	2	2	2	2	2	2	8	10	3	2,2	1	0,7	2	1,1	0,5	0,5	0	0
NHM	2	0,7	2	1,3	2	4,5	8	7	3	3,1	1	2,4	2	0,8	0,5	0,8	0	0
BGRHB	2	2,14	2	2,08	2	2,76	8	7,95	3	2,33	1	1,07	2	2,01	0,5	0,76	0	0,04
UAH	4	2,57	4	3,41	4	4,21	14	16,04	5	5,03	2	2,59	2,5	2,61	0,5	0,49	0	
UL	2	2	2	2	2	2	8	8,02	3	3,03	1	1	2	1,99	0,5	0,51	0	0
<b>Total</b>	<b>44,5</b>	<b>29,4</b>	<b>39</b>	<b>36,6</b>	<b>39</b>	<b>51,0</b>	<b>133</b>	<b>160,7</b>	<b>52</b>	<b>44,2</b>	<b>29</b>	<b>53,5</b>	<b>46,5</b>	<b>28,0</b>	<b>31</b>	<b>41,0</b>	<b>1</b>	<b>3,3</b>



BGRHB	2	2,14	2	2,08	2	2,76	8	7,95	3	2,33	1	1,07	2	2,01	0,5	0,76	0	0,04
UAH	4	2,57	4	3,41	4	4,21	14	16,04	5	5,03	2	2,59	2,5	2,61	0,5	0,49	0	
UL	2	2	2	2	2	2	8	8,02	3	3,03	1	1	2	1,99	0,5	0,51	0	0
<b>Total</b>	<b>44,5</b>	<b>30,4</b>	<b>39</b>	<b>37,6</b>	<b>39</b>	<b>53,0</b>	<b>133</b>	<b>164,7</b>	<b>52</b>	<b>46,7</b>	<b>29</b>	<b>56,0</b>	<b>46,5</b>	<b>41,0</b>	<b>31</b>	<b>43,9</b>	<b>1</b>	<b>3,8</b>

Budget allocation for personnel costst has been adequate for most partners, however some exceeded their budget e.g. KEW, MTSN , etc. – in particular due to high salary costs of personnel. Partners who exceeded allocated budgets for personell costst were aware that no extra EU funding would be provided and donated time / funds from their own institutional budgets to cover any extra spend. All tasks were therefore fulfilled according to the contracts signed by each partner. There was an underestimation in the time required for administration / project management required from BGCI and LFU however LFU were able to re-allocate funds as appropriate to BGCI to support the extra time / personnel cost (see. p.139ff )

## 2.4. Project management during the period

### 2.4.1. Consortium Management tasks and achievements

#### 2.4.2. Consortium Agreement

A consortium agreement was signed by all partners at the end of November 2010.

#### 2.4.3. Management Structure

The management structure has been implemented as proposed in the Grant Agreement (Annex I, p.63 ff.). The structure is based on three formal groups:

1. Management Board
2. IBSE Expert Consortium
3. Advisory Groups.

The IBSE Expert Consortium summarizes all representatives from each participating country. The IBSE Expert Consortium has met 3 times already (See List of meetings Annex 1) and will meet another two times in consortium Meetings and a third time at the Final Conference. A final meeting is planned at the very end of the project. The consortium will decide whether this meeting will be held during the course of the 4<sup>th</sup> consortium meeting (month 23 in Portugal).





In each country an Advisory Group (teachers, school board, LOTC institution, teacher training institutions, LOTC educators) was installed. For a more detailed description see p.99ff. IBSE Expert Consortium members from the UK and Germany run this Advisory Group jointly.

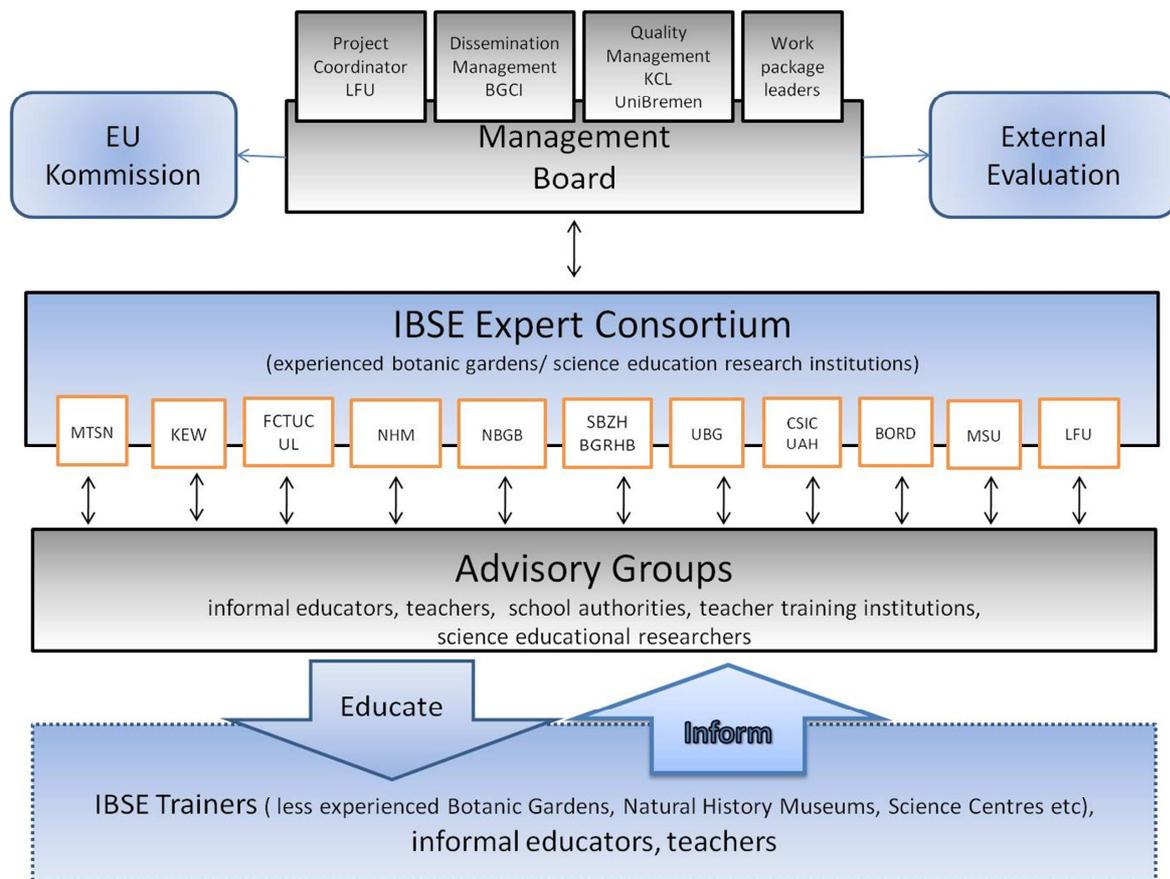


Fig.1.: INQUIRE management structure (Annex of the Consortium Agreement .p 63).

### 2.4.3.1. The Management Board

The Management Board currently comprises seven people:

- Quality Management: Justin Dillon, Elaine Regan





- Dissemination Management: Julia Willison, Asimina Vergou
- Project Coordinator: Suzanne Kapelari
- Work package leaders: Costa Bonomi, Gail Bromley

Work package leader (3 and 9): UniHB has left the Management Board January 2012  
 12 Management Board meetings have been held in course of the project and have focused on preparing the Partners' meetings but also on other issues related to the management of the project e.g. developing the Quality Management Report, evaluation, dissemination activities and final reporting schedules / content etc.

*Table 4 INQUIRE Management Board meetings (Second period)*

Title of meeting	Dates	Place	Number of people attending
1st Management meeting	20th Dec 2010	Royal Botanic Gardens, Kew, UK	4
2nd Management meeting	25 February 2011	King's College London	6
3rd Management meeting	3rd May and 5th May 2011	Wakehurst Place, UK	7
4th Management meeting	2nd September 2011	Royal Botanic Gardens, Kew, UK	6
5th Management Board meeting	25 and 28 September 2011	Hotel Munte, Bremen	9
6th Management Board meeting	25-27 January 2012	University of Innsbruck, Institute of Botany	9
7th Management Board meeting	28-29 February 2012	University of Alcala, Spain	7
8 <sup>th</sup> Management meeting	30 <sup>th</sup> – 31 <sup>st</sup> September 2012	University Innsbruck, Austria	7
9 <sup>th</sup> Management meeting	2 <sup>nd</sup> – 3 <sup>rd</sup> October 2012	University Botanic Garden, Lisbon, Portugal	7 + Alun Morgan
10 <sup>th</sup> Management meeting	20 <sup>th</sup> -21 <sup>st</sup> March 2013	University Innsbruck, Austria	7
11 <sup>th</sup> Management meeting	11 <sup>th</sup> July 2012	Royal Botanic Gardens, Kew, UK	7
12 <sup>th</sup> Management Board meeting	2 <sup>nd</sup> October 2013	Muse, Trento, Italy	6





Main tasks and achievements in the second period

Main tasks	Achievement in the Period
<i>According to General Conditions</i>	
Maintenance of the consortium agreement, if it is obligatory,	✓ The Date for Conclusion of the Consortium Agreement is 14.04.2011
The overall legal, ethical, financial and administrative management including, for each of the beneficiaries,	✓ All these tasks have been fulfilled (Two payments has been distributed on time)
, the obtaining of the certificates on the financial statements and on the methodology and costs relating to financial audits and technical reviews	A technical review and a financial audit is not required (No beneficiate will receive an EU contribution exceeding the given limit of 375 00€)
Implementation of competitive calls by the consortium for the participation of new beneficiaries, where required by Annex I of this grant agreement,	Not applicable
Any other management activities foreseen by the annexes, except coordination of research and technological development activities.	See below
<i>According to Annex I (p.64)</i>	
Project decisions in the field of project results, procedures (including selection criteria for the teacher recognition scheme), activities to be carried out and support for partners to fulfill INQUIRE quality standard agreed in the consortium agreement.	✓
To interact with the INQUIRE Consortium for guidance and advice with respect to the goals and activities of the project, for instance to ensure a basis for the project results on practitioners reflective practice and INQUIRE course content.	✓ Consortium meetings (See List below) have been organized to fulfill these tasks
To interact with the INQUIRE Consortium for guidance and advice with respect to the goals and activities of the project, for	✓ Interactions with the consortium have been done via meetings and the project handbook (Project management website





instance to ensure a basis for the project results on practitioners reflective practice and INQUIRE course content.	Glasscubes which iwas used to communicate, share data, collect results, etc.)
---	---

### 2.4.3.2. Quality Management

The Quality Management Team was responsible for ensuring that the project meets the INQUIRE objectives and that resources are used effectively. The Quality Managers Justin Dillon and Elaine Regan (KCL) facilitated a clear systematic approach for achieving goals and partners were made aware of existing research. Prof. Doris Elster from UniHB, left the Management Board at the end of the first year and was therefore no longer responsible for any quality management tasks for the rest of the project duration.

Practitioners reported on progress within their courses and evaluation to the Quality Managers on a regular basis.

As reported in the 1<sup>st</sup> interim report, a draft Quality Management Plan including a practitioner’s manual was developed and submitted as Deliverable 7.1 in month 12. The practitioner’s manual included guidelines on how Partners could structure and organise reflective practice while implementing IBSE in the classroom over the remaining 2<sup>nd</sup> period of the project.

The KCL team have conducted support visits with every partner in the consortium in their own institutions (support for the Bremen partner was conducted in London) providing advice and support on all aspects of the project delivery. These visits have been supplemented by online support (email and Skype).





Table 5.: KCL Support visits

	<b>Name of person</b>	Partner Country	<b>Duration (inc. travel) Please put dates</b>	<b>Reason for attending meeting</b>
KCL	Elaine Regan Justin Dillon	Austria	22 June -28 June 2011	Train the Trainers, Obergurgl
KCL	Elaine Regan	England	30 Aug-1st Sept 2011	KEW Partner Support visit, inter-site meetings
KCL	Elaine Regan	Austria	14-17 Sept 2011	LFU Partner Support visit
KCL	Elaine Regan	Bulgaria	18-21 Sept 2011	UBG Partner Support visit
KCL	Elaine Regan	Germany, Bremen Hannover	29-30 Sept 2011	SBZH and BGRHB Partner Support Visit
KCL	Elaine Regan	Belgium	16-18 Oct 2011	NBGB Partner Support visit
KCL	Elaine Regan	Italy	24-28 Oct 2011	MTSN Partner Support visit
KCL	Elaine Regan	Portugal, Lisbon and Coimbra	6-9 Nov and 23-25 Nov 2011	UL and FCTUC Partner Support visit
KCL	Elaine Regan	France	13-15 Nov 2011	BORDEAUX Partner Support visit
KCL	Elaine Regan	Spain	16-18 Nov 2011	UAH and CSIC Partner Support visit
KCL	Elaine Regan Justin Dillon	Russia	27-30 Nov 2011	MSU Partner Support visit
KCL	Justin Dillon	Norway	13-15 Feb 2012	NHM Partner Support visit

The KCL team have continued to support Consortium Partners by online support (email and Skype) and with one-to-one informal communications at each partner meeting throughout the whole project duration.

The team has also undertaken the following work in connection with the INQUIRE management and implementation of the QMP:

- The team lead interviews and discussions with partners to prepare them for the development of their portfolios of evidence and techniques for the analysis of interview data.
- The KCL team have worked closely with the external evaluator to devise and administer questionnaires and an interview strategy for the external evaluation.





- ✓ The KCL team delivered presentations on relating research to practice through the use of the <http://relatingresearchtopractice.org/> platform.

The QM manual has been completed and uploaded to website.

Partners have received significant support for implementing the QMP. During consortium meetings Partners have been able to discuss their progress and any concerns with KCL. Training in the form of workshops have been provided by members of the MB in areas such as conducting interviews, concept maps, diaries as a reflective tool, analysing interview data, portfolios of evidence, using educational research and use of the INQUIRE website.

Throughout the whole project duration, an excellent working relationship between Partners and KCL has been maintained and there is a strong sense that KCL is supporting, not judging, Partners to develop their practice and implement the QMP. During the running of their INQUIRE courses, all Partners have collected data from teachers using a range of evaluation tools presented ahead of time, during the Train the Trainers course in Austria and the 3rd Consortium Meeting in Germany. Partners used these techniques during to prepare their portfolios of evidence and submit these to KCL for evaluation for both the PIC (post September 2012) and final INQUIRE courses (post September 2013).

The QM report has been completed and submitted as Deliverable 7.2. However, it is worth noting that because of the trusting relationships that developed between Partners and KCL, reporting is completely open particularly about the challenges Partners face as well as their successes and outcomes.

**Main tasks and achievements in the first period**

Main tasks	Achievement in the Period
Development of a Quality Management Plan (month 4). This manual will consist of:	✓ This plan has been developed and presented in at the Train the Trainers workshop in June 2011. There was a delay in finishing the plan due to appointment requirements in Britain but this delay did not cause serious problems because the plan was published before partners started their course
A “Practitioners manual” for INQUIRE course participants will include guidelines on how to structure and run reflective	✓ Has been published and handed in as a deliverable D.4.1. on time





<p>practice while implementing ISBE in classroom situations. This reflective practice will also include IBSE activities carried out at participating LOTC institutions.</p>	
<p>A “Summative and Formative Evaluation Framework”, to evaluate the process of professional development of teachers participating in pilot INQUIRE courses. UniHB is responsible for this part of the work. The summative and formative assessment will focus on 11 pilot INQUIRE courses, data will be collected in 11 partner countries and analysed by UniHB.</p>	<p>✓ Has been discussed in the MB and is part of the Quality Management Plan. Tasks have been moved from UniHB to KCL .</p>
<p>QM helps to organize consortium meetings. It is also responsible for evaluating outcomes of these meetings and checking reports from the quality point of view.</p>	<p>✓ QM team supported the MB in organizing all meetings through discussion at MB meetings. Outcomes and reports from the Partner meetings have been analysed and incorporated as evaluation within the QM Report.</p>
<p>KCL will visit each participating partner once to discuss local circumstances.</p>	<p>✓ All partners have been visited once already (List of visits see above)</p>
<p>The final Quality Management Report (Month 36) will include best practice models by the end of the project and will include formative and summative evaluation results. This Report is published on the INQUIRE website to support practitioners all over the world to initiate reflective practice in IBSE as well as teacher training course developers.</p>	<p>✓ Submitted as a deliverable D.7.2. on time</p>





### 2.4.3.3. Dissemination Management (DM)

Main tasks and achievements in the second period

Main tasks	Achievement in the Period
The DM will draft publishable deliverables and will work closely with the Project Coordinator (PC) for final revision before these papers will be sent to the EU Commission and will be released to the public.	✓ All required deliverables planned in course of the project (1.1; 1.2; 1.3.; 2.1.;2.2.;3.1.;3.2;4.1;4.2;4.3; 4.4.;4.5.;5.1. 6.1; 6.2; 6.3.;6.4.; 7.1.; 7.2, 8.1, 8.2, 8.3.) have been successfully completed and submitted on time. The deliverables are also published on the INQUIRE website. In addition as it has been reported in the Interim report month 1-18 the Deliverable 4.2 Train the Trainer Course Manual was submitted on 24 <sup>th</sup> of December 2012 (month 25) and has been also published on-line. The delay in submitting that deliverable has been justified well in advance.
DM will help to organize consortium meetings and to develop the project handbook (web portal which supports data exchange between project partners).	✓ Achieved see above
The development and the maintenance of the INQUIRE website will be carried out,	✓ The multilingual Website has been launched in Month 10 During the whole project duration BGCI continued to monitor the smooth functioning of the website. When glitches occurred in the functioning BGCI liaised with the website developers and ensured the resolution of the issues.
The Final Conference will be organized.	The INQUIRE conference was held at Royal Botanic Gardens, Kew on 9-10 <sup>th</sup> of July, 2013 including a post congress activity on the 11 <sup>th</sup> July. BGCI collaborated closely with KEW to organize the conference. 124 delegates from 13 countries gathered at the conference. The conference proceedings (Deliverable





	D6.4) and the conference conclusions are now published on-line.
The DM will be responsible for all dissemination activities described in WP 6.	✓ Deliverable 6.1. Dissemination Plan was handed in on time (month 4) an updated. Deliverable 6.3 Dissemination summary was submitted on month 36 summarising all the Partner dissemination activities.

- **Dissemination activities**

The dissemination activities of the INQUIRE project intended to promote the INQUIRE courses, inform about the progress and outcomes of the project and, ultimately, widely encourage the implementation of IBSE. Partners provided dissemination through participating in national and international conferences and events, preparing publications, updating the INQUIRE website and the INQUIRE social media, producing e-newsletters, distributing news through two e-mail lists, organising and participating in the INQUIRE conference, preparing press releases, and disseminating project outputs through SCIENTIX. A detailed summary was provided in Deliverable D6.3.

- **The INQUIRE Website:**

The INQUIRE website was launched in month 10 and is in 10 languages – Bulgarian, Dutch, English, French, German, Italian, Norwegian, Portuguese, Russian and Spanish. The website is aimed at teachers and educators and contains news and discussions, resources and an area dedicated to Partner course information.

- **INQUIRE conference**

Organised by BGCI in collaboration with KEW the INQUIRE conference was held at Royal Botanic Gardens, Kew on 9-10<sup>th</sup> July, 2013. The two-day conference was organised to celebrate the project’s successes, reflect on its challenges and bring together researchers and professionals from schools and LoTc centres to discuss the current status and future of IBSE in Europe. 124 delegates from 13 countries gathered at the INQUIRE conference, which stimulated discussions and reflections on IBSE. Four other EU funded projects related to Science Education and professional development were represented at the conference i.e. PATHWAY, Natural Europe, GreenNET and S-TEAM. The conference programme comprised four keynote speeches, 60





workshops, paper and poster presentations and a networking session. A post congress event attended by 35 delegates was also organised at University of Oxford Botanic Garden.

- **INQUIRE promotional materials**

To endorse botanic gardens as sites for IBSE and encourage teachers to sign up for the INQUIRE courses, 2 short promotional films were produced, one of approximately 7minutes and another, a summary video, of approximately one minute. The film is shot in five different Partner languages and subtitled in all ten. All videos have been uploaded onto Youtube and disseminated through the INQUIRE website and social media e.g. see <http://www.inquirebotany.org/en/resources/inquire-film-232.html>.

Other INQUIRE promotional materials produced in the second period of the project were the INQUIRE banners which were created in all 10 Partner languages. The banners were displayed at the INQUIRE conference, and each Partner now uses these in their dissemination activities at conferences and other events.

- **Inquire publications**

During the 2nd period of the project Partners published the INQUIRE outcomes in print and online journal articles, special journal issues, books, conference proceedings, deliverables and other publications. This form of dissemination ensures the long lasting impact of INQUIRE, as these publications will continue to be of use after the end of the project. Some of the publications were initially produced to support the INQUIRE course participants; these are now available for use by other practitioners, researchers and policy makers. Many of the publications are available on the INQUIRE website resources section (<http://www.inquirebotany.org/en/resources.html>) and are distributed through e-mail lists, the INQUIRE social media and SCIENTIX. Table x presents seminal publications of the 2nd period of the project that were produced by the collaborative work of Partners and Table x illustrates in more detail Partners' published work.





Table 6: Seminal publications of the INQUIRE Partners months 19-36

Publication type	Title
Deliverables and tasks' publications	D.4.2 Train the Trainer Course (TTC) Manual
	D.4.4 Pilot INQUIRE Course participants feedback
	D4.5 INQUIRE course participants feedback (third year)
	Literature Review: Current understanding of IBSE
	D.5.5 Final INQUIRE Course Manual
	D.6.3 Dissemination Summary
	D.6.4 Proceedings of the Final Conference
	D.7.2 Final Quality Management Report
	D.8.1 Interims External Evaluation Report
	D.8.2 Recommendations from Consortium Meetings
Special journal issues	D.8.3 Final External Evaluation Report
	Roots (2012) Inquiry-Based Science Education, Vol.9:2, BGCI, London, UK
Book	Roots (2012) Professional Development for Educators, Vol.10:1, BGCI London, UK
	Tavares, C. (2013) 'A alga que queria ser flor/The algae who wanted to be a flower', FCTUC, Coimbra, Portugal





Table 7: Overview of each Partners' publications

Partners	Publications
LFU	<ul style="list-style-type: none"> <li>❖ Book with case studies of educators</li> <li>Article in <i>Roots Inquiry-Based Science education</i>, Vol. 9.2 , BGCI. London Available at: <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a></li> <li><a href="http://www.uibk.ac.at/ipoint/news/2011/neue-schule-forschend-lernen.html.de">http://www.uibk.ac.at/ipoint/news/2011/neue-schule-forschend-lernen.html.de</a></li> <li>Conferences: <a href="http://www.ecsite.eu/sites/default/files/final_programme_2011_0.pdf">http://www.ecsite.eu/sites/default/files/final_programme_2011_0.pdf</a></li> <li><a href="http://fibonacci.uni-bayreuth.de/resources/events/leicester-conference-2012.html">http://fibonacci.uni-bayreuth.de/resources/events/leicester-conference-2012.html</a></li> <li><a href="http://conference.pixel-online.net/npse2013/acceptedabstracts.php">http://conference.pixel-online.net/npse2013/acceptedabstracts.php</a></li> <li><a href="http://www.eera-ecer.de/ecer-programmes/conference/8/contribution/21783/">http://www.eera-ecer.de/ecer-programmes/conference/8/contribution/21783/</a></li> </ul>
BGCI	<ul style="list-style-type: none"> <li>❖ Editors and article contribution in <i>Roots</i>, Inquiry-Based Science education, Vol. 9.2 , BGCI. London Available at: <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a></li> <li>❖ Editors of <i>Roots</i>, Professional Development for Educators, Vol. 10.1, BGCI, London <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a></li> <li>❖ Monthly e-newsletter</li> <li>INQUIRE conference conclusions published on the INQUIRE website and BGCI website <a href="http://www.inquirebotany.org/en/final-conference.html">http://www.inquirebotany.org/en/final-conference.html</a></li> </ul>
KCL	Article in <i>Roots Inquiry-Based Science education</i> , Vol. 9.2 , BGCI. London Available at: <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a>
MUSE	Article in <i>Roots</i> , Professional Development for Educators, Vol. 10.1, BGCI. London Available at: <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a>
KEW	<ul style="list-style-type: none"> <li>❖ Article in <i>Roots Inquiry-Based Science education</i>, Vol. 9.2 , BGCI. London Available at: <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a></li> <li>❖ Journal article: Primary Science or Journal of Biological sciences</li> <li>❖ Online articles (4)</li> <li>Manual with Activities / Lesson Plans for educators / teachers UK wide. Due end project period</li> <li><a href="http://www.kew.org/Kewscientist/kewscientist_39.pdf">http://www.kew.org/Kewscientist/kewscientist_39.pdf</a></li> </ul>
CSIC &UAH	<ul style="list-style-type: none"> <li>❖ Leaflets (joint publication: with UAH)</li> <li>❖ Press releases (7) (joint publication: with UAH)</li> <li>❖ Newsletter</li> <li>❖ Newsletter(joint publication: with UAH)</li> <li>❖ Online articles(7) (joint publication: with UAH)</li> </ul>





	<p>Youtube video <a href="http://www.youtube.com/watch?v=9XXx3QXJcLo">http://www.youtube.com/watch?v=9XXx3QXJcLo</a> (joint publication: with UAH)</p>
UniHB	<ul style="list-style-type: none"> <li>❖ Newsletters (40)</li> <li>❖ Paper in: Praxis der Naturwissenschaften-Kommunikation durch Botenstoffe 62 (7)</li> <li>❖ <a href="http://www.aulis.de/files/materials/downloads_links/BioS_2013_6_V_72.pdf">http://www.aulis.de/files/materials/downloads_links/BioS_2013_6_V_72.pdf</a></li> <li>❖ Paper in: Unterricht Biologie: Biologie in Geschichten und Berichten</li> <li>❖ <a href="http://www.friedrich-verlag.de/go/4F95617CE09B4B388F8F7A3F6852AE2E">http://www.friedrich-verlag.de/go/4F95617CE09B4B388F8F7A3F6852AE2E</a></li> <li>❖ Paper in: Unterricht Biologie (Teaching and learning biology)</li> <li>❖ Conference proceedings: INQUIRE for Students – How to promote inquiry-based learning? ( New Perspectives in Science Education, Florence, Italy)</li> <li>❖ Conference proceedings: Initiating inquiry-based science education in outdoor learning sites: issues and challenges ( FIBONACCI Project European Conference Leicester, UK)</li> <li>❖ Conference proceedings: Biodiversity loss and climate change – Inquiry in the pre-service teacher education ( ESERA international conference (European Science Education Research Association)Nicosia, Cyprus)</li> </ul> <p>Conference proceedings: The INQUIRE project and some ideas for activities related to biodiversity and climate change (ESTABLISH teacher Conference Dublin, Ireland)  <a href="http://www.kreiszeitung.de/lokales/bremen/arbeiten-echte-forscher-1148599.html">http://www.kreiszeitung.de/lokales/bremen/arbeiten-echte-forscher-1148599.html</a></p>
UBG	<ul style="list-style-type: none"> <li>❖ All lesson plans were exchanged between the participants, some- uploaded on INQUIRE web-site</li> <li>❖ Article in Roots Inquiry-Based Science education, Vol. 9.2 , BGCI. London Available at: <a href="http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf">http://www.bgci.org/files/Worldwide/Education/Roots_PDFs/Roots9.2.pdf</a> Pencheva, L. (2012) Teacher in the mirror - reflecting on practice and change. Roots, Vol 9, No2, pp.13-16</li> <li>❖ Online articles (4)</li> <li>❖ Press releases (3)</li> </ul> <p>Newspaper article</p>
NBGB	<ul style="list-style-type: none"> <li>❖ Online article (6)</li> <li>❖ Newsletter (3)</li> </ul> <p>Letter to schools (2)</p>
SBZH	<ul style="list-style-type: none"> <li>❖ Developed Lesson Plans. They are uploaded on the SBZH website, on the INQUIRE Botany website and on Scientix</li> </ul> <p>Press releases (4)</p>
BORD	<ul style="list-style-type: none"> <li>❖ Cartoon</li> <li>❖ School journal (access only at school)</li> <li>❖ Website</li> <li>❖ Movie (access on internet)</li> </ul> <p>Review article: <a href="http://www.reseau-orfee.org/IMG/pdf/Edito_SommaireWeb.pdf">http://www.reseau-orfee.org/IMG/pdf/Edito_SommaireWeb.pdf</a></p>
FCTUC	<ul style="list-style-type: none"> <li>❖ Tavares, C. (2013) 'A alga que queria ser flor/The algae who wanted to be a flower', Bilingual book, FCTUC, Coimbra, Portugal</li> <li>❖ News articles (online) (18)</li> </ul>





	<ul style="list-style-type: none"><li>❖ Two editions of COINQUIRE FORUM presentations and resources/ COINQUIRE Forum 2012 and 2013 see links, respectively: <a href="http://sequoia.bot.uc.pt/jardim/inquire/forum2012/">http://sequoia.bot.uc.pt/jardim/inquire/forum2012/</a> <a href="http://sequoia.bot.uc.pt/jardim/inquire/forum2013/">http://sequoia.bot.uc.pt/jardim/inquire/forum2013/</a></li><li>❖ TRAINEES IBSE EDUCATIVE RESOURCES (implemented in a school context) - Two editions Course - 2012 and 2013 - Inquire Coimbra course: <a href="http://sequoia.bot.uc.pt/jardim/inquire/index.php?menu=22&amp;language=pt&amp;tabela=geral">http://sequoia.bot.uc.pt/jardim/inquire/index.php?menu=22&amp;language=pt&amp;tabela=geral</a> <a href="http://sequoia.bot.uc.pt/jardim/inquire/index.php?menu=37&amp;language=pt&amp;tabela=geral">http://sequoia.bot.uc.pt/jardim/inquire/index.php?menu=37&amp;language=pt&amp;tabela=geral</a></li></ul>
MSU	<ul style="list-style-type: none"><li>❖ Елена Соколова, Ирина Кобузева “От рисунка к систематике”, 2013 <a href="http://www.inquirebotany.org/ru/discussions/best-practice-from-drawing-of-plants-to-plant-systematics-730.html">http://www.inquirebotany.org/ru/discussions/best-practice-from-drawing-of-plants-to-plant-systematics-730.html</a></li><li>❖ Elena Sokolova, Irina Kobuzeva “From drawing of plants to plant systematics”, 2013 <a href="http://www.inquirebotany.org/en/discussions/best-practice-from-drawing-of-plants-to-plant-systematics-730.html">http://www.inquirebotany.org/en/discussions/best-practice-from-drawing-of-plants-to-plant-systematics-730.html</a></li><li>❖ Юлия Михайлова. Урок в ботаническом саду: изучаем первоцветы. Презентация, (Yuliya Mikaylova, Best Practice –lesson in Botanic Garden, learning spring flowers), Presentation 2013/ <a href="http://www.inquirebotany.org/ru/case_study/10/urok-v-botanicheskom-sadu-zuchaem-pervotsvet.html">http://www.inquirebotany.org/ru/case_study/10/urok-v-botanicheskom-sadu-zuchaem-pervotsvet.html</a></li><li>❖ Инесса Войнова «Опыт внедрения методологии INQUIRE в школе: побуждение к творчеству, исследованию и самопознанию (Inessa Voynova “Experience of Applying INQUIRE in School: Inspiration for Creativity, Study and Self-knowledge”), 2012 // <a href="http://www.inquirebotany.org/ru/discussions/developing-inquire-in-schools-519.html">http://www.inquirebotany.org/ru/discussions/developing-inquire-in-schools-519.html</a></li><li>❖ Ольга Хрущалова «Биология на уроках английского», 2012// <a href="http://www.inquirebotany.org/ru/discussions/website-inquirebotany-for-english-lessons-333.html">http://www.inquirebotany.org/ru/discussions/website-inquirebotany-for-english-lessons-333.html</a></li><li>❖ Olga Khuschalova “Biology in English Lessons”, 2012// <a href="http://www.inquirebotany.org/en/discussions/website-inquirebotany-for-english-lessons-333.html">http://www.inquirebotany.org/en/discussions/website-inquirebotany-for-english-lessons-333.html</a></li><li>❖ Анна Пишпек «Наполним уроки жизнью» (Anna Pishpek “Bringing Lessons Alive”), 2013// <a href="http://www.inquirebotany.org/ru/discussions/inquire-lessons-and-climate-change-600.html">http://www.inquirebotany.org/ru/discussions/inquire-lessons-and-climate-change-600.html</a></li><li>❖ Алла Андреева «Первые уроки INQUIRE в ботаническом саду МГУ «Аптекарский огород», 2012 // <a href="http://www.inquirebotany.org/ru/news/first-science-experience-with-plants-lessons-in-msu-botanical-garden-335.html">http://www.inquirebotany.org/ru/news/first-science-experience-with-plants-lessons-in-msu-botanical-garden-335.html</a></li><li>❖ Alla Andreeva “First Science Experience With Plants - Lessons in MSU Botanic Garden”, 2012 // <a href="http://www.inquirebotany.org/en/news/first-science-experience-with-plants-lessons-in-msu-botanical-garden-335.html">http://www.inquirebotany.org/en/news/first-science-experience-with-plants-lessons-in-msu-botanical-garden-335.html</a></li><li>❖ Conference proceedings: (A.E.Andreeva “Lessons in the Botanic Garden: New Opportunities to Engage Students in Research Work”) // Материалы конференции «Новые образовательные программы МГУ и школьное образование» , 2014</li><li>❖ E newsletter (3)</li></ul>





	Webinar: Stimulating Interest in Science in the 5 <sup>th</sup> Form and Developing Student Creativity
NHM	Online article
BGRHB	<ul style="list-style-type: none"> <li>❖ Press release</li> <li>❖ Newspaper articles</li> <li>❖ Leaflets</li> <li>❖ Online articles (5)</li> <li>❖ Abstract conference proceedings, Vilm conference 2011</li> </ul> Reports in local magazines
UAH	<ul style="list-style-type: none"> <li>❖ Published news with 2 teachers:  <a href="http://www.youtube.com/watch?v=9XXx3QXJcLo">http://www.youtube.com/watch?v=9XXx3QXJcLo</a>  <a href="http://www.inquirebotany.org/es/discussions/what-do-students-_____think-about-ibse-670.html">http://www.inquirebotany.org/es/discussions/what-do-students-_____think-about-ibse-670.html</a> </li> <li>❖ <u>Teachers and students have been writing their experiences with IBSE activities in their blogs:</u>  <a href="http://mutantesgurke.blogspot.com.es/">http://mutantesgurke.blogspot.com.es/</a>  <a href="https://fitoatocha.wikispaces.com/">https://fitoatocha.wikispaces.com/</a> </li> </ul> Newsletter
UL	<ul style="list-style-type: none"> <li>❖ Newsletter</li> </ul> Newspaper opinion letter

○ **Inquire participation in conferences and other events**

In order to achieve public awareness on IBSE and the INQUIRE project outputs Partners participated in 91 national and 39 international conferences and meetings of professionals from formal and informal education and natural sciences sectors. **Table 8** provides an overview of the conferences and one off events that each Partner has participated during the 2<sup>nd</sup> period of the project (months 19-36) and what sort of dissemination activity they undertook. Several Partners attended the same conferences and events and this was taken into account when estimating the total number of conferences and events.





*Table 8: International and National conferences and other events that the INQUIRE Partners have participated in the 2nd period of the project (month 19-36)*

Partner	International conferences and other events	National conferences and other events
LFU	<ul style="list-style-type: none"> <li>• SCIENTIX conference, Brussels, Belgium 6-9/05/2011 (1 person - stand and oral presentation)</li> <li>• ECSITE Conference, Warsaw, Poland 26-28/5/2011 (1 person – workshop)</li> <li>• ESERA conference, Lyon, France 5/9/2011-9/9/2011 (1 person – leaflets)</li> <li>• International Congress of Alpine Botanic Gardens, Trento, Italy. 13/09/2012 – 14/09/2012 (1 person – oral presentation)</li> <li>• CARN/IPDC Conference 2012 –Towards Creative Action: Transformations and Collaborations, Ashford, UK. 23/11/2012 -25/11/2012 (1 person – oral presentation)</li> <li>• Comenius Thematic Meeting on Literacy, Math &amp; Science, Brussels, Belgium. 06/12/2012 - 07/12/2012 (1 person – poster and leaflets)</li> <li>• MASCIIL Project Kick off Meeting, Freilburg, Germany. 28/01/2013 – 01/02/2013 ( 1 person – leaflet)</li> <li>• New Perspectives in Science Education Conference, Florence, Italy. 13/03/2013 – 15/03/2013 (1 person - oral presentation)</li> <li>• INSTEM Conference, Amsterdam, Netherlands. 17/03/2013 -20/03/2013 ( 1 person – poster)</li> <li>• Science education in School Conference, Galati, Romania. 18/04/2013 – 21/04/2013 (1 person – oral presentation)</li> <li>• EU Commission Open Door Day, Brussels, Belgium. 04/05/2013 ( 1 person - stand)</li> <li>• ProCoNet Meeting, Brussels, Belgium. 10/06/2013 – 11/06/2013 (1 person – leaflets)</li> <li>• ESERA-Conference, Nicosia, Cyprus. 02/09/2013 – 07/09/2013 (1 people – oral presentation (2))</li> <li>• ECER Conference, Istanbul, Turkey. 09/09/2013 – 14/09/2013 ( 1 person – oral presentation)</li> <li>• International Meeting of the Section Didactics of Biology (FDdB), Kassel, Germany. 16/09/2013 – 20/09/2013 ( 2 people – oral presentation (2))</li> <li>• SECURE conference, Mechelen, Belgium. 23/11/2013 – 24/11/2013 (1 person – oral presentation)</li> </ul>	<ul style="list-style-type: none"> <li>• Austrian Association of Research and Development in Education OEFEB meeting, Innsbruck, Austria. 24/05/2012 - 25/05/2012 (2 people – oral presentation (2))</li> <li>• European Discourses, EPSO, Fiss, Austria. 27/08/2012 – 30/08/2012 (2 people – oral presentation &amp; workshop)</li> <li>• AECC Summer School, Spital am Pyhrn, Austria. 09/07/2012 – 12/07/2012 (1 person – oral presentation)</li> <li>• Fachdidaktik meeting, School of Education, Innsbruck, Austria. 08/03/2013 (2 people - oral presentation (2))</li> <li>• Botanical Seminar University of Graz, Austria. 23/04/2013 (1 person – oral presentation)</li> <li>• Botanical Seminar University of Linz, Austria. 25/04/2013 (1 person – oral presentation)</li> <li>• Österreichische Gesellschaft für Fachdidaktik ÖGFD, Klagenfurt, Austria. 23/09/2013 (2 people – poster)</li> <li>• INQUIRY Day, Vienna, Austria. 11/11/2013 – 12/11/2013 ( 1 person – stand)</li> </ul>
BGCI	<ul style="list-style-type: none"> <li>• SCIENTIX conference, Brussels, Belgium 9/9/2011 (2 people – poster &amp; paper presentation)</li> <li>• Fibonacci conference, University of Leicester UK 26-27/4/2012 (1 person – oral presentation)</li> </ul>	<ul style="list-style-type: none"> <li>• BGEN annual conference, Harlow Carr, Yorkshire, 23-</li> </ul>





	<ul style="list-style-type: none"> <li>&amp; leaflets)</li> <li>• Ecsite Annual conference, Toulouse, France 31/05/2012-02/06/2012 (1 person – poster)</li> <li>• Eurogard VI, Chios, Greece 28/05/2012-02/06/2012 (3 people – workshop)</li> <li>• BGCI's 8<sup>th</sup> International Congress, Mexico City, Mexico 12/11/2012- 16/11/2012 (2 people- leaflets)</li> <li>• SiBG Seminar, Katowice, Poland 17/07/2012 – 19/07/2012 (1 person- Oral presentation)</li> <li>• The Longwood Graduate Program in Public Horticulture, Annual Symposium, Delaware, USA 14/03/2013 (1 person- Leaflets)</li> <li>• ECSITE annual conference, Gothenburg, Sweden 06/06/2013 – 08/06/2013 (1 person- leaflets)</li> <li>• 7<sup>th</sup> WEEC, Marrakech, Morocco 09/06/2013 – 14/06/2013 (1 Person- Leaflets)</li> <li>• 5<sup>th</sup> GBGC, Dunedin, New Zealand 20/10/2013 -25/10/2013 (1 person – poster)</li> </ul>	<p>25/11/2011 (2 people – Oral presentation)</p> <ul style="list-style-type: none"> <li>• Science Communication Conference, London, UK 14-15/05/2012 (1 person – oral presentation)</li> <li>• PlantNetwork annual conference, Cambridge, UK 11/04/2012 – 12/04/2012 ( 1 person- Leaflets)</li> </ul>
KCL	<ul style="list-style-type: none"> <li>• Fibonacci conference, University of Leicester, UK 26-27/4/2012 (2 people - oral presentation)</li> <li>• Ecsite Annual conference, Toulouse, France 31/05/2012-02/06/2012 (2 people – oral presentation)</li> <li>• Seminar Deep education for a sustainable future in non-formal settings, Poland. July, 2012. (1 person –oral presentation)</li> <li>• INQUIRE conference 9, Kew, UK 09/07/2013 -10/07/2013 (1 person – oral presentation)</li> <li>• Ecsite conference, Toulouse, France. 06/06/2013 – 08/06/2013 ( 2 people – oral presentation)</li> <li>• ESERA 2013, Nicosia, Cyprus. 02/09/2013 -07/09/2013 (2 people – paper presentation)</li> <li>• ECER, Istanbul, Turkey. 10/09/2013 – 13/09/2013 (2 people – paper presentation)</li> </ul>	<ul style="list-style-type: none"> <li>• MA Science Education KCL, London, UK march, 2012 (1 person – Lecture)</li> <li>• Science Communication Conference, London, UK British Science Association, 14 &amp; 15 May 2012 (1 person – workshop).</li> <li>• TISME conference, London, UK 13/06/2012 (1 person – oral presentation)</li> </ul>
MUSE	<ul style="list-style-type: none"> <li>• Annual Meeting of the European Consortium of Botanic Gardens EBGC, organised by the Silesian Botanic Garden, Katowice, Poland. 21/05/2011 (1 person – oral presentation)</li> <li>• International Conference of Botanic Gardens „Back to the Eden - the Challenges for Contemporary Gardens”, Ustroń-Mikołów, Poland, 22-23/5/2011 (1 person - oral presentation)</li> <li>• 6th Planta Europa Conference “Actions for wild plants”, Kraków, Poland, 23-27/5/2011 (1 person - oral presentation)</li> <li>• Annual Meeting of the European Consortium of Botanic Gardens EBGC. organised by the Silesian Botanic Garden, Meise, Belgium. 03/12/2011 – 04/12/2011 (1 person – oral presentation)</li> <li>• Eurogard VI, Chios, Greece 28/05/2012-02/06/2012 (1 person – workshop)</li> <li>• Annual Meeting of the European Consortium of Botanic Gardens, Chois, Greece. 26/05/2012 (1 person – oral presentation)</li> </ul>	<ul style="list-style-type: none"> <li>• Open days at the museum for local schools MUSE “Tre giorni per la scuola, organised by museo delle scienze, Trento”, Italy. 20/09/2010 – 22/09/2010 (3 people – stand)</li> <li>• Annual meeting of National network of Botanic Gardens, Parma, Italy 16/04/2011 (3 people - oral presentation)</li> <li>• Annual meeting of the Italian Botanical Society, Genoa, Italy 21-24/09/2011 (1 person – poster)</li> <li>• Annual meeting of the Italian Association of Science Museums</li> </ul>





	<ul style="list-style-type: none"> <li>• FLORIADE 2012, International horticultural exhibition, Venlo, Netherlands. 15/06/2012 (3 people – workshop)</li> <li>• Annual Meeting of the European Consortium of Botanic Gardens, Gijon, Spain. 01/12/2012 – 02/12/2012 ( 1 person – oral presentation)</li> <li>• Annual Meeting of the European Consortium of Botanic Gardens, Prague, Czech Republic. 24/05/2013 – 26/05/2013 (1 person – oral presentation.)</li> <li>• European conference: Science and Sustainability through outdoor learning, Planica, Slovenia. 27/11/2013 – 30/11/2013 (2 people – workshop)</li> </ul>	<p>“XXI Congresso ANMS - "La ricerca nei musei scientifici" Padova, Italy 9-11/11/2011 (1 person - oral presentation)</p> <ul style="list-style-type: none"> <li>• National Training course on visitor interpretation for Botanic Gardens and nature reserves, Villa Carlotta, Como, Italy, 7-9/11/2011 (2 people – stand)</li> <li>• Annual Meeting of Italian Botanic Gardens Network Meran, Italy 18/5/2012 (2 people – workshop)</li> <li>• 22nd Congress of the Italian society for Ecology (SITE), Alessandria, Italy. 10/09/2012 – 13/09/2012 (1 person – oral presentation)</li> <li>• Congress “Le giornate della scienza - Education in Science”, Camerino, Italy. 06/09/2012 – 08/09/2012 (3 people – oral presentation)</li> <li>• Open days at MUSE for local schools, Trento, Italy. 25/07/2012 – 27/09/2012 ( 3 people – stand)</li> <li>• 3rd national congress on education 2.0 3° convegno nazionale Education 2.0 organised by EDUCA, Firenze, Italy. 26/10/2012 (1 person – oral presentation)</li> <li>• Annual meeting of the Italian association of science museums, Firenze, Italy. 14/11/2012 – 16/11/2012 (1 person – oral presentation)</li> <li>• Convegno “Didattica delle scienze nella scuola post-riordino e costruzione di una cittadinanza scientifica. Inquiry- based</li> </ul>
--	---	---





		<p>science education ed integrazione delle scienze sperimentali: esempi e riflessioni sulla pratica docente” Ancona, Italy. 17/12/2012 – 18/12/2012 ( 2 people – workshop)</p> <ul style="list-style-type: none"> <li>• L’integrazione delle scienze e la didattica laboratoriale: Il Cannocchiale di Galileo, Fiesole, Italy. 11/03/2013 – 13/03/2013 (2 people – oral presentation)</li> <li>• Annual Meeting of Italian Botanic Gardens Network, Pisa, Italy. 06/06/2013 ( 1 person – oral presentation)</li> <li>• celebrative congress for the 30 years of Valbonella Botanic Garden, Italy. 06/06/2013 (1 person – oral presentation)</li> <li>• Open days at MUSE for local schools, Trento, Italy. 24/09/2013 – 25/09/2013 (3 people – stand)</li> <li>• national congress, Bergamot, Italy. 17/10/2013 – 18/10/2013 (1 person – workshop)</li> </ul>
KEW	<ul style="list-style-type: none"> <li>• Botanic gardens and Conservation seminar, Gijon, Spain 18/03/2012 (1 person- Oral presentation)</li> <li>• Association of Science Education (ASE) International conference, Liverpool, UK 5-7/01/2012 (2 people - workshop, stand, poster)</li> <li>• International Diploma in Botanic Garden Education, Kew, UK 26/04/2012 -27/04/2012 (2 people- workshops)</li> <li>• BGCI Education Congress, Mexico City, Mexico 11/11/2012 – 15/11/2012 (3 people- Workshop)</li> <li>• EU Science Fair, Brussels, Belgium 03/05/2013- 04/05/2013 (4 people – Stand &amp; Demonstration)</li> <li>• INQUIRE workshop for museum educators, Trento, Italy 02/10/2013 (1 person in association with A. Vergou BGCI, S.Kapelari, Innsbruck and C. Bonami – Workshop)</li> <li>• INQUIRE conference 9, Kew, UK 10/07/2013 (1 person – Workshop)</li> <li>• Botanic Garden education Network for Italy And Bergamot Science Festival, Bergamot, Italy</li> </ul>	<ul style="list-style-type: none"> <li>• Growing Schools Conference, Coventry, UK 23/03/2011 (1 person - stand &amp; demonstration)</li> <li>• BGEN annual conference, Harlow Carr, Yorkshire, 23-25/11/2011 (2 people - workshop)</li> <li>• LICE, London, UK 07/11/2011 – 10/11/2011 (2 people – Oral presentation)</li> <li>• ASE Annual Conference, Liverpool, UK 04/01/2012- 07/01/2012 (2 people- Stand &amp; Activity)</li> <li>• Biosciences Evening and OCR invitation evening, Kew, UK</li> </ul>





	<p>18/11/2013 -19/11/2013 (1 person – oral presentation &amp;Activity)</p>	<p>03/03/2012 (3 people- Oral presentation &amp; stand &amp; demonstration)</p> <ul style="list-style-type: none"> <li>• Diversity Heritage Group Meeting, London, UK 23/03/2012 (1 person- oral presentation)</li> <li>• Growing Schools Conference, Wisley, UK 28/03/2012 (1 person- Stand &amp; demonstration)</li> <li>• Growing Schools Conference, Essex, UK 19/03/2013 (1 person- Workshop)</li> <li>• LAWHF meeting, Weymouth, UK 26/04/2013 (1 person- oral presentation)</li> <li>• PGCE at IOE, Kew, Uk 03/06/2013 -11/06/2013 (2 people – course)</li> <li>• Educational Growing: Growing Education Conference, London, UK 05/07/2013 (1 person- workshop)</li> <li>• Historic House Association Education Seminar, 19/09/2013 (1 person- oral presentaion)</li> </ul>
<p>CSIC &amp; UAH</p>	<ul style="list-style-type: none"> <li>• XI Symposium de la Asociación Ibero-Macaronésica de Jardines Botánicos Faial, Portugal 15-19/06/2011 (1 person - oral presentation)</li> <li>• Curso introductorio sobre técnicas de jardinería, Jardín Botánico Ambiental, Universidad Nacional Autónoma de Nicaragua-León, Nicaragua 28/10/2011 – 02/11/2011 (1 person – oral presentation)</li> <li>• Pilots Training Course for Museum Explainers Educators and Young Scientists involved in outreach programmes, Lisbon, Portugal 17/09/2012 – 21/09/2012 (1 person – Oral Presentation &amp; Leaflets)</li> </ul>	<ul style="list-style-type: none"> <li>• • II Congreso de Docentes de Ciencias, Universidad v Complutense de Madrid 06/06/2012 08/06/2012 (1 person oral presentation and leaflets)</li> <li>• III Jornadas Técnicas de los Jardines Botánicos (AIMJB), Jardín Botánico Juan Carlos I, UAH, 06/06/2012 - 08/06/2012 (2 people – oral presentation, poster and leaflets)</li> <li>• III Simposio de Museología Científica, Madrid, Spain</li> </ul>





		<p>03/10/2012 – 04/10/2012 (2 people – Leaflets)</p> <ul style="list-style-type: none"> <li>• XII Simposio de la Asociación Ibero Macaronésica de Jardines Botánicos, Gijón, Spain 08/05/2013 – 13/05/2013 (1 Person – Oral Presentation &amp; leaflets &amp; poster)</li> <li>• Technical Conference on Environmental Education, Vitoria-Gastéiz, Spain, 13/06/2013 (1 person – Workshop &amp; Leaflets)</li> <li>• XX Biennial of the Royal Society of Natural History, Madrid, Spain 04/09/2013 – 07/09/2013 (5 people – Poster &amp; Leaflets)</li> <li>• II Encuentro de Equipamientos de Educación Ambiental, Segovia, Spain 25/11/2013 -27/11/2013 (1 person- Oral Presentation &amp; Leaflets)</li> </ul>
UniHB	<ul style="list-style-type: none"> <li>• 41st Annual Meeting of the Ecological Society of Germany, Austria and Switzerland, Oldenburg, Germany 12-15/9/2011 (1 person - oral presentation)</li> <li>• 2<sup>nd</sup> INQUIRE Partner meeting, Bremen, Germany 27/09/2011 -29/09/2011 (1 person – Oral Presentation)</li> <li>• FIBONACCI conference, Leicester, UK 26/04/2012 – 27/04/2012 ( 6 People – Workshop)</li> <li>• <b>ESTABLISH Science and Mathematics Education Conference (SMEC -2012)</b>, Dublin, Ireland 7-9/06/2012, , (1 person – workshop)</li> <li>• Annual international conference, Florence, Italy 14/03/2013 – 15/03/2013 (1 person – Paper Presentation)</li> <li>• INQUIRE Teacher Conference, Kew, UK 09/07/2013 – 11/07/2013 (6 people – Workshop &amp; paper presentation)</li> <li>• ), Nicosia, Cyprus 02/09/2013 – 07/09/2013 ( 1 person – paper presentation)</li> <li>• IOSTE Eurasian Regional Symposium and Brokerage Event HORIZON 2020, Antalya, Turkey 30/10/2013 – 01/11/2013 (1 person – Paper presentations (2))</li> </ul>	<ul style="list-style-type: none"> <li>• MNU annual conference, Bremerhaven, Germany 17/09-18/09/2011 (2 people - oral presentation)</li> <li>• Conference of the German Society of Environmental Conversation, Vilm, Rügen, Germany 12-15/8/2011 (2 people - oral presentation)</li> <li>• Annual GDCP conference, Hannover, Germany, 17/09/2012 – 19/09/2012 (2 People- Poster)</li> <li>• MNU Conference, Bremerhaven, Germany 17/11/2012 ( 2 people – Oral Presentations (2) &amp; Demonstration)</li> <li>• 2. Bildungs-forum, Bremerhaven, Germany 06/03/2013 (4 people – Poster)</li> </ul>





UBG	<ul style="list-style-type: none"> <li>• Black Sea Cross Border Cooperation, Eforia, Romania 11/05/2012 (1 person – Oral presentation)</li> </ul>	<ul style="list-style-type: none"> <li>• UzanaPoljanaFest – green ideas in action, Gabrovo, Bulgaria 16/07/2011 – 17/07/2011 (3 people – Activity &amp; Poster)</li> <li>• “Buskers Play Out” Fest, Sofia, Bulgaria, 17/09/2013 (1 person- Poster)</li> <li>• VII National Conference of Botany, Bulgarian Botany Society, University of Sofia, Bulgarian Academy of Sciences and others 29-30/09/2011 (2 people - oral presentation, poster)</li> <li>• National Conference on the "Modern goals for education in physics in secondary schools and universities”, Gabrovo, Bulgaria, 5-8 April 2012. (1 person –oral presentation)</li> <li>• II Autumn scientific and educational forum, Sofia, Bulgaria 24/11/2013 – 25/11/2013 (1 person – Leaflets)</li> <li>• Workshop on biodiversity for students from National High school of natural science, Sofia, Bulgaria 02/05/2013 (2 people- Workshop &amp; Leaflets)</li> <li>• Green Fest: Man, Society, Nature – sustainable Development, Varna, Bulgaria 18/05/2013 – 21/05/2013 (2 people- Workshop and Leaflets)</li> <li>• International Science Forum “Traditions and innovation in education” , Sofia, Bulgaria 01/11/2013 – 03/11/2013 (1 person _ Oral Presentation)</li> </ul>
NBGB	<ul style="list-style-type: none"> <li>• 26th Benelux conference on education for sustainable development, Brussels, Belgium 28/11/2012 (1 person- Poster)</li> </ul>	<ul style="list-style-type: none"> <li>• WIN network Association of Flemish Science Communicators, 9-6-2011 (2 people - oral presentation)</li> </ul>





		<ul style="list-style-type: none"><li>• VBTA Association of Belgian Botanic Gardens and Arboreta 20-9-2011 (1 person- oral presentation)</li><li>• Vlaamse NME-dag (Flemish Day of Nature, Sustainability and Environmental Education) 14 – 2 – 2012 (2 people - oral presentation, workshop)</li><li>• Happening on IBSE organized by Artevelde Hogeschool, Ghent, Belgium 21/03/2012 (2 People – Stand &amp; workshop)</li><li>• Personal presentation of the project for staff of 5 Primary Schools, Meise, Belgium September, 2012 (1 person – Oral presentation)</li><li>• VALEWE- Association of Flemish Science Teachers, Antwerp. Belgium, November, 2012 (1 person -Oral Presentation)</li><li>• Leermiddelenbeurs (Market on educational tools), Leuven, Belgium 19/04/2013 – 20/04/2013 (2 people – stand)</li><li>• Teacher training school, Ostend, Belgium. 15/04/2013 (1 person – oral presentation)</li><li>• Introduction in IBSE for pre-service teachers of Artevelde Hogeschool, Meise, Belgium 10/05/2013 ( 2 people – oral Presentation &amp; Activity)</li><li>• GRUNDTVIG: VIP day for teachers, Meise, Belgium 06/06/2013 (2 people – stand)</li><li>• Meeting with pedagogical advisors of OVSG, Brussels, Belgium 20/09/2013 (2 people – Oral Presentation)</li></ul>
--	--	--





		<ul style="list-style-type: none"> <li>• VIP-day for teachers, Meise, Belgium 28/09/2013(2 people-demonstration)</li> <li>• STEM-dag Technopolis (conference for STEM teachers), Mechelen, Belgium 08/10/2013 (2 people – Oral presentation&amp; stand &amp; Activity)</li> <li>• Meeting with pedagogical advisors of VVKSO, Meise, Belgium 09/12/2013 (2 people – oral Presentation &amp; activity)</li> </ul>
SBZH		<ul style="list-style-type: none"> <li>• German Core Working Group “Pedagogical Staff at Botanical Gardens”, Hannover, Germany 05/02/2011 – 05/02/2011 (1 person – Oral presentation)</li> <li>• Meeting of the regional Environmental Education Centers of Lower Saxony, Hannover, Germany. 16/05/2011 ( 1 person – oral presentation)</li> <li>• The whole German Working Group “Pedagogical Staff at Botanical Gardens”, Hannover, Germany 20/05/2011 – 22/05/2011 (1 person- oral presentation)</li> <li>• German Core Working Group “Pedagogical Staff at Botanical Gardens” Bremen, Germany. 22/06/2011 – 24/06/2011 (1 person -oral presentation &amp; Poster)</li> <li>• Headmaster conference for schools in the region of Hannover, Germany July,2011 (1 person- oral presentation &amp; paper)</li> <li>• Umweltforum (Environmental Forum), Tharandt, Germany 22/09/2011 (1 person – Oral presentation &amp; demonstration)</li> </ul>





		<ul style="list-style-type: none"><li>• Annual Meeting of the German speaking association of Botanical Gardens in Tharandt, Germany 26 –28/09/2011 (1 person – oral presentation)</li><li>• Rio+20 Meeting, Sustainability in Education, Congress center, Germany, 8/12/2011 (1 person - oral presentation)</li><li>• Regular Advanced Teacher Training Courses, Hannover, Germany, 20 dates, 2011 (3 people – Poster &amp; Oral presentation &amp; paper)</li><li>• German Core Working Group “Pedagogical Stuff at Botanical Gardens”, Botanical Garden Osnabrück 3/2/2012 (1 person-oral presentation, workshop)</li><li>• Meeting of the Regional Environmental Education Centers of Lower Saxony, Hannover, Germany. June, 2012 (1 person- Oral presentation)</li><li>• Headmaster conference for schools in the region of Hannover, Germany. June, 2012 (1 person – oral presentation)</li><li>• Umweltforum (Environmental Forum), Hannover, Germany 16/09/2012 (1 person – oral presentation &amp; poster &amp; leaflet)</li><li>• Annual meeting of the German speaking Botanical Gardens’ educators network 'Botany à la carte' , Mainz, Germany 20/09/2012 – 23/09/2012 (1 person – oral presentation)</li><li>• Meeting of the SBZH contact teachers for the plant set deliveries, Hannover, Germany November, 2012 (1 person –</li></ul>
--	--	---





		<p>Oral presentation &amp; leaflet)</p> <ul style="list-style-type: none"> <li>• Regular Advanced Teacher Training Courses, Hannover, Germany. 10 throughout 2012, (3 people – Oral presentation &amp; Poster &amp; leaflet)</li> <li>• Colloquium of nature science and pedagogy, Braunschweig, Germany. 09/01/2013 (2 people – oral presentation)</li> <li>• “Ideen Expo”, Hannover, Germany. 23/08/2013 – 30/08/2013 (SBZH pedagogical staff- leaflet &amp; paper &amp; oral presentation)</li> <li>• Environmental forum, Hannover, Germany. 01/09/2013 (1 person- Oral presentation &amp; poster &amp; paper)</li> <li>• Conference of Germany. 09/09/2013 (1 person- oral presentation &amp; Leaflets)</li> </ul>
BORD	<ul style="list-style-type: none"> <li>• “Sud expert plants”, Foreign affairs Ministry, Paris, 29/04/2011 (1 person - oral presentation)</li> <li>• EU Science Fair, Brussels, Belgium 03/05/2013- 04/05/2013 (1 person – Oral presentation &amp; poster &amp; workshop)</li> <li>• INQUIRE conference 9, Kew, UK 09/07/2013 -10/07/2013 (2 people – oral presentation &amp; poster)</li> </ul>	<ul style="list-style-type: none"> <li>• Event organized by Jardin botanique de Bordeaux, France. 08/03/2011 &amp; 07/04/2011. (3 people – Oral presentation &amp; paper)</li> <li>• Event organized by Jardin botanique de Bordeaux, France. 20/06/2012 (2 people – Oral presentation)</li> <li>• Event organised by GRAINE Aquitaine, Varaignes, France. 03/11/2013 – 05/11/2013 (1 person Oral presentation &amp; Poster)</li> <li>• Event organised by jardin Exotique de Monaco, France. 11/06/2012 – 15/06/2012 (1 person – Oral presentation)</li> <li>• Event organised by Strasbourg botanical garden and university,</li> </ul>





		<p>France. 26/02/2013 -28/02/2013 (1 person- Oral presentation)</p> <ul style="list-style-type: none"> <li>• Event organised by Société Nationale d’Horticulture de France, Paris. 14/02/2013 (1 person - oral presentation)</li> <li>• Event organised by Conservatoire national botanique de Brest, France. 13/06/2013 (1 person – oral presentation)</li> <li>• Event organised by Jardin botanique alpin du Lautaret, France. 08/07/2013 -10/07/2013 (1 person – oral presentation)</li> </ul>
FCTUC	<ul style="list-style-type: none"> <li>• Symposium AIM Jardiens botanicos, Azores, Portugal, 15-19/6/2011 (1 person - poster)</li> <li>• EUROGARD VI, Chios Island, Greece 28/5-2/6/2012 (1 person - oral presentation, workshop)</li> <li>• 5<sup>TH</sup> WORLD CONFERENCE on Educational Sciences, Rome, Italy. 05/02/2013 – 08/02/2013 (7 people – oral presentation via Skype)</li> <li>• INQUIRE conference 9, Kew, UK 09/07/2013 -10/07/2013 (7 people – oral presentation (3) poster (3))</li> <li>• 6<sup>th</sup> International Conference of Education, Research and Innovation (ICER 2013), Seville, Spain. 18/11/2013 – 20/11/2013 (3 people – oral presentation via Skype (2))</li> </ul>	<ul style="list-style-type: none"> <li>• FORUM INQUIRE – COIMBRA 2012, Portugal. 21/11/2012 – 22/11/2012 ( 1 person- Oral presentation &amp; leaflets &amp; workshop &amp; Poster)</li> <li>• FORUM INQUIRE – COIMBRA 2013, Portugal. 04/11/2013 – 05/11/2013 (1 person – Oral presentation &amp; Leaflets)</li> </ul>
MSU	<ul style="list-style-type: none"> <li>• <b>Science and Mathematics Education Conference (SMEC -2012)</b>, Dublin, Ireland 7-9/06/2012, ESTABLISH (2 people – workshop)</li> <li>• <b>BGCI's 8th International Congress on Education in Botanic Gardens, Mexico City, Mexico. 12/11/2012 – 16/11/2012 ( 1 person – oral presentation)</b></li> <li>• First congress of the CIS Council of Botanic Gardens under the International Association of Academies of Science, Moscow, Russia. 19/06/2013 – 20/06/2013 ( 2 people – Oral presentation)</li> <li>• INQUIRE conference 9, Kew, UK 09/07/2013 -10/07/2013 ( 6 people- oral presentation &amp; posters (4) &amp; workshop)</li> <li>• 3rd International Conference «Living in Harmony: Botanic Gardens and Society – Dialogue without Borders», Tver, Russia. 13/09/2013 – 16/09/2013 ( 2 people – oral presentation &amp; workshop)</li> </ul>	<ul style="list-style-type: none"> <li>• Soils and Biosphere: Sustainable Development, MSU Biology Museum, Moscow, Russia. 15/03/2011 – 15/03/2011 ( 1 person – Oral presentation)</li> <li>• National Convention of Biology Teachers, St.Petersburg University, Ministry of Education and Science, Moscow State University, Moscow, 28-30/6/2011 (3 people – poster &amp; leaflets)</li> <li>• Botanic Gardens in the Developing World: Theory and Practice, Moscow, Russia. 05/07/2011 – 07/07/2011 (2 people – Oral presentation)</li> <li>• 6th National Science Festival, Moscow, Russia. 08/10/2011 –</li> </ul>





		<p>09/10/2011 (2 people – Poster)</p> <ul style="list-style-type: none"><li>• National conference “Botanical Garden - 305 years of work and history”, Moscow, Russia. 07/12/2011 (2 people- Oral presentation)</li><li>• Conference for teachers and educators: “ New educational programs of the Moscow State University and school education”, Moscow State University, Moscow 10/12/2011 (1 person – oral presentation &amp; poster)</li><li>• Interuniversity regular seminar «Methodology of education for a sustainable development», Moscow, Russia. April, 2012 (1 person –Oral presentation)</li><li>• Conference «Methodology of ecological education», Moscow, Russia. 16/05/2012 (1 person- Workshop &amp; leaflets)</li><li>• Annual scientific-practical conference, Moscow, Russia. 22/09/2012 (1 person – oral presentation)</li><li>• 7th National Science Festival, MSU, Russia. 12/10/2012 – 14/10/2012 ( 3 people –oral presentation &amp; workshop)</li><li>• Moscow teacher’s and educators conference “Lesson in the Museum”, Russia. 25/09/2013 (1 person – Oral presentation)</li><li>• 8th National Science Festival, MSU, Russia. 13/10/2013 – 15/10/2013 (4 people – stand &amp; leaflets &amp; stand &amp; workshop)</li><li>• 3rd scientific and methodological conference: “New MSU Education Programmes and School Education”, Moscow,</li></ul>
--	--	--





NHM	<ul style="list-style-type: none"> <li>• EUROGARD VI, Chios Island, 28/5-2/6/2012 (1 person – workshop and poster)</li> <li>• <b>BGC's 8th International Congress on Education in Botanic Gardens, Mexico City, Mexico. 12/11/2012 – 16/11/2012 ( 1 person )</b></li> <li>• INQUIRE conference 9, Kew, UK 09/07/2013 -10/07/2013 ( 5 people- paper &amp; posters &amp; workshop)</li> </ul>	<p>Russia. 16/11/2013 (1 person – Oral presentation)</p> <ul style="list-style-type: none"> <li>• Museumspedagogisk fagdag "Museum Education day." Oslo, Norway 11/4/2011 (1 person - oral presentation)</li> <li>• Naturfagkonferansen 2011, Oslo, Norway. 20/10/2011 (1 person – oral presentation)</li> <li>• Museumspedagogisk fagdag "Museum Education day" 26/3/2012 (2 people - oral presentation &amp; demonstration)</li> <li>• Forskerfrøkonferanse Conference for kinder garden- and preschool, Oslo 04/02/2013 (1 person – oral presentation)</li> <li>• Museumspedagogisk fagdag "Museum Education day." Oslo, Norway. 18/03/2013 ( 1 person – demonstration)</li> </ul>
BGRHB	<ul style="list-style-type: none"> <li>• INQUIRE conference 9, Kew, UK 09/07/2013 -10/07/2013 ( 2 people- poster)</li> </ul>	<ul style="list-style-type: none"> <li>• 15th Advanced Training Meeting of Botanical Garden education centres in Mainz, Germany 20 – 22/5/2011 (2 people - oral presentation)</li> <li>• Conference of the German Society of Environmental Conversation, Vilm, Rügen, Germany 12-15/8/2011 (3 people – oral presentation)</li> <li>• 58th MNU Meeting in Bremerhaven, Germany National congress 17/09-18/09/2011 (3 people - oral presentation)</li> <li>• Annual Meeting of the German speaking association of Botanical Gardens in Tharandt, Germany 22nd – 25th September 2011 (1 person - oral presentation)</li> <li>• Scientific Directors of Botanic Gardens, Tharadt, Germany.</li> </ul>





		<p>24/09/2011 (1 person – oral presentation)</p> <ul style="list-style-type: none"> <li>• Meetings Advisory-Group, Hannover and Bremen, Germany. January, October, 2012 ( 1 person – workshop)</li> <li>• German Core Working Group “Pedagogical Staff at Botanical Gardens”, Oldenburg, Germany, 3-4/2/2012 (2 people - oral presentation)</li> <li>• Scientific Directors of Botanic Gardens, Göttingen, Germany. 17/02/2012 (1 person – oral presentation &amp; leaflets)</li> <li>• Members of bBR e.V., Bremen, Germany. 10/03/2012 (1 person – oral presentation)</li> <li>• INQUIRE Workshop, German Core Working Group “Pedagogical Staff at Botanical Gardens”, Bremen, Germany. 22/06/2012 – 24/06/2012 (3 people - workshop &amp; oral presentation)</li> <li>• Members of bBR e.V., Bremen, Germany. 09/03/2013 (1 person – Oral presentation)</li> <li>• 13th National Meeting of PhD students in Biology education in Muehlheim, Germany (1 Person – oral presentation).</li> </ul>
UL	<ul style="list-style-type: none"> <li>• BGCi's 8th International Congress on Education in Botanic Gardens, Mexico City, Mexico. 12/11/2012 – 16/11/2012 ( poster)</li> <li>• International Congress on ITC and education, Lisbon, Portugal. 14/11/2013 (2 people – oral presentation)</li> </ul>	<ul style="list-style-type: none"> <li>• Event at Botanic Garden, UL June,2011 (3 people – oral presentation)</li> <li>• Meeting with Santillana Publishers, Lisbon, Portugal. July 2012 (1 person- oral presentation)</li> </ul>
<b>Total</b>	<b>56 International conferences</b>	<b>135 National conference</b>





- **Snowballing**

In the INQUIRE project, in order to encourage the further implementation of IBSE in the 11 European countries, Partners have been running Train the Trainers seminars and courses. Partners across 11 countries ran 15 INQUIRE Train the Trainers seminars and courses. Some of these were day seminars while others were ran in a similar structure like the INQUIRE courses over a period of 3-5 months (max 72). These seminars/courses were attended by a total of 289 participants from various professional backgrounds. The most represented group was educators from botanic gardens, science centres, natural history museums, zoos and environmental NGO's - Contributing 168 of the participants - followed by, the attendance of 41 secondary teachers (including 8 head teachers) and 38 primary school teachers (including 3 head teachers). Moreover, 23 Teacher trainers, and 5 representatives of Educational authorities participated in the courses. Other professionals attending the courses (14 participants) include scientists and technicians.

The table below provides an overview of the professions of those who attended each course. The remainder of the document consists of a comprehensive list of participants.

*Table: 9. Overview of the professions of participants of INQUIRE Train the Trainers courses.*

INQUIRE course	Primary school teachers	Secondary school teachers	Educators	Teacher trainers	Education authorities representatives	other	total
LFU 17/1/2013- 24/5/2013 50 hours	1	0	8 Educators (1 head of education)	0	0	1 Scientist	10
MUSE 28- 31/8/2013 27 hours	1 (Head teacher)	8 (head teachers)	16 (6 senior managers)	5	3	2 (scientists)	35
KEW 23/10/2012 7 hours	0	0	21 (1 senior manager)	1	1	0	23
CSIC & UAH 28- 29/11/2012 10 hours	2 (1 Head teacher)	2	14	3	0	2 (1 technician, 1 scientist)	23
CSIC & UAH 29- 30/10/2013 10 hours	0	6	14	2	1	1	24





UniHB 6/9/2012 6 hours	7 (1 Head teacher)	3	3	1	0	0	14
UBG 5/6/2013 4 hours	0	1	6	5	0	1 (scientist)	13
NBGB 15/9/2012 7 hours	0	3	14	0	0	0	17
SBZH & BGRHB 22- 24/6/2012 17.5 hours	0	0	21	0	0	1 (scientist)	22
BORD 26/9/2012- 30/5/2013 28 hours	0	0	3	0	0	0	3
FCTUC 18/5/2012 7 hours	5	1	7	0	0	0	13
FCTUC 19/5/2012 7 hours	6	6	11	0	0	0	23
MSU 20/7/2013- 15/10/2013 72 hours	0	1	8	1	0	4 (scientists)	14
NHM 23/4/2013 11 hours	0	0	18	4	0	2 (scientists)	24
UL 21- 22/11/2012 12 hours	16	10	4 (1 senior manager)	1	0	0	31
Total	38	41	168	23	5	14	289

#### 2.4.3.4. Project Coordinator (PC)

The Project coordinator is responsible for all financial administration. Money received by the European commission was distributed immediately once it had been received. See Financial administration Section p.128ff.

Main tasks and achievements in the second period

Main tasks	Achievement in the Period
<i>According to General Conditions</i>	
Administer the financial contribution of the Union regarding its allocation between beneficiaries and activities, in accordance	✓ Two payments have been allocated to beneficiaries. Some money has been reallocated amongst partners. See detailed





with this 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;	description in Section p.128ff.
Keep the records and financial accounts making it possible to determine at any time what portion of the financial contribution of the Union has been paid to each beneficiary for the purposes of the project;	✓ Records are kept via the SAP system of the University of Innsbruck and each beneficiary received the second payment (30% of the money) according to the grant agreement
Inform the Commission of the distribution of the financial contribution of the Union and the date of transfers to the beneficiaries, when required by this grant agreement or by the Commission;	See financial administration Section p.128ff ✓
Review the reports to verify consistency with the project tasks before transmitting them to the Commission;	✓ Done
Monitor the compliance by beneficiaries with their obligations under this grant agreement.	✓ Done
<i>According to Annex I Grant Agreement (p.64)</i>	
Monitoring and coordinating the development process.	✓ Done
Project plan execution and monitoring.	✓ Visible in First and Second interims Report and Final report; Deliveable 8.3. External Evaualtion Report
Updating of the project plan.	No major updates have been made, The Project run according to the schedule presented in the Grant Agreement.
Coordination of the work package leaders.	✓ WP leaders are partners in the MB and met in MB meetings and were informed about any MB decision via the particular MB





	workspace on Glasscubes website (INQUIRE handbook) <a href="http://www.glasscubes.com/">http://www.glasscubes.com/</a>
Carrying out the operational management of the project.	✓ Visible in First and Second interims Report and Final report; Deliveable 8.3. External Evaualtion Report
Maintaining contact with and between partners.	✓ via Handbook (Glasscubes) and management and consortium meetings
Reporting to the IBSE Expert Consortium.	✓ Was done during Consortium meetings whenever necessary
Preparing documents and delivering information needed for the decisions of the IBSE Expert Consortium	✓ (e.g. Grant Agreement)
Maintaining contact between Management Board members.	✓ This contact is maintained via the Management Board Work space on the Glasscubes website (INQUIRE Handbook), emails and additional MB meetings which were not planed beforehand but had to be organized to support the project properly.
Carrying out correspondence with the EU Commission.	✓ Whenever necessary correspondence was done via email
Fostering the awareness of gender equality and gender mainstreaming in the project.	✓ The project consortium is female dominated but male partners are well accepted and work on equal terms.
Monitoring compliance with legal regulations of the European Community concerning gender equality	✓ “The Strategy for equality between women and men represents the European Commission's work program on gender equality for the period 2010-2015. It is a comprehensive framework committing the Commission to promote gender equality into all its policies for the thematic priorities. The program states that there is still inequality and activities need to be taken to balance those. During the INQUIRE project we have addressed in the best possible waythe issues





	<p>raised in this Framework; in particular::</p> <ul style="list-style-type: none"> <li>- In <i>relation to women's employment rates</i>: More women than men have been employed in INQUIRE due to their better qualifications for doing the job.</li> <li>- Women in INQUIRE <i>earned the same salary</i> as men earned if they were employed in that position (according to the information partners gave us).</li> <li>- Unfortunately most women who were employed in INQUIRE <i>worked part-time due to the budget constraints</i> in a 36 month project the average period of employment is 22 person month</li> </ul> <p>In INQUIRE many <i>female partners held leading positions</i></p> <ul style="list-style-type: none"> <li>- MB members gender: 2 males 4 females</li> <li>- Work package leaders gender: 2 males 4 females</li> <li>- Contact person in partner Institute (leading positions ): 6 males 9 females</li> </ul>
Monitoring the overall legal, contractual, and ethical management.	✓ Included supporting WP9 Ethical Issues leader in fulfilling her tasks
Coordination of knowledge management and other innovation-related activities.	✓ The Glasscubes website (INQUIRE Handbook) is particularly helpful for managing this task and supporting partners to share knowledge / inform each other about any project progress
Providing information to all partners on principles and guidelines for the protection of IPR (intellectual property).	✓ INQUIRE Ethical Guidelines have been finished and partners have been informed about IPR in particular see ANNEXE 4 Ethical Guidelines
Reporting to the EU commission:	✓ All of the deliverables have been handed in on time (see Table of Deliverables p.123 ff).
Financial administration:	✓ Part of this report





### 2.4.3.5. Work package leaders (WP Leaders)

Main tasks and achievements in the second period

Main tasks	Achievement in the Period
Participate in Project Management Board meetings.	✓ All WP leaders participated in the MB Meetings organized in course of the project duration.
Collect work done in between working sessions.	✓ WP Leaders fulfilled their job very well, as expected
Monitoring and coordination of the development process of the work package.	✓ WP Leaders fulfilled their job very well, as expected
Work package plan execution and monitoring; updating of the plan.	✓ Completed as expected, No updating needed
Reporting to the management board, handing out deliverables.	✓ Was done by all WP leaders and all deliverables were handed in on time
Organize meetings if scheduled and be responsible for the minute taking of this meeting. In case there is more than one meeting during the course of the Work package the WP leader can select another IBSE Expert Consortium member who is not a WP leader to take the minutes.	✓ Minutes were taken by the Dissemination Officer of BGCI; this resulted in the most efficient way of managing this task.

### 2.4.3.6. IBSE Expert Consortium

#### INQUIRE Consortium/Partner meetings

The INQUIRE consortium meetings bring Partners together to ensure that work is delivered on time, to a high standard and also to support the development of a Community of practice amongst the consortium Partners.

During the consortium meetings, Partners discuss a whole range of issues, including the project deliverables, the INQUIRE course structure and evaluation and communication within the project. Partners are also trained in different evaluation methods, reflect on running the





courses, exchange good practice on IBSE, carry out peer reviews for lesson plans and modules, and receive training on the website.

5 Consortium meetings have been organised.

Tables 10. and 11. give an overview of these meetings and numbers of participants.

*Table 10.: List of Consortium Meetings*

Title of meeting	Dates	Venues	Number of people attending	Activities
Inaugural meeting	20-21 January 2011	National Botanic Garden of Belgium, Brussels	30	Discuss dissemination, communication in the project, ethical issues, models for developing the course, criteria for selecting IBSE, understanding of IBSE, quality assurance for meeting the project objectives.
1 <sup>st</sup> Consortium meeting	3-4 May 2011	Wakehurst Place, Royal Botanic Gardens KEW, UK	31	Communication platform, discussion on IBSE approaches, posters with the structure of course, evaluation techniques, lesson plans presented, ethical issues, logos and website.
Train the Trainers meeting	23-25 June 2011	Obergurgl, Austria	39	Quality Management Plan, list of tools and ideas to evaluate, IBSE lesson demonstration to try out observation technique, talk on Biodiversity and Climate Change, educational resources to be used for the courses. Activity on IBSE questioning, peer review of lesson plan, poster on outcomes and assessment methods.
2 <sup>nd</sup> Consortium meeting	26-28 September	Schulbiologiezentrum	36	IBSE sessions on climate change and biodiversity





	2011	Hannover and Rhododendron Park, Bremen, Germany		demonstration, lessons learned from running the courses, peer review of INQUIRE modules, presentation of PIC manual and what needs to be done, Quality Management Plan presentation, portfolios of evidence and pre-course questionnaires, assessment techniques- concept maps and reflective journals. Presentation of INQUIRE website and interviews.
3 <sup>rd</sup> Consortium meeting	29 February- 2 March 2012	Royal Botanic Garden Juan Carlos I, Alcála and Royal Botanic Garden, Madrid Spain	34	IBSE activities demonstration by Partners CSIC, UAH. Poster on successes and challenges with running the INQUIRE courses, Requirements for Interim report, practicing and analysing interviews, portfolios of evidence. Web-clinics, criteria for selecting participants for INQUIRE conference.
4 <sup>th</sup> Consortium meeting	3 <sup>rd</sup> 5 <sup>th</sup> October 2012	University of Lisbon, Coimbra Botanic Gardens	39	Tour of Lisbon Botanic Garden; IBSE activity – example from Partner UL; Partners share experiences about what went well during the running of their course; presentation on external evaluation report; discussion on portfolios of evidence; tour of Coimbra Botanic Garden; IBSE activity – example from Partner FCTUC; Group discussions - what Partners





				will do differently in their next INQUIRE courses; Presentation from 4 Partners about the Train the Trainers seminars; Open Space workshop on evaluation; presentation of interim report; final conference timeframe.
5 <sup>th</sup> Consortium meeting	29 <sup>th</sup> September – 1 <sup>sts</sup> October 2013	MUSE Trento, Italy	27	Best inquiry activity; Diamond Ranking activity; top criteria for appointing an education officer at a botanic garden; feedback on external evaluation; parallel sessions: Interviews – Reporting; relating research to practice; dissemination; reviewing lesson plans; partners’ reflection on their emotional journey during the INQUIRE project; final thoughts on the sustainability of the INQUIRE courses; IBSE activity – example from partner MUSE;





Table 11.: number of Participants at Consortium Meetings from each institution

Partner	Inaugural meeting Belgium	1 <sup>st</sup> consortium meeting Wakehurst Place	Train the Trainers meeting Obergugl Austria	2 <sup>nd</sup> consortium meeting Germany	3 <sup>rd</sup> consortium meeting Spain	4 <sup>th</sup> consortium meeting Portugal	5 <sup>th</sup> consortium meeting Italy
LFU	1	2	6	3	2	3	4
BGCI	2	2	2	2	2	2	2
KCL	1	1	1	2	2	2	1
MTSN	3	2	4	3	3	3	3
KEW	4	2	3	3	3	3	1
CSIC	1	2	2	2	2	2	1
UniHB	2	2	2	2	1	2	0
UBG	2	2	2	2	2	2	2
NBGB	2	1	1	1	3	1	1
SBZH	2	3	2	5	2	3	2
BORD	2	2	1	1	2	1	2
FCTUC	1	1	3	2	1	3	1
MSU	2	2	2	2	2	2	1
NHM	1	1	3	1	2	2	2
BGRHB	1	2	1	2	1	2	0
UAH	1	2	2	2	2	2	2
UL	1	2	2	1	3	4	2

Main tasks and achievements in the second period

Main tasks	Achievement in the Period
Decisions on the admission of additional members to the consortium. These members may consist of staff from partner institutions or other LOTC sites. Additional members will be responsible for their own costs.	✓ The consortium has fulfilled all the following tasks. There were no additional LOTC sites partners brought into the consortium. No other LOTC insitutions have been funded via the INQUIRE project.
Conflict resolution between consortium members.	✓ Only one conflict arose in course of th whole project duration and consortium partners





	involved were very cooperative in solving this problem.
Decisions about the work and task allocation between partners.	✓ Partners are very respectful towards each other and maintain very good working relationships. This is deeply rooted in having had good personal contact with each other during consortium meetings and the conference resulting in the establishment of long-term friendships and opportunities for future collaboration.
Adjustments to the work plan and re-allocation of resources based on the recommendations of the Project Management Team.	✓ No adjustments to the work plan
The IBSE Expert Consortium is responsible for accomplishing agreed work on time.	✓ This has been fully achieved as obvious in this report
It is also responsible for agreeing quality standards and setting up deadlines and schedules for handing in work.	✓ This has been fully achieved as obvious in Deliverable 8.3 External evaluation report and Deliverable 7.2. Quality Management Report.
Consortium Meetings:	✓ 5 consortium meetings were organized and held. These meetings have been extremely helpful for the project progress and quality assurance of the projects (see p.96ff)

### 2.4.3.7. The INQUIRE Advisory Groups (AG)

During the 1<sup>st</sup> year of the INQUIRE project Partners established 11 Advisory groups in their countries where the INQUIRE courses run. The Advisory groups were formed in order to support the running and promotion of the INQUIRE courses nationally.

The members of the Advisory groups have been selected based on criteria such as:

- Knowledge of the national educational system and especially the science curriculum in each country,
- understanding of Inquiry-based Science Education in relation to the national education system,
- understanding of opportunities and constraints for teachers and educators,





- ability to influence curriculum delivery and training,
- good networking contacts,
- knowledge of accreditations systems,
- enthusiasm and support for teacher training,
- interest in Biodiversity, Climate change and sustainability issues,
- being involved in the national and local education system in primary and secondary level

The 11 Advisory groups of the INQUIRE project consisted of 122 members who hold a variety of positions: representatives of National and local Education authorities, representatives of regional teacher training institutions, head teachers, science education researchers/academics, science researchers, teachers, botanic garden educators, representatives of other informal education institutions, representatives of formal and informal education networks, botanic gardens directors (see First Interim Report for more details on the expertise of the members in each National Advisory Group).

The number and the timings of the AG meetings over the whole project period varied from country to country depending on the Partners' need to get the AG's support in running the courses and also on the availability of the members of the AG to attend (see table 14 providing an overview of all the AG meeting dates).

Most of the Partners organised at least 3 meetings (on an annual basis) during the whole period of the project. The meetings were organized timely to get the support of the AG in major developments of the project i.e. designing and running the Pilot INQUIRE Course (PIC), revising and running the INQUIRE Course (IC) and ensuring the sustainability of the IC in the future. Some Partners such as NHM and KEW run most of their AG meetings in the first period of the project as they needed more support to establish and run their PIC and also to review and run the IC. It is notable that in some countries the AG were more active which is indicated by the number and regularity of their meetings but also by the groups' constitution and actions. For example the Italian AG (Partner MTSN) met in total 14 times whilst the French AG (Partner BORDEAUX) met in total 7 times. In both cases the meetings were attended by representatives from local and national education authorities who supported actively the marketing, development and sustainability of the PIC and IC in Italy and France respectively. Some Partners who had difficulty in organizing a meeting with all the AG members found other ways to communicate and get the support of the group. For example UBG used face to face meetings





with individual members of the Bulgarian AG and e-mail communications to report on the results of the PIC and review and finalize the IC. It should be also noted that in some countries the AG discussed and supported actions that contributed significantly to the snowballing and sustainability of the INQUIRE courses. For example the Portuguese AG discussed and supported the organizing of two INQUIRE Forums in Portugal to promote the IBSE as a pedagogical tool. Two forums were organised by FCTUC and UL individually as two-day events during the Science Week, November, 2012. Also, during one of the German AG meetings it was discussed how to integrate the INQUIRE course in the higher education courses of teacher training run by University of Bremen.

Overall, in the 1<sup>st</sup> period of the project (December 2010/month 1 – May 2012/month18) the meetings of the 11 AG focused on the following topics:

- Presentation and updates on the INQUIRE project
- Agreeing on a definition of IBSE
- Structure and content of the Pilot INQUIRE Course (PIC)
- Budget and logistics of running the PIC
- Linking the PIC course with the National Educational Systems
- Criteria for selecting participants for the PIC
- Marketing the courses
- How to engage schools and LOtC sites in each country to reinvigorate IBSE
- Ethical issues
- Evaluation methods and results of the PIC
- Update on the progress of the PIC and recommendations for improving the next modules before the end of the course
- Accreditation of the PIC
- Dissemination and snowballing (influencing and reaching teachers, educators, schools, LOtC sites and local and national Education authorities)

During the 2<sup>nd</sup> period of the project (June 2012/month 19 – November 2013/month36) the main topics discussed in the 11 Advisory groups overall were:

- Updates on the project progress
- Assessment and evaluation results of the PIC and recommendations for improving the structure and content of the INQUIRE course (IC).





- Final structure and content of the IC
- Marketing the IC and dissemination strategies
- Criteria for selecting the IC participants
- Logistics of running the IC
- Snowballing of IBSE and the INQUIRE courses in other institutions
- Running the TtT course - logistics and structure and content of the course
- Results from the evaluation of the IC and recommendations of improving the courses which will run after the end of the project
- Ideas for future courses and sustainability
- How to use the INQUIRE website
- Accreditation of the IC
- INQUIRE conference-participation of the PIC participants in the conference
- Funding and support from the National and/or local education authorities for running the IC in the future

Below are presented the agenda and action points of the meetings of the Spanish AG meetings during the whole period of the project. These indicate the breadth and the importance of the issues discussed and addressed by the National AG meetings in all Partner countries. AS an example see below the summary report presented by Spanish partners (CSIC, UAH)

*Table 12: Summary report of the Spanish AG meetings months 1- 36 of the project*

<b>Date and place of the meeting</b>	<b>Names of attendees</b>	<b>Role &amp; organisation of attendee</b>	<b>Outcomes of the meeting including any action points</b>
<b>09/06/2011 Real Jardín Botánico de Madrid (CSIC)</b>	María Bellet Serrano	Head of the Education CSIC	<b>AGENDA:</b> <ul style="list-style-type: none"> <li>• Introduction of all the members of the NAG</li> <li>• Presentation of the INQUIRE Project</li> <li>• Structure and content of the INQUIRE courses</li> </ul>
	Marina Ferrer Canal	INQUIRE Project Assistant CSIC	
	Blanca Olivé de la Puente	Head of the Education UAH	
	Alicia Fernández	INQUIRE Project	





	Rodríguez	Assistant UAH	<p>(2011-2012).</p> <ul style="list-style-type: none"> <li>• What is IBSE?</li> <li>• INQUIRE Website</li> <li>• Ethical Issues</li> <li>• Education Policies</li> <li>• Suggestions and contributions from the other attendees.</li> <li>• Dates for the next AG Meeting.</li> </ul> <p>ACTION POINTS:</p> <ul style="list-style-type: none"> <li>• Ideas for the announcement of the courses</li> <li>• Permissions from school principals and parents</li> <li>• Evaluation strategies, Final report, etc.</li> </ul>
	Mar Jiménez	Head of Teacher Training Department of the Ministry of Education	
	Carmen Monge García-Moreno	Head of the Department of Biology and Geology at Palomeras-Vallecas Secondary School	
	M <sup>a</sup> Dolores Perales Herrero	Teacher of Biology and Geology at Palomeras-Vallecas Secondary School	
	Juan Carlos Sánchez Blasco	Teacher of Biology and Geology at Joaquín Rodrigo Secondary School	

Date and place of the meeting	Names of attendees	Role & organisation of attendee	Outcomes of the meeting including any action points
<b>04/10/2011</b> <b>Real Jardín Botánico de Madrid (CSIC)</b>	María Bellet Serrano	Head of the Education CSIC	<p>AGENDA:</p> <ul style="list-style-type: none"> <li>• Results of the Pilot INQUIRE Course run through with the Ministry of Education (5th-9th September 2011).</li> <li>• Ideas for improvement /modification of the first course through the Regional Teacher</li> </ul>
	Marina Ferrer Canal	INQUIRE Project Assistant CSIC	
	Blanca Olivé de la Puente	Head of the Education UAH	
	Alicia Fernández Rodríguez	INQUIRE Project Assistant UAH	
	Mar Jiménez	Head of Teacher	





		Training Department of the Ministry of Education	<p>Training Centre (Centro Regional de Innovación y Formación “Las Acacias” Comunidad de Madrid) (both primary and secondary)</p> <ul style="list-style-type: none"> <li>• Presentation of the INQUIRE Website</li> <li>• Review and adaptation of the Lesson Plan: “Pollination: why do insects visit flowers” by University of Innsbruck.</li> <li>• Dates for the next AG Meeting</li> </ul> <p><b>ACTION POINTS:</b></p> <ul style="list-style-type: none"> <li>• Finalize an INQUIRE questionnaire to evaluate each module</li> <li>• Decide on whether to use moodle in the next course through the Ministry of Education</li> <li>• Choose criteria to select course participants. The Regional Teacher Training Institutions selects participants based on the registration dates while the Ministry of Education selects participants based on the seniority of the teacher</li> <li>• In the final reports more emphasis should be put</li> </ul>
	Carmen Monge García-Moreno	Head of the Department of Biology and Geology at Palomeras-Vallecas Secondary School	
	M <sup>a</sup> Dolores Perales Herrero	Teacher of Biology and Geology at Palomeras-Vallecas Secondary School	
	Juan Carlos Sánchez Blasco	Teacher of Biology and Geology at Joaquín Rodrigo Secondary School	





			<p>on the methodology</p> <ul style="list-style-type: none"> <li>• In the INQUIRE course questionnaires questions should aim not only to evaluate teachers but to improve the course.</li> <li>• Select the best PIC course participant's project to present it during the next course</li> <li>• Dissemination of the INQUIRE course</li> </ul>
--	--	--	--

Date and place of the meeting	Names of attendees	Role & organisation of attendee	Outcomes of the meeting including any action points
<b>19/03/2013</b> <b>Real Jardín Botánico de Madrid (CSIC)</b>	María Bellet Serrano	Head of the Education CSIC	<p>AGENDA:</p> <ul style="list-style-type: none"> <li>• Review of the 1st module of the 2013 INQUIRE Course</li> <li>• How to ensure that more institutions will run INQUIRE Courses</li> <li>• Ideas to run INQUIRE Courses in the future</li> </ul> <p>ACTIONS: Ideas for future INQUIRE Courses:</p> <ul style="list-style-type: none"> <li>• Through the Centro Territorial de Innovación y Formación Madrid Este (CTIF-Este) → Establish an appointment with the Head of the Department</li> </ul>
	Blanca Olivé de la Puente	Head of the Education UAH	
	Alicia Fernández Rodríguez	INQUIRE Project Assistant UAH	
	Carmen Monge García-Moreno	Head of the Department of Biology and Geology at Palomeras-Vallecas Secondary School	
	M <sup>a</sup> Dolores Perales Herrero	Teacher of Biology and Geology at Palomeras-Vallecas Secondary School	
	Juan Carlos Sánchez Blasco	Teacher of Biology and Geology at Joaquín	





		Rodrigo Secondary School	<ul style="list-style-type: none"> <li>• To run the course at the school/high school</li> <li>• To run the course in English through the CLIL (Content Language Integrated Learning)</li> <li>• Through Postgraduate courses at CSIC</li> <li>• Through summer courses at UAH</li> <li>• Through Grundtvig/Comenius seminars.</li> <li>• To run online courses</li> </ul>
--	--	--------------------------	---

**Note:** throughout 2012 no Advisory Group Meetings were organised because:

- With the change of Government in November 2011, the Teacher Training Department of the Ministry of Education was abolished.
- The relationship with the Regional and Local Education Authorities were damaged due to the difficulties to run the PIC through them.





Table 13.: Expertise of the Advisory group members in the INQUIRE project countries

Advisory groups	Science education researcher / academic <sup>1</sup>	Science researcher/academic	Teacher trainer	Head teacher	Science teachers – secondary education/primary teachers	Botanic garden educator	Staff from other LOTC, NHM, botanic gardens	Education authority representatives <sup>2</sup>
LFU-Austria	3	1	2	2	2	2	2	3
MTSN-Italy	1		2		4	3	2	2
KEW-UK	4			2	2	1	2	
CSIC and UAH - Spain	1	1		1	2	3	1	2
UniHB, Botanika, SBZHB - Germany	3	1	2	1	1	4	1	2
UBG - Bulgaria	1				2	2	2	
NBG - Belgium	1			1	2	2		1
BORD - France	1		1			2	4	4
FCTUC and UL - Portugal	2	1	1	1	2	2		1
MSU – Russia	2	3			3			
NHM - Norway	2	2		1	2		2	1
Total no of members	21	9	8	9	22	21	16	16

<sup>1</sup> Some of the science education academics are also involved in teacher training

<sup>2</sup> Some of the representatives are also involved in Teacher training





Table 14.: INQUIRE National Advisory Group number of members and meetings

Advisory groups	Numbers of members	Meeting dates
LFU-Austria	17	1 <sup>st</sup> meeting 7/3/2011 2 <sup>nd</sup> meeting 03/05/2012 3 <sup>rd</sup> meeting 21/11/2013
MTSN-Italy	14	1 <sup>st</sup> meeting 01/02/2011 2 <sup>nd</sup> meeting 30/05/2011 3 <sup>rd</sup> meeting 14/09/2011 4 <sup>th</sup> meeting 14/10/2011 5 <sup>th</sup> meeting 08/05/2012 6 <sup>th</sup> meeting 17/05/2012 7 <sup>th</sup> meeting 08/06/2012 8 <sup>th</sup> meeting 17/07/2012 9 <sup>th</sup> meeting 18/09/2012 10 <sup>th</sup> meeting 10/10/2012 11 <sup>th</sup> meeting 19/12/2012 12 <sup>th</sup> meeting 24/01/2013 13 <sup>th</sup> meeting 21/02/2013 14 <sup>th</sup> meeting 27/08/2013
KEW-UK	11	1 <sup>st</sup> meeting 13/05/2011 2 <sup>nd</sup> meeting 04/10/2011 3 <sup>rd</sup> meeting 19/09/2012
CSIC and UAH - Spain	11	1 <sup>st</sup> meeting 09/06/2011 2 <sup>nd</sup> meeting 04/10/2011 3 <sup>rd</sup> meeting 19/03/2013
UniHB, Botanika, SBZHB - Germany	15	1 <sup>st</sup> meeting 07/03/2011 2 <sup>nd</sup> meeting 16/03/2012 3 <sup>rd</sup> meeting 01/03/2013 (UniHB & Botanika) 4 <sup>th</sup> meeting 31/10/2013 (Botanika & SBZH)
UBG -Bulgaria	7	1 <sup>st</sup> meeting 25/03/2011 2 <sup>nd</sup> meeting September-October 2012 (face to face meetings and phone discussions with Advisory Board members)
NBGB - Belgium	7	1 <sup>st</sup> meeting 31/05/2011 2 <sup>nd</sup> meeting 08/12/2011





		3 <sup>rd</sup> meeting 09/09/2012 4 <sup>th</sup> meeting 30/11/2013 (on-line)
BORD - France	12	1 <sup>st</sup> meeting 06/03/2011 2 <sup>nd</sup> meeting 7/04/2011 3 <sup>th</sup> meeting 18/05/2011 4 <sup>th</sup> meeting 7/09/2011 5 <sup>th</sup> meeting 3/07/2012 6 <sup>th</sup> meeting 20/03/2013 7 <sup>th</sup> meeting 19/06/2013
FCTUC and UL - Portugal	10	1 <sup>st</sup> meeting 14/05/2011 2 <sup>nd</sup> meeting 14/07/2012 3 <sup>rd</sup> meeting 21/09/2013
MSU – Russia	8	1 <sup>st</sup> meeting 11/04/2011 2 <sup>nd</sup> meeting 08/02/2013 3 <sup>rd</sup> meeting 24/12/2013
NHM - Norway	10	1 <sup>st</sup> meeting 04/04 2011 2 <sup>nd</sup> meeting 16/02 2012 3 <sup>rd</sup> meeting 29/04/2013
<b>Total no of members</b>	<b>122</b>	

Main tasks and achievements in the project period months 1-36

Main tasks	Achievement in the Period
The AG will advise the Advisory Group Manager in all matters concerning the national as well as local school curriculum, teacher training requirements as well as teacher's needs. School teachers, head teachers and education authorities are selected by their profession and their commitment to work in the project voluntarily. AG members may be given the opportunity to accompany the AGM abroad to attend a Consortium meeting or participate in the Final Conference	<p>✓ Deliverable D.1.3. "Document explaining Advisory Group constitutions" was handed in on time in Month 4.</p> <p>All partners have installed an Advisory Group in their country and handed in a List of Participants for D.1.3. The AGM has fulfilled his/her tasks</p>
The AGM is responsible for: <ul style="list-style-type: none"> <li>- setting up an advisory group of teachers, botanic gardens educators and representatives of the school</li> </ul>	<p>✓ Deliverable D.1.3. "Document explaining Advisory Group constitutions" was handed in on time in Month 4.</p> <p>All partners have installed an Advisory Group in their</p>





<p>authority. Including a representative of a teacher training institution and science education researchers are recommended</p> <ul style="list-style-type: none"> <li>- inviting AG participants to a meetings at least twice a year</li> <li>- summarize meeting outcomes and recommendations to discuss national requirements during consortium meeting</li> </ul>	<p>country and handed in a List of Participants for this document. Table 14 gives an overview of all the AG meetings held in each country. The number and the timings of the AG meetings over the whole project period varied from country to country depending on the Partners' need to get the AG's support to run the courses and also on the availability of the members of the AG to attend (see table 14 providing an overview of all the AG meeting dates).</p> <p>Most of the Partners organised at least 3 meetings which were held annually during the whole period of the project which reflects the contribution of the AG's in major developments i.e. developing and running the Pilot INQUIRE Course (PIC), revising and running the INQUIRE Course (IC) and ensuring the sustainability of running the IC in the future. Some Partners run most of their AG meetings in the first period of the project as they needed more support to establish and run their PIC and also to review and run the IC. Some Partners exceeded the originally planned number of meetings e.g. AG meetings in France organized by BORDEAUX and AG in Italy organized by MTSN. When necessary Partners discussed during the Consortium meetings the AG meetings' outcomes. Also during the Consortium meetings Partners reflected on the successes and challenges of forming an AG and running regular meetings.</p>
<p>Advisory Groups running in four of the countries will be coordinated by more than one partner:</p> <ul style="list-style-type: none"> <li>- In UK the AG will be run by Kew, KCL and BGCI</li> <li>- In Germany the AG will be run by SBZH, UniHB and BGRHB</li> <li>- In Spain the AG will be run by UAH and CSIC</li> <li>- In Portugal the AG will be run by UL and FCTUC</li> </ul>	<p>✓ In four countries (UK, Germany, Portugal and Spain) the AG were coordinated by more than one partner as was originally planned.</p>
<p>In UK, KEW will be responsible for running the INQUIRE course at the Royal Botanic Gardens whereas KCL will be responsible for inviting people engaged in education research and</p>	<p>✓ All these Partners have fulfilled their tasks according to the planning</p>





<p>science curriculum planning to AG meetings. BGCI will join these meeting to be kept informed for conveying information.</p>	
<p>In Germany SBZH and BGRHB will run the pilot INQUIRE course while UniHB will be responsible for the formative assessment of the pilot INQUIRE course, run the Advisory group and serve as an important link to national curriculum planners.</p>	<p>✓ SBZH and BGRHB ran their courses but it turned out that they preferred to do the formative assessment of their course themselves and did not need to cooperate with UniHB for this task. As it was explained in the Interim report months 1-18 UniHB changed their role in the project. As a result UniHB ran two INQUIRE courses and contributed to training a higher number of teachers on IBSE. UniHB and BGRHB also agreed to collaborate with each other in order to integrate the INQUIRE course in the higher education system i.e. in the accredited teacher training courses at University of Bremen.</p>
<p>In Spain and Portugal all four partners will run the pilot INQUIRE course.</p>	<p>✓ Partners UL and FCTUC (Portugal) and UAH and CSIC (Spain) collaborated closely in developing and running INQUIRE courses. In Portugal, UL and FCTUC run the Pilot INQUIRE courses separately while UAH and CSIC planned to run together two courses (one at a local and one at a national level). However courses in Spain ran at the national level with almost twice the number of participantst for effience and effectiveness. In the second period of the project UL and FCTUC continued to offer the INQUIRE courses separately while UAH and CSIC run one INQUIRE course together.</p>
<p>All partners have contacted the school authorities in their country and are in discussions about how the training course can be linked to regional continuing professional development for teachers. Several gardens have received letters from their authorities stating their commitment to support this course.</p>	<p>✓ The Deliverable 2.1.: INQUIRE course Implementation plan (submitted in Month 5) presented how the PIC would be implemented in each country and would be linked to the Partners' regional and national teacher continuing professional development. During the AG meetings representatives of local and national education authorities supported running the PIC and IC by disseminating information through their networks for the recruitment of participants, by advising on the course structure and content and by supporting the accreditation and sustainability of the courses.</p>





	<p>Some of the Partners were also successful in securing financial support by the Education authorities to the course . In Norway the City of Oslo Education Authority funded supply teachers to cover the days that the INQUIRE participants had to be away from school in order to attend the PIC and IC run by NHM.</p> <p>It should be also noted that in one case Partners reported problems in their relationship with the education authorities. In particular, in 2012 no Advisory group meetings were held in Spain because of changes in the government and the Ministry of Education (the Teacher Training Department of the Ministry was abolished) and because of issues arising in the relationship of CSIC and UAH with the regional and local education authorities. These issues arose when CSIC and UAH tried to run the PIC through the education authorities, a collaboration that didn't work out.</p> <p>The section of this report on the sustainability of the INQUIRE courses includes more information on how the INQUIRE courses will continue to be linked to the regional continuing professional development for teachers in the future.</p> <p>ANNEXE 4 Sustainability</p>
--	---

### 2.4.3.8. Consortium Partner (LOtC Institution)

Main tasks and achievements in the second period

Main tasks	Achievement in the Period
Administering an Advisory Group in the country.	<p>✓ Deliverable D.1.3. "Document explaining Advisory Group constitutions" was handed in on time in Month 4.</p> <p>All partners have installed an Advisory Group in their country and handed in a List of Participants for this document. Most of the partners organized 4 or more meetings in course of the project.</p>





<p>Cooperating with an official teacher training institution to implement the INQUIRE course in their training programme.</p>	<p>✓ Deliverable 2.1.: INQUIRE course Implementation plan was handed in on time in Month 5. All partners are either an official teacher training institution themselves or were cooperating with an official training institution. INQUIRE training course in each country. All partners run two training courses and handed in an implementation showing a detailed planning for how to implement the INQUIRE training course in each country after the projects is finished.</p>
<p>Running one professional development workshop for other botanic garden and LOTC educators in-country to promote the use of IBSE materials with teachers.</p>	<p>✓ This Train the Trainer Course was held in Obergurgl, Austria 23<sup>rd</sup>-25<sup>th</sup> of June 2011 Agenda see Annex 1</p>
<p>Running the pilot INQUIRE course for teachers and educators twice one in the second year, one in the third year.</p>	<p>✓ All partners responsible for this task run the second course.</p>
<p>Acting as a 'mentor' to botanic gardens, natural history museums, science centres in-country.</p>	<p>✓ Train the Trainers courses were run by all partners responsible for this task.</p>
<p>Feeding back news about the project to BGCI for production of an E-newsletter, translating the E-newsletter (approximately 1,500 words) twice per year into the local language and sending this back to BGCI for inclusion on the website.</p>	<p>✓ See p. 47 Task 6.1.</p>
<p>Supporting INQUIRE course participants to carry out reflective practice while participating in the course.</p>	<p>✓ INQUIRE course participants in all countries handed in case studies about their own IBSE teaching development. Reflective practice has been implemented in all partner courses in all countries.</p>
<p>Attending the Inaugural Meeting and 4 Consortium Meetings over the three years (2 days/ nights including arrival and departure) plus one final conference (two days).</p>	<p>✓ Representatives of partners have attended consortium meetings scheduled in course of the project. These meetings were extremely rewarding for all partners because they allowed partners to share experiences, enhance their understanding of IBSE and</p>





	get helpful Input from education researchers. Meetings were organised by partners KEW, SBZH, UniHB, BGRHB;CSIC, UAH, UL, FCTUC, MTSN; All meetings were extremely well organized and very productive for all participants.
Writing up own outcomes and supporting teachers to also write up outcomes and present at the final conference.	✓ The INQUIRE Quality Management Plan not only asks partners, but also course participants, to hand in case studies and report on their own particular learning development. At the Final INQUIRE conference INQUIRE partners as well as their INQUIRE course participants oriented case studies they produced.
Writing reports about INQUIRE trainings and other dissemination activities for the interim and final reports.	✓ The Dissemination report was updated on a regular basis. See Dissemination activities p. 71ff and Deliverable 6.3. Dissemination Summary.

**2.4.3.9. Communication between beneficiaries**

Main tasks	Achievement in the Period
The systematic and timely implementation of information flow is central for any consortium based project.	✓ The Project handbook on Glasscubes is extremely helpful to support the implementation of information; partners have used this tool on a regular basis. (see below).

**2.4.3.10. Evaluation Process**

Main tasks	Achievement in the Period
A Quality Management Manual will be produced in the first three months to guarantee excellent development of the EU Support Action. The Consortium will agree on this manual as a part of the consortium agreement in month 4. The main objective is to ensure the optimal quality of the INQUIRE	✓ not applicable for this period





deployment and deliverables.	
<p>The Project Handbook (web based domain) will only be accessible to project partners. Each partner will be allocated an individual password to enable them to upload and download information, exchange high data material, pictures, meeting schedules, deadlines etc.</p>	<p>✓ A project handbook was installed via Glasscubes: <a href="http://www.glasscubes.com/">http://www.glasscubes.com/</a></p> <p>Glasscubes is a project management tool: <i>“Project Management and collaboration Projects go well when people can organize and communicate clearly - Glasscubes focuses on this making it easy and transparent to everybody involved. Glasscubes saves everyone time and therefore money getting work done and not wasting time bogged down in emails”</i>.</p>
<p>An external evaluation is planned and will be subcontracted in the LFU budget.</p>	<p>✓ Dr. Alun Morgan, Exeter University, UK handed in Deliverables 8.1. Interims External Evaluation Report (Month 24) and Deliverable 8.2. Final External Evaluation Report (Month 36) on time. Dr. Morgan attended the 4<sup>th</sup> consortium meeting in Portugal (October 2012) and presented his Interims External Evaluation Report in front of the consortium. Both Deliverables 8.2 and 8.3. were uploaded on the ECAS website on time. The KCL team has worked closely with the external evaluator to devise and administer questionnaires and an interview strategy for the external evaluation process.</p>

## 2.4.4. Project Planning and Status

### 2.4.4.1. Planning

Figures below show the actual timing of the whole project duration based on the planning presented in the grant agreement Annexe 1, p. 25-26.

The project delivery is in accordance with this planning

Figure 1. p.116 : Timing of the Project WP 1 – 4

Figure 2. p.117: Timing of the project WP 5 - 9









#### 2.4.4.2. Cooperation with other EU Projects

The INQUIRE Consortium has been keen to link the project to other IBSE initiatives in Europe. The coordinator, as well as other consortium partners, has participated in events and meetings organized by various projects to ensure these interactions are achieved.

INQUIRE participated in:

- **SCIENTIX** conference: Stand and oral presentation (2 persons), Brussels, Belgium 6-9/5/2011
- **FIBONACCI** Conference, University of Leicester, oral presentation, UK, 26-27/4/2012 oral presentation (3 persons)
- **ESTABLISH** Conference Dublin, Workshop, Ireland, 7-9/6/2012 (2 persons)
- **PROCONET** Meetings in Brussels, Belgium, 15/3/2011 and in Freiburg, Germany 19-21/9/2011
- **Ecsite**, European network for science centres and museums, Annual Conference 30/5/2012 – 2/6/2012
- **Science is a Girls Thing - Event**, European Commission, Brussels, Stand, 21/6/2012
- TOGETHER FOR BASIC SKILLS, Comenius Thematic Meeting on Literacy, Math & Science". 6. – 7.12.2012, (INQUIRE poster, leaflets); Brussels,
- Together with SECURE Austria: INQUIRY Day, 11. – 12.11. 2013, (INQUIRE interactive stand) Vienna, Austria
- MASCIL: Kick off Meeting, 28.01. - 1.02.2013 Freiburg (INQUIRE leaflets), Germany
- New Perspectives in Science Education Conference, 13. - 15.03.2013, (2 INQUIRE Oral Presentation) Florence, Italy
- INSTEM: Conference, 17. -20. 03.2013, (INQUIRE oral presentation), Amsterdam, Netherlands
- EU Commission Open Doors Day 4.05. 2012 (4 partners INQUIRE interactive stand) Brussels, Belgium
- ProCoNet: Meeting 10. - 11.06.2013 (1 Person from INQUIRE participated as a discussant), Brussels, Belgium
- ESERA-Conference, 2. -7.09. 2013 (INQUIRE Oral Presentation), Nicosia, Cyprus





- ECER Conference, 9. – 14.09. 2013 (INQUIRE Oral Presentation, 1 person), Istanbul, Turkey.
- SECURE conference, 23. -24.10.2013, (Oral presentation, 1 persons), Mechelen, Belgium.
- SCIENTIX: more than 30 lesson plans (different partners languages) have been uploaded on the Scientix website

#### **2.4.4.3. Summary of deviations and their possible impact**

A few aspects have not been planned well beforehand and therefore lead to delays in their delivery later:

1. Planning for Milestone 2: “Launching the Website” was not accurate because designing and setting up a Website in 10 different languages is much more time consuming than expected. The multilingual Website has been launched in Month 10 (estimated month 5). Be that as it may the results are very satisfactory and according to the work agreed to be performed. See: [www.inquirebotany.org](http://www.inquirebotany.org)

2. Deliverable 4.2. The Train the Trainers manual was not well planned either.

The publication of this manual has been postponed as it was felt that it made more sense to publish the manual following the completion of the PIC courses in order to include materials that have been tried and tested.

The Deliverable 4.2 'Train the Trainer Course (TTC) Manual', was finally handed in on 24<sup>th</sup> of December 2012 – Month 25.

Justification for the delay of deliverable:

The Coordinator provided to the EC, via a series of emails, justifications and thorough explanations on the reasons why a delay has taken place with respect to the submission of this Deliverable. The reasons for delaying its submission – among others – pertained to:





a) The fact that there was a miscalculation of the project timeline during the planning of this deliverable. In particular, during the negotiations of the project with the EU the planned starting date of the project changed. Unfortunately the deadline of Deliverable 4.2 did not change accordingly to take into account that the start date of the project was delayed.

b) Another reason for delaying the submission of Deliverable 4.2 was the heavy work - load during that period in the project.

During month 14 of the project Partners were setting up their Final INQUIRE courses and did not have time to prepare the documents needed for the TTC manual.

However, a draft version was sent to the EC Project Officer of INQUIRE as evidence that the deliverable was in progress. Partners were also provided a draft version of the manual at the beginning of September 2012 so that they could use it for their training courses.

[Here is also an overview of the electronic communication that has taken place with the PO regarding the delay in submitting Deliverable 4.2:

First email communication: 19.12.2011

Second email: 13.01.2012

Third email: 24.02.2012 (in this email the outline of the deliverable was also sent).

Final 16.11.2012].

All the above provided information showcases the INQUIRE's efforts to produce a good quality manual.

Emails Attached in ADDS ON 2<sup>nd</sup> Version First Interims report.

3. Publish an E-Newsletter: An automatic electronic newsletter in each language was planned to be published every month with updates in news and discussion from the INQUIRE website. This was initiated in Month 13 and began in Month 14. One newsletter had been distributed in Month 9.

However, it was felt that the most effective way of sending out the newsletter would be via the website. Partners were required to create one pieces of news and one discussions each month and to select at least two other pieces of news and/or discussions to translate into their own languages. Ten language templates were created and each language area on the website was set up to enable newsletter signups to be directed to MailChimp, through which the newsletters are distributed.





The original proposal was for BGCI to produce an electronic newsletter every four months which would be translated into each Partner language and distributed. However, it was felt that this was not an efficient way of disseminating news and meant that ultimately Partners would be dependent on BGCI for coordinating the newsletter. This solution means that the newsletter was distributed more frequently and was controlled by Partners.

#### 4. Press releases:

The project proposal stated that two press releases would be distributed each year. Due to time constraints in developing the website, this has not happened (only 1 per year).

Two press releases have been prepared.

1. Press release about the launch of the INQUIRE project. Month 4, March, 2011
2. Press release about the launch of the INQUIRE website. Month 17, April, 2012

This issue was addressed in the MB meeting, which took place in Month 22 (30th-31st September 2012, Innsbruck, Austria)

BGCI reported that two press releases had been disseminated about the INQUIRE project so far; however they had not been successful in generating press coverage. It was therefore decided that BGCI would send out more frequent newsletters from the website and set up a Facebook and Twitter account which BGCI would manage.

Find in ADDS On 2<sup>nd</sup> Version of the First Interims report the minutes of the MB meeting

5. Rearranging Tasks in WP7: The intention of the INQUIRE Management Board was not to impose a Quality Management Plan on the Partners. It was therefore agreed that it was too early to present a plan in Month 4 and that this would be developed in consultation with Partners. For this reason, task 7.1 was delayed.

During the Train the Trainers course in Obergurgl, Austria, UniHB presented a draft framework for evaluating the teachers' development participating in the INQUIRE courses. This was followed up by Uni-HB preparing a draft on-line survey to collect data from participating teachers, which was presented to the Management Board. Following a discussion in the Management Board meeting in September 2011, it was decided not to pursue this framework but to ask Partners to collect evidence to demonstrate the success of their courses.





There was a disagreement within the Management Board between UniHB and all other members of the Management Board about the approach to take with the Quality Management Plan. For this reason, the Management Board finally agreed to move tasks from University Bremen to King's College London. Prof. Doris Elster agreed to this decision and UNi HB signed a letter to confirm the reallocation of funds.

The PO was informed about this decision well in advance. An email was sent: 3.02.2012, 24.02.2012, 24.02.2012.

KCL will receive the budget from UniHB for taking responsibility of these tasks. This budget was transferred to KCL in the second payment.

For detailed Information see 2<sup>nd</sup> Version of the First Interims report, p. 89

6. External Evaluation: Although the external Evaluator Prof. Manfred Prenzel, TU Munich was named in the proposal, negotiations with the EU commission revealed that there was a requirement to invite tenders for this position. Prof Prenzel finally decided not to hand in a tender document.

A brief for the external evaluation was prepared in Month 2 and an invitation circulated among universities inviting evaluators to tender for the work. Dr. Alun Morgan, Exeter University, UK was selected as it was felt his CV and letter of application was best suited for carrying out the external evaluation. Dr. Morgan attended the first Partners meeting at Wakehurst Place, Royal Botanic Gardens Kew, in May from 2<sup>nd</sup> to 5<sup>th</sup> 2011 He has been given access to the Partners area of Glasscubes and support in contacting Partners. Dr. Morgan has also received support in developing an on-line survey for Partners.

The KCL team worked closely with the external evaluator to devise and administer questionnaires and an interview strategy for the external evaluation reports (Deliverable D 8.1 and D 8.2.).



### 3. Tables of Deliverables and Milestone

Table 15: All deliverables for this period have been handed in on time.

Deliverable No	Deliverable name	Version	WP No	Lead beneficiary	Dissemination level	Delivery date from Annex I month	Actual Forecast delivery date	Status	Contractual	Comments
D.1.1.	Project Planning		1	2 BGC I	PU	4	31/03/2011	submitted 31/03/2011	accepted 06/06/2011	
D.1.2.	Document explaining criteria on how to select IBSE teaching material		1	2 BGC I	PU	4	31/03/211	submitted 31/03/211	accepted 06/06/2011	
D.1.3.	Document explaining Advisory Group constitutions		1	2 BGC I	PU	4	31/03/2011	submitted 31/03/2011	accepted 06/06/2011	
D.2.1.	INQUIRE Course Implementation Plan (CIP).		2	1 LFU	PU	5	30/04/2011	submitted 30/04/2011	accepted 06/06/2011	
D.2.2.	Document summarising how IBSE is defined in INQUIRE course		2	1 LFU	PU	5	30/04/2011	submitted 30/04/2011	accepted 06/06/2011	

D.3.1.	Strategy Plan for Pilot INQUIRE Course promotion		3	7 UniHB	PU	8	31/07/2011	submitted 26/07/2011	received	
D.3.2.	Document identifying relevant educational materials for inclusion in the PIC		3	7 UniHB	PU	8	31/07/2011	submitted 26/07/2011	received	
D.4.1.	Pilot INQUIRE Course Manual		4	4 MTSN	PU	13	31/12/2011	submitted 24/12/2011	received	
D.4.2.	Train the trainer course (TTC) manual		4	4 MTSN	PU	14	31/01/2012	submitted 24/12/2012 Month 25	received	
D.4.3.	Selection criteria for teacher recognition scheme is posted on the INQUIRE website		4	4 MTSN	PU	17	30/04/2012	submitted 30/04/2012	received	
D.4.4.	Pilot INQUIRE Course participant feedback		4	2 BGCI	PU	25	31/12/2012	submitted 24/12/2012	received	
D.4.5.	INQUIRE course participants feedback (third year)		4	2 BGCI	PU	36	30/11/2013	submitted 30/11/2013	received	
D.5.1.	Final INQUIRE Course Manual		5	5 KEW	PU	36	30/11/2013	submitted 30/11/2013	received	
D.6.1.	Dissemination Plan		6	2 BGCI	PU	4	31/03/2012	submitted 31/03/2012	accepted 06/06/2011	

D.6.2.	INQUIRE information leaflet in 10 languages		6	2 BGCI	PU	13	31/01/2012	submitted 27/01/2012	received	
D.6.3.	Dissemination Summary		6	2 BGCI	PU	36	30/11/2013	submitted 30/11/2013	received	
D.6.4.	Proceedings of the Final Conference		6	2 BGCI	PU	36	30/11/2013	submitted 30/11/2013	received	
D.7.1.	Quality Management Plan		7	3 KCL	PU	12	30/11/2011	submitted 30/11/2011	received	
D.7.2.	Final Quality Management Report		7	3 KCL	PU	36	30/11/2013	submitted 30/11/2013	received	
D.8.1.	Interims External Evaluation Report		8	1 LFU	PU	24	30/11/2012	submitted 26/11/2012	received	
D.8.2.	Recommendations from Consortium Meetings		8	1 LFU	PU	36	30/11/2013	submitted 30/11/2013	received	
D.8.3.	Final External Evaluation Report		8	1 LFU	PU	36	30/11/2013	submitted 30/11/2013	received	
D.9.1.	Information Manual about Ethical Issues		9	1 LFU	PU	12	30/11/2011	submitted 30/11/2011	received	

Table 16.: Table of Milestones applicable to the period

Milestone number	Milestone name	Work packages involved	Delivery date from Annex	Achieved	Actual date	Comments
1	Inaugural Meeting	WP1	Month 2 31/01/2011	yes	20th - 21st of January 2011	
2	Website launched	WP4, WP6, WP7	Month 5 31/03/2011	yes	Month 10 2011 15/09/2011	This milestone was delayed due to various reasons (see p.53)
3	Pilot Course runs in 11 Countries	WP4	30/11/2011	yes	Various 30/11/2011	All 13 courses were launched in 2011 but with various starting dates
4	End of Pilot INQUIRE Course	WP4	Month 24	yes	26/11/2012	
5	Final Conference	WP6	Month 32	yes	9.- 10/07/2013	
6	INQUIRE course manual published on website	WP8	Month 36	yes	30/11/2013	All 14 INQUIRE Courses Manuals have been uploaded on the ECAS Website as well as on the INQUIRE website.



## 4. Explanation of the Use of the resources

### 4.1. Major Cost Items

Two very important aspects of the INQUIRE project are that consortium partners are establishing a community of learners and that they continued to work in a collaborative group. This was important for establishing a sustainable working relationship once the project has ended.

The main goal for establishing a community of practice in INQUIRE was to share experiences, knowledge and assessment outcomes to improve the INQUIRE course design as well as the individual institutions IBSE teaching skills. As a result travel costs are a major cost item in this project. This major cost item was foreseen in the proposal already. 190.300 € have been calculated for travel costs for the whole project period. Finally **255.625,96 €** were actually spent by all partners .

*Table 17.: Summary table for travel expenses for each partner Months 1-36 (+2 months for MB)*

	Travel costs for Consortium and MB meetings	Travel costs for National conferences	Travel costs for International conferences	Travel costs for training	Other eg. Advisory group	<b>Total</b>
LFU	13920,51	1577,86	13813,06	257,16		<b>29568,59</b>
BGCI	10541,00	525,00	3026,00	1301,00	418,00	<b>15811,00</b>
KCL						<b>29970,60</b>
MUSE	7.012,20	2.741,79	7.567,92	2.295,22	2.814,03	<b>22.431,16</b>
KEW						<b>13510,31</b>
CSIC	9411,76		4205,04			<b>13616,8</b>
UniHB	6835,82	142,80	4439,19	0	703,03	<b>12120,84</b>
UBG	13425,34	123,86	1071,55	644,21	0	<b>15264,96</b>
NBGB	7830,48	0	0	0	18,10	<b>7848,58</b>
SBZH	7923,84	213,77	2628,7	243,7	35,33	<b>11.045,34</b>
BORD	9089,95		1832	207,81	254,24	<b>12961,5</b>
FCTUC	12074,00	2497,00			71,00	<b>14642</b>
MSU	6222,67	0	2843,37	2230,95	0	<b>11296,99</b>





NHM	12325,00	0	4447,00	0	0	<b>16772</b>
BGRHB	3157,26	309,86	1552,73	711,19	254,26	<b>5985,3</b>
UAH	7689,54	240,00	3316,92	0	0	<b>11246,46</b>
UL	0	0	11484,33	0	49,20	<b>11533,53</b>
<b>Total</b>	<b>127459,37</b>	<b>8371,94</b>	<b>62227,81</b>	<b>7891,24</b>	<b>4617,19</b>	<b>255625,96</b>

## 4.2. Financial administration

### 4.2.1 Distribution of money by the coordinator

For the first and the second period the project coordinator was responsible for distributing 55% and 30% of the allocated budget to partners.

This money arrived into LFU's account on the

Pre Financing: 31.12.2010 – distribute 20.01.2011

First Payment: 03.12. 2013 – distribute 12.12.2011

See table on the following pages.

Cuerrently there are interests of 2.555,81 € on this account

Table 18.: *Financial administration by the coordinator*

The final payment will be distributed as soon as it will arrive at our account



Belegdatum	Buchungsdatum	Referenz	Bezeichnung	Wert/KWähr	Netto	Bezeichnung des Gegenkontos	PSP-Element
21.01.2014	23.01.2014	*HYP34 004/14	*Hyp34 004/14, Botanika GmbH, Transaction Error TRS	-529,00	-529,00	30053196117	P7170-018-020
02.01.2014	08.01.2014	*HYP34 001/14	*Hyp34 001/14, Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-018-020
31.12.2013	31.12.2013	*HYP34 034/13	*Hyp34 034/13, Habenzinsen	-124,02	-124,02	30053196117	P7170-018-020
31.12.2013	31.12.2013	*HYP34 034/13	*Hyp34 034/13, KEST	31,01	31,01	Verb.Koordinatoren	P7170-018-020
31.12.2013	31.12.2013	*HYP34 034/13	*Hyp34 034/13, Spesen	17,58	17,58	Verb.Koordinatoren	P7170-018-020
13.12.2013	16.12.2013	*HYP34 032/13	*Hyp34 032/13, Bank Provision zu Re.Lomonosov Mosc	49,31	49,31	30053196117	P7170-018-020
13.12.2013	16.12.2013	*HYP34 032/13	*Hyp34 032/13, Spesen zu Re.Lomonosov Moscow	6,01	6,01	30053196117	P7170-018-020
13.12.2013	13.12.2013	UMBUCHUNG	*Umb. 2. Payment Inquire Project	62.171,29	62.171,29	Universität Innsbruck §27	P7170-018-020
10.12.2013	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project UL, Koordinator	26.764,40	26.764,40	Universidade de Lisboa	P7170-018-020
10.12.2013	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project Uni-h, Koordinator	10.925,10	10.925,10	Landeshauptkasse Bremen	P7170-018-020
10.12.2013	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project NHM, Koordinator	40.995,40	40.995,40	University of Oslo	P7170-018-020
10.12.2013	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project NHM, Koordinator	40.995,40	40.995,40	Botanic Gardens Conservation	P7170-018-020
10.12.2013	12.12.2013	2. PAYMENT	*Re 2. Payment, BGCI, Koordinator	92.252,20	92.252,20	Int.	P7170-018-020
10.12.2013	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project MTSN, Koordinator	38.322,60	38.322,60	Museo Tridentino di Scienze Natural	P7170-018-020

10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project KCL, Koordinator	70.849,91	70.849,91	King's College London	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project CSIC, Koordinator	32.861,60	32.861,60	Tesoro Publico Aportaciones De La U	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project UBG, Koordinator	31.365,40	31.365,40	Sofia University ST KLIMENT OHRI SK	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project UAH, Koordinator	32.929,60	32.929,60	Universidad de Alcala	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project BGRHB, Koordinator	30.944,65	30.944,65	Botanika GmbH	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project KEW, Koordinator	36.907,50	36.907,50	Royal Botanic Gardens	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project MSU, Koordinator	32.870,45	32.870,45	Lomonosov Moscow State University	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project NBGB, Koordinator	32.175,40	32.175,40	Rechtspersoonlijkheid Nationale	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project SBZH, Koordinator	31.297,40	31.297,40	Landeshauptstadt Hannover	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project Bord., Koordinator	36.112,40	36.112,40	Recette des Finances de Bordeaux	P7170-018-020
10.12.20	13	12.12.2013	2. PAYMENT	*Re 2. Payment, Inquire Project FCTUC, Koordinator	30.461,90	30.461,90	UC - Projectos de I&D Europeus	P7170-018-020
03.12.20	13	06.12.2013	HYPO 030-13	*Hypo 030-13 European Commission Directorate	670.207,60	670.207,60	30053196117	P7170-018-020
02.12.20	13	05.12.2013	HYPO 029-13	*Hypo 029-13 Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-018-020
04.11.20	13	07.11.2013	*HYP34 027/13	*Hyp34 027/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-018-020
30.09.20	13	04.10.2013	*HYP34 024/13	*Hyp34 024/13, Zinsenerträge	-2,71	-2,71	Verb.Koordinatoren	P7170-

13								018-020
30.09.20	13	04.10.2013	*HYP34 024/13	*Hyp34 024/13, KEST	0,68	0,68	30053196117	P7170-
30.09.20	13	04.10.2013	*HYP34 024/13	*Hyp34 024/13, Spesen des Geldverk.	10,63	10,63	30053196117	018-020
01.10.20	13	04.10.2013	*HYP34 025/13	*Hyp34 024/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-
02.09.20	13	04.09.2013	*HYP34 022/13	*Hyp34 022/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	018-020
01.08.20	13	02.08.2013	*HYPO 020/13	*HYP 020/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-
30.06.20	13	02.07.2013	*HYPO 017/13	*Hypo 017/13, Zinserträge	-2,37	-2,37	Verb.Koordinatoren	018-020
30.06.20	13	02.07.2013	*HYPO 017/13	*Hypo 017/13, Spesen des Geldverk.	10,68	10,68	30053196117	P7170-
30.06.20	13	02.07.2013	*HYPO 017/13	*Hypo 017/13, KEST	0,59	0,59	30053196117	018-020
01.07.20	13	02.07.2013	*HYPO 018/13	*Hypo 018/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-
03.06.20	13	05.06.2013	*HYPO 015/13	*Hypo 015/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	018-020
02.05.20	13	08.05.2013	*HYPO 14/13	*Hypo 014/13, Nutzung Telebanking MBS	4,00	4,00	30053196117	P7170-
02.04.20	13	03.04.2013	HYPO 011/13	*Hypo 010/13 Nutzung Telebanking	4,00	4,00	30053196117	018-020
31.03.20	13	02.04.2013	HYPO 009/13	*Hypo 009/13 Quartalsabschluss Zinsen	-1,06	-1,06	Verb.Koordinatoren	P7170-
31.03.20	13	02.04.2013	HYPO 009/13	*Hypo 009/13 Quartalsabschluss Kest	0,27	0,27	30053196117	018-020
31.03.20	13	02.04.2013	HYPO 009/13	*Hypo 009/13 Quartalsabschluss Spesen	10,49	10,49	30053196117	P7170-

13								018-020
01.03.20	13	04.03.2013	HYPO 005/13	*Hypo 005/13 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
01.02.20	13	04.02.2013	HYPO 003/13	*Hypo 003/13 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
02.01.20	13	08.01.2013	HYPO 001/13	*Hypo 001/13 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
31.12.20	12	31.12.2012	HYPO 030-12	*Hypo 030-12 Abschluss 31.12.12 Habenzinsen	-1,06	-1,06	Verb.Koordinatoren	P7170-018-020
31.12.20	12	31.12.2012	HYPO 030-12	*Hypo 030-12 Abschluss 31.12.12 KEST	0,27	0,27	30053196117	P7170-018-020
31.12.20	12	31.12.2012	HYPO 030-12	*Hypo 030-12 Abschluss 31.12.12 Spesenbeitrag	9,29	9,29	30053196117	P7170-018-020
03.12.20	12	04.12.2012	HYPO 028/12	*Hypo 028/12 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
02.11.20	12	05.11.2012	HYPO 026/12	*Hypo 026/12 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
01.10.20	12	03.10.2012	HYPO 024/12	*Hypo 024/12 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
30.09.20	12	01.10.2012	HYPO 023/12	*Hypo 023/12 Quartalsabschluss per 30.09.12 Zinsen	-2,36	-2,36	Verb.Koordinatoren	P7170-018-020
30.09.20	12	01.10.2012	HYPO 023/12	*Hypo 023/12 Quartalsabschluss per 30.09.12 Kest	0,59	0,59	30053196117	P7170-018-020
30.09.20	12	01.10.2012	HYPO 023/12	*Hypo 023/12 Quartalsabschluss per 30.09.12 Spesen	8,87	8,87	30053196117	P7170-018-020
03.09.20	12	04.09.2012	HYPO 021/12	*HYPO 021/12 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
01.08.20	12	02.08.2012	HYPO 19/12	Hypo 19/12 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
02.07.20	12	03.07.2012	HYPO 017/12	*Hypo 017/12 Nutzung Telebanking	4,00	4,00	30053196117	P7170-

12								018-020
30.06.20			*Hypo 016/12 Quartalsabschluss per					P7170-
12	02.07.2012	HYPO 016/12	30.06.201240	-3,81	-3,81	Verb.Koordinatoren		018-020
30.06.20			*Hypo 016/12 Quartalsabschluss per					P7170-
12	02.07.2012	HYPO 016/12	30.06.2012	0,95	0,95	30053196117		018-020
30.06.20			*Hypo 016/12 Quartalsabschluss per					P7170-
12	02.07.2012	HYPO 016/12	30.06.2012	8,86	8,86	30053196117		018-020
01.06.20								P7170-
12	04.06.2012	HYPO 013/12	*Hypo 013/12 Nutzung Telebanking	4,00	4,00	30053196117		018-020
02.05.20								P7170-
12	03.05.2012	HYPO 11/12	HYPO 11/12 Nutzung Telebanking	4,00	4,00	30053196117		018-020
02.04.20								P7170-
12	04.04.2012	HYPO 9/12	HYPO 9/12 Nutzung Telebanking	4,00	4,00	30053196117		018-020
31.03.20								P7170-
12	02.04.2012	HYPO 8/12	HYPO 8/12 Habenzinsen per 31.3.2012	-6,22	-6,22	Verb.Koordinatoren		018-020
31.03.20								P7170-
12	02.04.2012	HYPO 8/12	HYPO 8/12 KEST per 31.3.2012	1,56	1,56	30053196117		018-020
31.03.20								P7170-
12	02.04.2012	HYPO 8/12	HYPO 8/12 Spesenbeitrag per 31.3.2012	15,16	15,16	30053196117		018-020
01.03.20								P7170-
12	02.03.2012	HYPO 5/12	HYPO 5/12 Nutzung Telebanking	4,00	4,00	30053196117		018-020
01.02.20								P7170-
12	02.02.2012	HYPO 3/12	HYPO 3/12 Nutzung Telebanking	4,00	4,00	30053196117		018-020
02.01.20								P7170-
12	03.01.2012	HYPO 001/12	*Hypo 001/12 Nutzung Telebanking	4,00	4,00	30053196117		018-020
31.12.20								P7170-
11	31.12.2011	HYPO 35/11	HYPO 35/11 Habenzinsen per 31.12.2011	-13,54	-13,54	Verb.Koordinatoren		018-020
31.12.20								P7170-
11	31.12.2011	HYPO 35/11	HYPO 35/11 KEST per 31.12.2011	3,39	3,39	Verb.Koordinatoren		018-020
31.12.20								P7170-
11	31.12.2011	HYPO 35/11	HYPO 35/11 Spesenbeitrag per 31.12.2011	15,35	15,35	Verb.Koordinatoren		018-020

11								018-020
31.05.20	11	27.12.2011	50097786	Nachbelastung Guv, Überw.32002172	-854,91	-854,91	FW Kursgewi. realis.	P7170-018-020
01.12.20	11	02.12.2011	HYPO 33/11	HYPO 33/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
02.11.20	11	03.11.2011	HYPO 31/11	HYPO 31/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
28.10.20	11	31.10.2011	HYPO 30/11	HYPO 30/11 Überw. auf P7170-018-019	4.280,00	4.280,00	30053196117	P7170-018-020
03.10.20	11	04.10.2011	HYPO 28/11	HYPO 28/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
30.09.20	11	03.10.2011	HYPO 27/11	HYPO 27/11 Habenzinsen per 30.9.2011	-244,20	-244,20	30053196117	P7170-018-020
30.09.20	11	03.10.2011	HYPO 27/11	HYPO 27/11 KEST per 30.9.2011	61,05	61,05	Verb.Koordinatoren	P7170-018-020
30.09.20	11	03.10.2011	HYPO 27/11	HYPO 27/11 Spesenbeitrag per 30.9.2011	15,32	15,32	Verb.Koordinatoren	P7170-018-020
28.09.20	11	29.09.2011	HYPO 26/11	HYPO 26/11 Spesen zu Re.Lomonosov Moscow	61,07	61,07	30053196117	P7170-018-020
22.09.20	11	26.09.2011	HYPO 025/11	*Hypo 025/11 Überweisung Lomonosov Universität	96,91	96,91	30053196117	P7170-018-020
13.09.20	11	21.09.2011	INQUIRE	*RE 1. Rate Project Inquire	60.600,95	60.600,95	Lomonosov Moscow State University	P7170-018-020
01.09.20	11	02.09.2011	HYPO 23/11	HYPO 23/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
01.08.20	11	02.08.2011	HYPO 21/11	HYPO 21/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
01.07.20	11	04.07.2011	HYPO 19/11	HYPO 19/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
30.06.20	11	01.07.2011	HYPO 18/11	HYPO 18/11 Habenzinsen per 30.6.2011	-191,92	-191,92	30053196117	P7170-

11								018-020
30.06.20	11	01.07.2011	HYPO 18/11	HYPO 18/11 KEST per 30.6.2011	47,98	47,98	Verb.Koordinatoren	P7170-018-020
30.06.20	11	01.07.2011	HYPO 18/11	HYPO 18/11 Spesenbeitrag per 30.6.2011	15,30	15,30	Verb.Koordinatoren	P7170-018-020
30.06.20	11	01.07.2011	HYPO 22/11	HYPO 22/11 Spesenbeitrag per 30.6.2011	15,91	15,91	Verb.Koordinatoren	P7170-018-020
30.06.20	11	01.07.2011	52055523	HYPO22/11 Spesenbeitrag per 30.6.11 umb.P6030-013-	-15,91	-15,91	Verb.Koordinatoren	P7170-018-020
14.06.20	11	16.06.2011	HYPO 17/11	HYPO 17/11 Rückg.Lomonosov Moscow State, Name nich	-	-		P7170-018-020
01.06.20	11	03.06.2011	HYPO 15/11	HYPO 15/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
31.05.20	11	01.06.2011	HYPO 14/11	HYPO 14/11 Kursd. zu Re. Lomonosov Moscow State	-414,46	-414,46	Verb.Koordinatoren	P7170-018-020
31.05.20	11	01.06.2011	HYPO 14/11	HYPO 14/11 Spesen zu Re. Lomonosov Moscow State	97,44	97,44	30053196117	P7170-018-020
12.01.20	11	26.05.2011	18/001	*RE18/001 Koordinator 1. Rate	62.220,50	62.220,50	Lomonosov Moscow State University	P7170-018-020
02.05.20	11	03.05.2011	HYPO 12/11	HYPO 12/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
31.03.20	11	04.04.2011	HYPO 9/11	HYPO 9/11 Habenzinsen per 31.3.2011	-914,55	-914,55	30053196117	P7170-018-020
31.03.20	11	04.04.2011	HYPO 9/11	HYPO 9/11 KEST per 31.3.2011	228,64	228,64	Verb.Koordinatoren	P7170-018-020
31.03.20	11	04.04.2011	HYPO 9/11	HYPO 9/11 Spesenbeitrag per 31.3.2011	21,11	21,11	Verb.Koordinatoren	P7170-018-020
01.04.20	11	04.04.2011	HYPO 10/11	HYPO 10/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-018-020
01.03.20	11	02.03.2011	HYPO 6/11	HYPO 6/11 Nutzung Telebanking	4,00	4,00	30053196117	P7170-

11								018-020
01.02.20		SUSTAINABLE						P7170-
11	03.02.2011	FUTU	*RESustainable Futur Koordinator	58.850,00	58.850,00	Universidad de Alcala		018-020
01.02.20		SUSTAINABLE				UC - Proyectos de I&D		P7170-
11	03.02.2011	FUTU	*RESustainable Futur Koordinator	54.142,00	54.142,00	Europeus		018-020
01.02.20		SUSTAINABLE				Nationale Platentuin van		P7170-
11	03.02.2011	FUTU	*RESustainable Futur Koordinator	57.673,00	57.673,00	Belgie Ver		018-020
01.02.20								P7170-
11	02.02.2011	HYPO 3/11	HYPO 3/11 Nutzung Telebanking	4,00	4,00	30053196117		018-020
21.01.20				127.316,7	127.316,7			P7170-
11	24.01.2011	HYPO 2/11	HYPO 2/11 Überweisung auf P7170-018-019	5	5	30053196117		018-020
18.01.20		SUSTAINABLE						P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	82.466,45	82.466,45	King's College London		018-020
18.01.20		SUSTAINABLE						P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	63.440,30	63.440,30	Landeshauptkasse Bremen		018-020
18.01.20		SUSTAINABLE				Botanic Gardens Conservation		P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	5	5	Int.		018-020
18.01.20		SUSTAINABLE				Recette des Finances de		P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	64.735,00	64.735,00	Bordeaux		018-020
18.01.20		SUSTAINABLE				Tesoro Publico Aportaciones		P7170-
11	20.01.2011	266616	Koordinator	58.850,00	58.850,00	De La U		018-020
18.01.20		SUSTAINABLE						P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	55.907,50	55.907,50	Botanika GmbH		018-020
18.01.20		SUSTAINABLE				Sofia University ST KLIMENT		P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	55.907,50	55.907,50	OHRI SK		018-020
18.01.20		SUSTAINABLE						P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	72.385,50	72.385,50	Royal Botanic Gardens		018-020
18.01.20		SUSTAINABLE				Schulbiologiezentrum		P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	55.907,50	55.907,50	Hannover		018-020
18.01.20		SUSTAINABLE				Universidade de Lisboa		P7170-

11		FUTU						018-020
18.01.20		SUSTAINABLE					Museo Tridentino di Scienze	P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	68.677,95	68.677,95		Natural	018-020
18.01.20		SUSTAINABLE						P7170-
11	20.01.2011	FUTU	*RE Zahlung Sustainable Futur Koordinator	73.562,50	73.562,50		University of Oslo	018-020
31.12.20								P7170-
10	31.12.2010	HYPO 1/10	HYPO 1/10 Abschluß per 31.12.2010 KEST	190,31	190,31		Verb.Koordinatoren	018-020
31.12.20			HYPO 1/10 European Commission	1.228.712	1.228.712			P7170-
10	31.12.2010	HYPO 1/10	Directorate G.B.	,80	,80	30053196117		018-020
31.12.20			HYPO 1/10 Abschluß per 31.12.2010					P7170-
10	31.12.2010	HYPO 1/10	Habenzinsen	-761,25	-761,25	30053196117		018-020
31.12.20								P7170-
10	31.12.2010	HYPO 1/10	HYPO 1/10 Spesenbeitrag per 30.9.2010	5,40	5,40		Verb.Koordinatoren	018-020
31.12.20			HYPO 1/10 Abschluß per 31.12.2010					P7170-
10	31.12.2010	HYPO 1/10	Sollzinsen	0,02	0,02		Verb.Koordinatoren	018-020
31.12.20			HYPO 1/10 Abschluß per 31.12.2010					P7170-
10	31.12.2010	HYPO 1/10	Spesenbeitrag	8,52	8,52		Verb.Koordinatoren	018-020
				-2.555,81				



#### 4.2.2. Deviations

##### Teacher recognition scheme

The Annex 1 to the Grant Agreement has foreseen that a group of teachers should be selected to come to the final INQUIRE conference. Their travel cost should be reimbursed. Budget for this “teacher recognitions scheme” was allocated to BGCI (Annex 1; Estimated Budget, Table, p. 93) as this partners was responsible for organizing the conference. Consortium Partners decided to take one or two teachers who have participated in the Pilot Inquire Course. The teachers where selected based on the quality of their case study, which was presented at the conference and their willingness to participate in the conference.

See Reference in the Annex 1 to the Grant Agreement:p. 7:

*“The challenging of encouraging teachers to participate in the website will be addressed by establishing a teacher recognition scheme to participate in the final European conference “*  
p.32:

*5. Selection Criteria for teacher recognition scheme is posted on the INQUIRE website.*

*WT2: Deliverable 4.3. Selection criteria for teachers recognition scheme is posted on the INQUIRE website*

Partners estimated travel cost for teachers (see table below). It was more efficient to allocate the money required for the teacher recognition scheme directly to partners from the Coordinator (LFU).

Therefore this money was added to the second payment to each partner directly and not given to BGCI first.

The overall budget each partner finally got (incl. the teacher recognition scheme) is listed below.





**Reallocation of funds** - Estimated budget allocation has been adequate for most partners (see Grant Agreement Annex 1. p. 94).

LFU	Old Total Budget		231.485,00
Transfer of Funds	From/To:	Purpose	
	MSU	Subcontracting Reardon	4.280,00
	BGCI	Teacher Recognition Scheme	824,00
	KEW	Subcontracting Bromley	2.000,00
	BGCI	INQUIRE-Movie	-13.335,00
	BGCI	Alun Conference Fee	-89,00
	BGCI	Add up to 6210 (agreed additional funds)	-720,00
	Uni-HB	Transfer Konferenz	-337,61
	KCL	Interviews Regan	-1180,29
		Budget Adjustment	-8557,90
	<b>New Total Budget</b>		<b>222.927,10</b>

	New	Old
Pre Financing (55%)	127.316,75	127.316,75
<b>1st Payment (30%)</b>	<b>62.171,29</b>	69.445,50
<b>last Payment + Security fund (10%+5%)</b>	<b>33.439,07</b>	34.722,75
<b>Total budget</b>	<b>222.927,10</b>	<b>231.485,00</b>

LFU subcontracted the Management Board Member Mrs. Gail Bromley who retired from KEW in October 11<sup>th</sup> 2013 because here project knowledge and experience was most important to finalize the INQUIRE documentation. Money for that was provided by Kew

It was not possible for KEW to subcontract Mrs. Bromley to finish the work as ex-KEW personnel are not allowed to be paid for twelve month following the exit from the institution.





Gail Bromley was subcontracted (2000€) to finalize the work for WP 5 (WP Leader KEW) to finalize all the KEW project related documentation, and to assist on reporting for the second period and the Final Report and the activity booklet.

LFU Subcontracted Alun Morgan the External evaluator as calculated in the Grant Agreement and paid 3.905,95€ in the whole period

LFU subcontracted David Readon and paid 4.280€. MSU has allocated this money to the coordinator.

BGC1		Old Total Budget	287.725,00
Transfer of Funds	From/To:	Purpose	
	UL	Subcontracting Money	4.280,00
	KEW	Subcontracting Money	1.210,00
	LFU	Add up to 6210 (agreed additional funds)	720,00
	LFU	INQUIRE-Movie	13.335,00
	LFU	Alun Conference Fee	89,00
	All	Teacher Recognition Scheme	-12.652,00
		Budget Adjustment	6.982,00
		<b>New Total Budget</b>	<b>294.707,00</b>

	New	Old
Pre Financing (55%)	158.248,75	158.248,75
<b>1st Payment (30%)</b>	<b>92.252,20</b>	86.317,50
last Payment + Security fund (10%+5%)	44.206,05	43.158,75
Transfer Error TRS MSU	277,00	
Transfer Error TRS UL	1.024,00	
Transfer Error TRS BGRHB	529,00	
<b>Last Payment total</b>	<b>46.036,05</b>	
<b>Total Budget</b>	<b>296.537,00</b>	287.725,00





<b>KCL</b>		<b>Old Total Budget</b>	<b>149.939,00</b>
Transfer of Funds	From/To:	Purpose	
	Uni-HB	Budget-Transfer	25.038,00
	Uni-HB	Budget-Transfer	4.214,90
	LFU	Interviews Regan	1.180,29
Budget Adjustment			30.433,19
<b>New Total Budget</b>			<b>180.372,19</b>

	<b>New</b>	Old
Pre Financing (55%)	82.466,45	82.466,45
<b>1st Payment (30%)</b>	<b>70.849,91</b>	44.981,70
<b>last Payment + Security fund (10%+5%)</b>	<b>27.055,83</b>	22.490,85
<b>Total Budget</b>	<b>180.372,19</b>	149.939,00





<b>MUSE</b>		<b>Old Total Budget</b>	<b>124.869,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	1.014,00
		Budget Adjustment	1.014,00
		<b>New Total Budget</b>	<b>125.883,00</b>

	New	Old
Pre Financing (55%)	68.677,95	68.677,95
<b>1st Payment (30%)</b>	<b>38.322,60</b>	37.460,70
<b>last Payment + Security fund (10%+5%)</b>	<b>18.882,45</b>	18.730,35
<b>Total Budget</b>	<b>125.883,00</b>	124.869,00





KEW		Old Total Budget	131.610,00
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	180,00
	LFU	Subcontracting Bromley	-2.000,00
	BGCI	Subcontracting Funds	-1.210,00
Budget Adjustment			-3.030,00
		<b>New Total Budget</b>	<b>128.580,00</b>

	New	Old
Pre Financing (55%)	72.385,50	72.385,50
<b>1st Payment (30%)</b>	<b>36.907,50</b>	39.483,00
<b>last Payment + Security fund (10%+5%)</b>	<b>19.287,00</b>	19.741,50
<b>Total Budget</b>	<b>128.580,00</b>	131.610,00

Partner KEW did not subcontract people for translation work. They reallocated 3.210€ to the coordinator (LFU). This money was used to pay the Subcontract for Gail Bromley 2000€ and 1210 € was given to BGCI as subcontracting money.





<b>CSIC</b>		<b>Old Total Budget</b>	<b>107.000,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	896,00
		Budget Adjustment	896,00
		<b>New Total Budget</b>	<b>107.896,00</b>

	New	Old
Pre Financing (55%)	58.850,00	58.850,00
<b>1st Payment (30%)</b>	<b>32.861,60</b>	32.100,00
<b>last Payment + Security fund (10%+5%)</b>	<b>16.184,40</b>	16.050,00
<b>Total Budget</b>	<b>107.896,00</b>	107.000,00





Uni-HB		Old Total Budget	115.346,00
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	1.058,00
	LFU	Transfer Konferenz	337,61
	KCL	Budget-Transfer	-25.038,00
	KCL	Budget-Transfer	-4.214,90
Budget Adjustment			-27857,29
		<b>New Total Budget</b>	<b>87.488,71</b>

	New	Old
Pre Financing (55%)	63.440,30	63.440,30
<b>1st Payment (30%)</b>	<b>10.925,10</b>	34.603,80
<b>last Payment + Security fund (10%+5%)</b>	<b>13.123,31</b>	17.301,90
<b>Total Budget</b>	<b>87.488,71</b>	115.346,00





<b>UGB</b>		<b>Old Total Budget</b>	<b>101.650,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	1.024,00
		Budget Adjustment	1.024,00
		<b>New Total Budget</b>	<b>102.674,00</b>

	New	Old
Pre Financing (55%)	55.907,50	55.907,50
<b>1st Payment (30%)</b>	<b>31.365,40</b>	30.495,00
<b>last Payment + Security fund (10%+5%)</b>	<b>15.401,10</b>	15.247,50
<b>Total Budget</b>	<b>102.674,00</b>	101.650,00

<b>NBGB</b>		<b>Old Total Budget</b>	<b>104.860,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	844,00
		Budget Adjustment	844,00
		<b>New Total Budget</b>	<b>105.704,00</b>

	New	Old
Pre Financing (55%)	57.673,00	57.673,00
<b>1st Payment (30%)</b>	<b>32.175,40</b>	31.458,00
<b>last Payment + Security fund (10%+5%)</b>	<b>15.855,60</b>	15.729,00
<b>Total Budget</b>	<b>105.704,00</b>	104.860,00





<b>SBZH</b>		<b>Old Total Budget</b>	<b>101.650,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	944,00
		Budget Adjustment	944,00
		<b>New Total Budget</b>	<b>102.594,00</b>

	New	Old
Pre Financing (55%)	55.907,50	55.907,50
<b>1st Payment (30%)</b>	<b>31.297,40</b>	30.495,00
<b>last Payment + Security fund (10%+5%)</b>	<b>15.389,10</b>	15.247,50
<b>Total Budget</b>	<b>102.594,00</b>	101.650,00

<b>BORDEAUX</b>		<b>Old Total Budget</b>	<b>117.700,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	944,00
		Budget Adjustment	944,00
		<b>New Total Budget</b>	<b>118.644,00</b>

	New	Old
Pre Financing (55%)	64.735,00	64.735,00
<b>1st Payment (30%)</b>	<b>36.112,40</b>	35.310,00
<b>last Payment + Security fund (10%+5%)</b>	<b>17.796,60</b>	17.655,00
<b>Total Budget</b>	<b>118.644,00</b>	117.700,00





<b>FCTUC</b>		<b>Old Total Budget</b>	<b>98.440,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	1.094,00
		Budget Adjustment	1.094,00
		<b>New Total Budget</b>	<b>99.534,00</b>

	New	Old
Pre Financing (55%)	54.142,00	54.142,00
<b>1st Payment (30%)</b>	<b>30.461,90</b>	29.532,00
<b>last Payment + Security fund (10%+5%)</b>	<b>14.930,10</b>	14.766,00
<b>Total Budget</b>	<b>99.534,00</b>	98.440,00





MSU		Old Total Budget	120.910,00
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	277,00
	LFU	Subcontracting Reardon	-4.280,00
		Budget Adjustment	-4.003,00
		<b>New Total Budget</b>	<b>116.907,00</b>

	New	Old
Pre Financing (55%)	66.500,50	66.500,50
<b>1st Payment (30%)</b>	<b>32.870,45</b>	36.273,00
last Payment + Security fund (10%+5%)	<b>17.536,05</b>	18.136,50
TRS Error (to BGCI)	-277,00	
Last Payment	17.259,05	
<b>Total Budget</b>	<b>116.630,00</b>	120.910,00





<b>NHM</b>		<b>Old Total Budget</b>	<b>133.750,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	1.024,00
		Budget Adjustment	1.024,00
		<b>New Total Budget</b>	<b>134.774,00</b>

	New	Old
Pre Financing (55%)	73.562,50	73.562,50
<b>1st Payment (30%)</b>	<b>40.995,40</b>	40.125,00
<b>last Payment + Security fund (10%+5%)</b>	<b>20.216,10</b>	20.062,50
<b>Total Budget</b>	<b>134.774,00</b>	133.750,00

<b>BGRHB</b>		<b>Old Total Budget</b>	<b>101.650,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	529,00
		Budget Adjustment	529,00
		<b>New Total Budget</b>	<b>102.179,00</b>

	New	Old
Pre Financing (55%)	55.907,50	55.907,50
<b>1st Payment (30%)</b>	<b>30.944,65</b>	30.495,00
<b>last Payment + Security fund (10%+5%)</b>	<b>15.326,85</b>	15.247,50
<b>Transfer Error TRS BGRHB</b>	<b>-529,00</b>	
<b>Total Budget</b>	<b>101.650,00</b>	101.650,00





UAH		Old Total Budget	107.000,00
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	976,00
		Budget Adjustment	976,00
		<b>New Total Budget</b>	<b>107.976,00</b>

	New	Old
Pre Financing (55%)	58.850,00	58.850,00
<b>1st Payment (30%)</b>	<b>32.929,60</b>	32.100,00
<b>last Payment + Security fund (10%+5%)</b>	<b>16.196,40</b>	16.050,00
<b>Total Budget</b>	<b>107.976,00</b>	107.000,00





<b>UL</b>		<b>Old Total Budget</b>	<b>98.440,00</b>
Transfer of Funds	From/To:	Purpose	
	BGCI	Teacher Recognition Scheme	1.024,00
	BGCI	Subcontracting Money send to coordinator	-4.280,00
		Budget Adjustment	-3.256,00
		<b>New Total Budget</b>	<b>95.184,00</b>

	New	Old
Pre Financing (55%)	54.142,00	54.142,00
<b>1st Payment (30%)</b>	<b>26.764,40</b>	29.532,00
last Payment + Security fund (10%+5%)	14.277,60	14.766,00
Transfer Error TRS (to BGCI)	-1.024,00	
<b>Last Payment</b>	<b>13.253,60</b>	
<b>Total Budget</b>	<b>94.160,00</b>	98.440,00

Partner UL did not subcontract people for translation work. They reallocated 4.280€ to the Coordinator (LFU) .





### 4.3. Justification of costs by each partner

<b>TABLE 4.1 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 1 LFU FOR THE PERIOD</b>			
Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	175117,78	Salary for B. Mittendrein (0,05 PM) D. Stecher (0,09 PM) E. Carli (0,74 PM) F. Van Waal (0,79 PM) I. Kirchebner (2,08 PM) J. Egg (16,42 PM) J. Schneider (6,90 PM) J. Zaubzer (0,04 PM) M. Prast (1,71 PM) S. Kapelari (10,11 PM) S. Sladky-Meraner (4,04 PM) V. Schaffer ( 1,69 PM)
	Subcontracting	10185.95	External Evaluator: A. Morgan Translations: D. Reardon (MSU) Editing: G. Bromley
	Major cost Item Travel	29568.59	Management Board Meetings, Consortium Meetings, National/International conferences
	Remaining direct costs	6462.39	
	Indirect costs 7%	14780,40	
	<b>TOTAL COSTS</b>	<b>236114,95</b>	





**TABLE 4.2 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 2 BGCI FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	178072,00	Julia Willison Asimina Vergou Liliana Derewnicka
	Subcontracting	72346,00	Publications, Website, INQUIRE Film
	Major cost Item Travel	15811,00	Management Board meetings, consortium meetings, National, international conferences
	Remaining direct costs	15272,00	
	Indirect costs 7%	14640,85	
	<b>TOTAL COSTS</b>	<b>296141,85</b>	

**TABLE 4.3 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 3 KCL FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	144876,26	Elaine Regan Justin Dillon
	Subcontracting	0.00	
	Major cost Item Travel	29970,60	Consortium meetings national international conferences, partner support visits
	Remaining direct costs	1421,9	
	Indirect costs 7%	12338,81	
	<b>TOTAL COSTS</b>	<b>188607,57</b>	





**TABLE 4.4 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 4 MTSN FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	94342,36	Serena Dorigotti Martina Battistotti Monica Murano Barbara Scappellato Anna Pascucci
	Subcontracting	0.00	
	Major cost Item Travel	22431,16	Consortium and Management Board Meetings national conferences International conferences Trainings, Advisory board meetings
	Remaining direct costs	940,48	
	Indirect costs 7%	8239,98	
	<b>TOTAL COSTS</b>	<b>125953,98</b>	





<b>TABLE 4.5 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY KEW FOR THE PERIOD</b>			
Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	€102899,66	Sue Hunt Gail Bromley Christine Newton Susan Allan Sarah Bell Prof. Angela McFarlane
	Subcontracting	0,0	None subcontracted
	Major cost Item Travel And subsistence	13510,31	Partner meetings, Train the trainer meeting and Management board meetings  UK National conferences
	Remaining direct costs	€3,589.34	Travel and subsistence for course participants, equipment, books, design and photography
	Indirect costs 7%	€ 8399,96	7% overheads
	<b>TOTAL COSTS</b>	<b>€ 128399,26</b>	





**TABLE 4.6 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 6 CSIC FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	86950,75	Marina Ferrer Maria Bellet Blanca Landazuri Maria Luisa Esteban Esther Garcia Jesús Garcia Rodrigo
	Subcontracting	0,00	
	Major cost Item Travel	13616,80	Consortium meetings
	Remaining direct costs	6644,85	
	Indirect costs 7%	2734,91	
	<b>TOTAL COSTS</b>	<b>114717,27</b>	

**TABLE 4.7 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY Uni-HB FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	635539,01	Susanne Bryl Tanja Barendziak Jansen Cornelia Federike Haskamp Lena Kastenholz Julian Kühn Doris Elster
	Subcontracting	418,00	
	Major cost Item Travel	12120,84	Consortium meetings
	Remaining direct costs	5710,98	
	Indirect costs 7%	5695,95	
	<b>TOTAL COSTS</b>	<b>87484,79</b>	





<b>TABLE 4.8 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 8 UGB FOR THE PERIOD</b>			
Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	68342,29	Ljuba Pencheva Krasimir Kossev Vera Dyankova (Vera Gruncharova) Veselina Ilieva Emil Ivanov
1,2,3,4,6,	Subcontracting	3914,19	
	Major cost item: travel	15036,40	Consortium meetings National conference
	Remaining direct costs	6279,80	
	Indirect costs 7%	6276,09	
	<b>TOTAL COSTS</b>	<b>99848,77</b>	

<b>TABLE 4.9 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 9 NBGB FOR THE PERIOD</b>			
Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	87936,20	Jutta Kleber Franck Hidvegi Gert Ausloos Koen Es Valérie Charavel
	Subcontracting	0.00	
	Major cost Item Travel	7848,58	Consortium meetings
	Remaining direct costs	4662,04	
	Indirect costs 7%	7031,28	
	<b>TOTAL COSTS</b>	<b>107478,10</b>	





**TABLE 4.10 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY SBZH FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	78476,17	Anke Malethan Regine Leo Jörg Ledderbogen
	Subcontracting	3212,73	
	Major cost item: travel	11045,34	Consortium meeting National conference Other
	Remaining direct costs	3503,29	
	Indirect costs 7%	6511,74	
	<b>TOTAL COSTS</b>	<b>102749,27</b>	

**TABLE 4.11 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 11 BORDEAUX FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	94061,58	Réjane Limet Mélissa Garrigue Nathalie Merieu Philippe Richard Laurent Dubois Gérard De Vecchi
	Subcontracting	0.00	
	Major cost Item Travel	12961,50	Consortium meetings National meetings, travel lecturers
	Remaining direct costs	9140,98	
	Indirect costs 7%	8131,48	
	<b>TOTAL COSTS</b>	<b>124295,54</b>	





**TABLE 4.12 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 12 FCTUC FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	90397,00	Salary for C.Tavares
	Subcontracting	3509,00	
1,2,3,4,6,	Major cost Item Travel	14641,00	Consortium meetings International conference , Advisory Group meetings
	Remaining direct costs	6600,00	
	Indirect costs 7%	7814,66	
	<b>TOTAL COSTS</b>	<b>122961,66</b>	





**TABLE 4.13 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 13 MSU FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	92250,00	Alla Andreeva Galina Belyakova Vladimir Novikov Aleksandr Rappoport Aleksey Reteyum Valeriy Snakin Ekaterina Zakharova Aleksandr Zernov Jana Kosenko Ninel Kapranova Nadezhda Lazareva Nadezhda Grigoryeva Anna Nesterova Artem Parshin Elena Sadovnikova Inessa Voynova Anton Dobenyuk
	Subcontracting	0.00	
	Major cost Item Travel	11296,99	Consortium meetings Training
	Remaining direct costs	1389,32	
	Indirect costs 7%	7345,54	
	<b>TOTAL COSTS</b>	<b>112281,85</b>	





**TABLE 4.14 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 14 NHM FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	121126,00	Kristina Bjureke Anne Birkeland Gry Hoell Anne Finnanger Aners Wollan Gro Hilde Jacobsen
	Subcontracting	1834,00	
	Major cost item: travel	17531,50	Consortium Meetings
	Remaining direct costs	6932,00	
	Indirect costs 7%	10191,27	
	<b>TOTAL COSTS</b>	<b>157614,77</b>	

**TABLE 4.15 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 15 BGRHB FOR THE PERIOD**

Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,9	Personnel direct costs	83739,28	Jan Möller Roland Wozniewski Hartwig Schepker Annette Reisenweber Mic Hale
	Subcontracting	3210,45	
	Major cost item: travel	6006,31	Consortium meeting National conference Other
	Remaining direct costs	2268,37	
	Indirect costs 7%	6440,98	
	<b>TOTAL COSTS</b>	<b>101665,39</b>	





<b>TABLE 4.16 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY UAH FOR THE PERIOD</b>			
Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	82257,16	Alicia Fernández Rodríguez Blanca Olivé de la Puente Pilar Castro Díez
	Subcontracting	0.00	
	Major cost Item Travel	12178,78	Consortium meetings and training course
	Remaining direct costs	1892,58	
	Indirect costs 7%	6743,00	
	<b>TOTAL COSTS</b>	<b>103071,52</b>	

<b>TABLE 4.17 PERSONNEL, SUBCONTRACTING AND OTHER MAJOR COST ITEMS FOR BENEFICIARY 17 UL FOR THE PERIOD</b>			
Work package	Item description	Amount in € with 2 decimals	explanation
1,2,3,4,5,6,7,8,	Personnel direct costs	70309,14	Ana Raquel Barata Maria Ireneia Melo Maria Amelia Loucao Nuno Carvakho Theresa Ferreira
	Subcontracting		
	Major cost item travel	11533,53	Consortium meetings
	Remaining direct costs	1408,77	
	Indirect costs 7%	5827,60	
	<b>TOTAL COSTS</b>	<b>89079,04</b>	

5. Financial statements (C Forms) have been handed in via the ECAS website.

Paper versions will be sent

6. No certificates are applicable.





**ANNEXE 1: LITERATURE REVIEW ON IBSE PDF**

**ANNEXE 2: ETHICAL MANUAL PDF**

**ANNEXE 3: INQUIRE COURSE PARTICIPANTS (PIC, IC; Train the Trainer) PDF**

**ANNEX 4: SUSTAINABILITY PDF**

**ANNEX 5: INQUIRE PROJECT AT KEY EVENTS PDF**



# INQUIRE: A review of the literature on Inquiry-Based Science Education in outdoor contexts

October 2013



Photo: Inquiry activities at University of Sofia Botanic Garden, Bulgaria

## Recommended citation:

Dutton, E., Riga, F., Winterbottom, M., Regan, E., Willison, J., Vergou, A. & Kapelari, S. (2013) INQUIRE: A review of the literature on Inquiry-Based Science Education in outdoor contexts. London: BGCI

Supported by





## Table of Contents

- 1. Pinning it down: an exploration of IBSE and current views on its effectiveness for teaching science.**
  - 1.1 Introduction
  - 1.2 Historical context
  - 1.3 Conceptions and misconceptions
    - 1.3.1 *IBSE and the American National Science Education Standards (NSES)*
    - 1.3.2 *The American NSES in the European context*
    - 1.3.3 *Pedagogies for teaching IBSE: the open, guided, structured continuum*
  - 1.4 What are the different roles for educators and students in IBSE?
  - 1.5 Why is IBSE effective and for who?
    - 1.5.1 Why is IBSE effective?
    - 1.5.2 Who benefits most from IBSE?
  - 1.6 How is IBSE assessed?
  
- 2. Making it happen: designing and implementing effective IBSE activities from a Learning Outside the Classroom (LOtC) practitioner perspective**
  - 2.1 Eight ideas for designing IBSE activities
  - 2.2 Utilising mobile technology for inquiry learning outdoors
  - 2.3 Approaches for implementing IBSE activities
  - 2.4 Final reflections: LOtC settings as champions for IBSE

Supported by





## **1. Pinning it down: an exploration of IBSE as an emerging educational movement and current views on its effectiveness for teaching science.**

### **1.1 Introduction**

Amid growing concerns about declining uptake of scientific careers, increased student disaffection with school-based science, a perceived lowering of school science attainment and a recent drive to promote the benefits of Learning Outside the Classroom (LOtC), the last seven years have seen huge European investment in educational projects aimed at disseminating effective inquiry-based approaches for teaching and learning in science. Through the European Union's 'Science in Society' funding programme, millions of euros have been spent on projects including INQUIRE, PROFILES, Fibonacci, Discover the Cosmos and PATHWAY which all have the broad aim of supporting teachers and science education practitioners in developing Inquiry Based Science Education (IBSE) approaches in their own practice. This is being achieved by providing innovative professional development programmes, developing high-quality IBSE resources (and making these widely available) and by helping schools to develop and strengthen relationships with science research centres and Learning Outside the Classroom settings (LOtC). A core aim of the INQUIRE project is to enhance children's science learning by giving them 'real world' science experiences that take them out of the classroom. In this way, the INQUIRE project speaks to both LOtC practitioners and to advocates of IBSE.

That Europe is hugely invested in IBSE is clear. The reasons why policy makers have supported investment are also relatively easy to identify: IBSE has been promoted as an effective approach for increasing 'children's and students' interest and attainment levels while at the same time stimulating teacher motivation' (Rocard et al., 2007). Pinpointing exactly what IBSE is and what it looks like in practice, however, is a little more problematic. This is because IBSE is not a single educational model or method. It is perhaps more accurately viewed as an emerging educational movement which draws upon and synthesizes wide-ranging educational approaches and which does not yet have a consistent definition. It is past its infancy when early proponents advocated IBSE as an approach to get students investigating scientific questions in a way that more closely resembles 'how real scientists do science' as compared to 'recipe-based' laboratory work. More recently, however, IBSE seems to have entered its awkward teenage years. Arguments rage, doubts emerge and practitioners struggle to assimilate multiple views about what IBSE is and how best to take it forward in their classroom and LOtC settings.

Given the current debate across Europe and beyond surrounding the conception and application of IBSE, we attempt in this review to offer a pragmatic working definition that can be used by LOtC practitioners to help design and implement inquiry-based approaches in their own practice. In the first section, after setting IBSE its historical context as rooted in constructivist theories for how people learn, we suggest that a useful way of defining IBSE is through common 'features'. We then go on to look at the effectiveness of IBSE and possible methods of assessment. In the second section we focus more specifically on practical aspects of developing IBSE activities in LOtC settings using a broad definition of LOtC settings that includes botanical

**Supported by**



gardens, zoos, aquariums, fieldwork centres, nature reserves, wetlands, heritage sites, museums, theatres, galleries, school gardens and grounds, parks, science research centres and science discovery centres. Here we provide examples of effective IBSE-style activities and discuss the relative roles of learners and educators. Finally we conclude by arguing that LOtC settings across Europe are already offering rich, stimulating IBSE activities within their educational programmes and not just for schools but for wide-ranging audiences. For this reason, we argue, LOtC settings are well placed to play a pivotal (if not leading) role in supporting effective dissemination of IBSE.

## 1.2 Historical context

Despite the recent surge in interest in IBSE, teaching science using inquiry-based approaches is not a new idea. Early proponents of inquiry-based science approaches come from early to mid twentieth century progressive educational theorists including Dewey and Schwab who railed against didactic, transmission teaching methods and rote learning of known scientific facts. They wanted to see science being taught as an ‘effective method of inquiry’ (Dewey, 1910, p. 121, 124) and incorporating the ‘revisionary character of scientific knowledge’ (Schwab, 1958, p. 374). This scorn for learning science passively as an accumulation of facts was also echoed in the ideas of educational psychologists such as David Ausubel and Jerome Bruner who had begun to discuss learning in terms of ‘concept formation’ and the ‘meaningful assimilation of concepts’ (Ausubel, Novak, & Hanesian, 1978; Ausubel, 1963; Bruner, 1962, 1986). In other words, they were arguing that learning requires the learner to actively grapple with different ideas in order to formulate new concepts in their mind.

By the third half of the twentieth century, educational psychologists championing new ‘constructivist’ theories for learning were also advocating inquiry-based approaches. Up until then, behaviourist theories had dominated. These saw learning as something imposed from the outside by an educator who utilised conditioning to encourage favourable behaviours and discourage unfavourable ones. Emerging constructivist theories challenged this perception, asserting that it is learners themselves who construct their own knowledge, through experience and the development of their cognitive structures (Cakir, 2008; Taber, 2006, 2009).

Such cognitive and constructivist views of learning led to a mass of research literature in the 1980s and 1990s which argued that learners do not come into a science classroom as a ‘tabula rasa’ (empty vessel), but instead they bring their own prior understandings, and therefore effective learning requires the learner to make connections between their existing ideas and new concepts in order for scientific knowledge to be built (Driver & Easley, 1978; Driver & Oldham, 1986; Gilbert & Watts, 1983; Nussbaum & Novick, 1982; Strike & Posner, 1985; Taber, 2001). This modern constructivist view also took account of social ideas about learning from theorists like John Dewey, Lev Vygotsky and Jerome Bruner who all argued that learning occurs most effectively when participants engage in active, participatory, learning activities which are highly interactive and social in nature (J. Bruner, 1983; Vygotsky, 1978).

Supported by



Thus, by the end of the last century, while the specific term ‘IBSE’ had not yet emerged, a substantial body of educational literature was pointing to learner-centred approaches for teaching science that focussed on student-construction of knowledge and which were best promoted by learners engaging actively in participatory learning activities. Effective teaching approaches were seen as those that promoted discovery learning and which encouraged the learner to grapple with scientific questions and problems. It is on the back of these late-twentieth century constructivist models for teaching and learning that conceptions of IBSE started to emerge. This led to the development of the American National Science Education Standards (NSES) that we address in the next section. Educators favouring inquiry-based approaches for teaching science today have suggested that these approaches provide learning environments that encourage this active, constructivist, learner-centred approach (Harlen, 2004) where ‘meaningful science learning can occur’ (Asay & Orgill, 2009, p. 57).

We can see then that the notion of teaching science as learner-centred inquiry has a long history in science education with its forerunners well established by the end of the last century. Bybee asserts, however, that ‘there is an equally long history of confusion’ about IBSE, mainly owing to the different ways educators have used the term (Bybee, 2000, p. 20). In the next section we explore how IBSE is defined and recognised as well as touching upon some common misconceptions about IBSE.

## 1.3 Conceptions and misconceptions

### 1.3.1 IBSE and the American National Science Education Standards (NSES)

In our introduction we noted that IBSE is not a single educational method and that there is currently no single, consistent definition. Early conceptions of IBSE across the world have been influenced by the publication of the American ‘National Science Education Standards’ (NSES) in 1996 and the ‘Inquiry and the National Science Education Standards: A guide for teaching and learning’ in 2000 (National Research Council (NRC), 2000; National Research Council, 1996). These were an attempt to define IBSE and set out clear guidelines on how to recognise it in practice. In 1996, the NSES described scientific inquiry as ‘the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work’ (NRC, 1996, p. 23). IBSE is probably most frequently defined as an approach to teaching science which engages students in the same sorts of activities, practices, and thinking processes that scientists use in their work (i.e. in their pursuit of scientific inquiry). The NRC sum up the benefits of inquiry approaches to teaching and learning science as follows:

When engaging in inquiry students...identify assumptions, use critical and logical thinking, and consider alternative explanations. In this way students actively develop their understanding of science by combining scientific knowledge with reasoning and thinking skills.

Supported by



(NRC, 1996, p. 2)

To support educators in recognising when inquiry is taking place, the NRC put forward five 'features', which they suggest are essential for identifying scientific inquiry. These are:

1. Learners are **engaged by scientifically oriented questions**.
2. Learners **give priority to evidence**, which allows them to develop and evaluate explanations that address scientifically oriented questions.
3. Learners **formulate explanations from evidence** to address scientifically oriented questions.
4. Learners **evaluate their explanations in light of alternative explanations**, particularly those reflecting scientific understanding.
5. Learners **communicate and justify their proposed explanations**.

(NRC, 2000, p. 25)

These five features have since been heavily cited in educational research literature on IBSE along with an additional sixth feature that 'learners engage in practical investigative work' which is cited most frequently in the European context. (Anderson, 2002) usefully develops the NRC (1996) definition of inquiry in terms of pedagogical processes by suggesting that the NRC definition encompasses three distinct aspects of teaching and learning science, namely:

1. **Science as inquiry**, i.e. 'scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work' (NRC, 1996, p. 23)
2. **Learning as inquiry**, i.e. learning is seen as an active process rather than a passive one, 'something that students do, not something that is done to them' (NRC, 1996, p. 2)
3. **Teaching as inquiry**, i.e. 'inquiry into authentic questions generated from the students' experiences is the central strategy for teaching science' (NRC, 1996, p. 31)

### ***1.3.2 The American NSES in the European context***

The American National Science Education Standards have clearly influenced the growing literature base around IBSE and have perhaps helped facilitate at least a small degree of international consensus about how to recognise IBSE in practice. IBSE today is viewed as an approach that i) reflects and promotes understanding of the inquiry processes that professional scientists really use, ii) that is highly active on the part of the learner and iii) which involves the learner developing a range of analytical critical thinking skills for science learning. There is also a clear emphasis on authentic, student-derived scientific problems and questions.

It is important to note, however, that conceptions of IBSE are still evolving based on new emerging research, particularly in the area of teacher competencies and attitudes towards teaching science as inquiry (Alake-Tuenter et al., 2012; Bhattacharyya, Volk, & Lumpe, 2009;

Supported by



Choi & Ramsey, 2009; Crippen & Archambault, 2012; Gibson & Chase, 2002; Leonard, Boakes, & Moore, 2009; Luera & Otto, 2005; Rogers, 2009; Varma, Volkmann, & Hanuscin, 2009; Yoon, Joung, & Kim, 2012). Aleke-Tuenter et. al. (2012) specifically explore the applicability of the American NSES with the current picture of IBSE in Europe. They point to gaps in the standards arguing that they fail to adequately take into account teachers' attitudes towards themselves and about teaching science. They go on to point out that because these teacher attitudes greatly influence a teacher's instructional decisions about what content to teach and how to teach it, this is leading to a discrepancies between proposed 'standards' for teaching IBSE and what actually happens in the classroom. In this way it could be argued that it is not enough to simply define what IBSE is or how it can be recognised because, if teachers are not both confident and competent in using an IBSE approach, then this approach will not be translated effectively into practice. This suggests a need to identify the sorts of teaching roles and competencies required to teach IBSE and to attempt to integrate these into teacher professional development programmes: something that many of the EU funded IBSE projects, including INQUIRE, are seeking to address.

### ***1.3.3 Pedagogies for teaching IBSE: the open, guided, structured continuum***

Just as we can see that there is no single definition for IBSE, there is equally no single way to teach it. There does seem to be some broad agreement, however, that IBSE should be developed as a 'flexible pedagogy' that allows teachers to 'tailor their approaches to the desired learning outcomes and specific circumstances of their different classroom contexts' (Levy, Lamas, McKinney, & Ford, 2011).

Research into IBSE has identified that IBSE activities can exist on a continuum of levels of inquiry that vary from being more structured or less structured as determined by the level and type of support or 'scaffolding' provided by the teacher (Alake-Tuenter et al., 2012; Windschitl, 2003). Drawing on earlier work by Schwab (1962) and Herron (1971), Windschitl (2003) describes four types of science inquiry activity that differ in terms of the degree of independence that the learner has in developing their own questions and methods for investigating them:

1. **Confirmation experiences:** these are traditional 'cook book' or 'recipe' laboratory activities that provide pupils with step-by-step procedures to confirm known principles. [equivalent to Herron's 'zero level' (Herron, 1971, p. 200)]
2. **Structured inquiry:** in which the teacher presents a question, lab equipment and procedures for pupils to discover an answer that is not known by them. [equivalent to Schwab's 'simplest level' (Schwab, 1962, p. 55)]

3. **Guided inquiry:** in which teachers allow pupils to investigate a prescribed problem using their own investigative methods of gathering and analysing data and drawing conclusions. [equivalent to Schwab's 'second level' (Schwab, 1962, p. 55)]
4. **Student-directed or 'open' inquiry:** in which the teacher presents a topic and lets pupils develop their own questions and design their own investigations. [equivalent to Schwab's 'third level' (Schwab, 1962, p. 55)]

In a more recent literature review conducted for the EU PATHWAY project about IBSE, Levy et al. (2011) synthesised a large body of research which explores merits and issues surrounding open, guided and structured inquiry learning approaches (see table 1) and set out a framework for 'seven essential features of inquiry' which also incorporates the three levels of teacher guidance for each feature (see table 2).

Inquiry type	Merits	Problems
<b>Structured</b> <ul style="list-style-type: none"> <li>• Strongly teacher-directed.</li> <li>• Students follow teacher's direction in pursuing an investigation or to produce a prescribed product.</li> </ul>	<ul style="list-style-type: none"> <li>• Structured investigation (lab work) is associated with a higher degree of student confidence than guided or open inquiry.</li> <li>• Offers specific teaching techniques to achieve particular learning outcomes, and clear assessment strategies, which reduce the chance of failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Could constrain the development of critical thinking.</li> </ul>
<b>Guided:</b> <ul style="list-style-type: none"> <li>• More loosely scaffolded (supported).</li> <li>• Students take more responsibility for establishing the direction and methods of their inquiry.</li> </ul>	<ul style="list-style-type: none"> <li>• Could help students to transition into more open inquiry.</li> <li>• Seems to help students to develop understanding of complex scientific concepts and, at the same time, to acquire scientific process skills, or competencies, necessary for conducting scientific investigations, and understand the nature of science.</li> <li>• Offers specific teaching techniques to achieve particular learning outcomes, and clear assessment strategies, which reduce the chance of failure.</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially less effective at advancing students' conceptual and procedural understanding as compared to 'open' inquiry.</li> </ul>
<b>Open</b>	<ul style="list-style-type: none"> <li>• Employs high-level critical thinking skills.</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of failure is increased as</li> </ul>

Supported by



- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>• Students take the lead in establishing the inquiry questions or investigation methods.</li> </ul> | <ul style="list-style-type: none"> <li>• Greater opportunity for students to experience the authentic nature of science.</li> <li>• Seems to be effective at supporting students' conceptual and procedural understanding.</li> </ul> | <p>compared to structured and guided inquiry.</p> |
|--|---|---|

**Table 1: Some potential merits and problems associated with Structure, Guided and Open inquiry approaches summarised from Levy, Lameris, McKinney, & Ford (2011).**

The recognition of a 'structured, guided, open' continuum of inquiry teaching and learning approaches is important in that it helps overcome a common misconception that IBSE necessarily requires minimum input or support from the teacher, or to put it more simply, that teachers cannot direct students when they are doing IBSE (Dillon, 2012). This misunderstanding is seen in Kirschner, Sweller, & Clark's (2006) critique of IBSE in which they argue for the efficacy of guided instruction over problem-based, discovery or inquiry approaches but incorrectly state that IBSE is characterised by a predominantly 'unguided' approach (Hmelo-Silver, Duncan, & Chinn, 2007). Furthermore, just as IBSE does not necessarily mean using 'unguided' or 'hands-off' teaching approach, it does not necessarily require a 'hands-on' one either. Indeed, researchers have recently started to challenge the idea that IBSE approaches must be predominantly 'active' or 'hands-on' by citing examples of activities which develop inquiry thinking skills but which do not involve experimentation or practical work, such as the selection and discussion of relevant evidence or the manipulation and analysis of data (Dillon, 2012; Lee, Linn, Varma, & Liu, 2010; Levy et al., 2011).

So far we have addressed what IBSE is, both its historical and contemporary context, including a brief discussion of different teaching approaches, and have pointed out that a wide-range of scientific activities as well as teaching approaches can be incorporated into modern definitions of IBSE. Indeed, effective inquiry activities may be many and varied in their topics, duration, teaching styles and level of teacher support required. We next take a deeper look at teaching and learning approaches for developing IBSE by exploring the relative roles of teachers and learners and the type of guidance teachers can provide.

Essential Features of IBSE	Variations		
	1 (Open)	2 (Guided)	3 (Structured)
<b>QUESTION:</b> students investigate scientifically oriented question	Student poses a scientifically oriented question	Student selects from a range of, or refines, a scientifically oriented question provided by the teacher, materials or other source	Student is given a scientifically oriented question by the teacher, materials or other source
<b>EVIDENCE:</b> students give priority to evidence	Student determines what constitutes evidence/data and collects it	Student selects from data/evidence provided by the teacher, materials or other source	Student is given evidence/data by the teacher, materials or other source
<b>ANALYSE:</b> students analyse evidence	Student decides how to analyse evidence	Student selects from ways of analyzing evidence provided by the teacher, materials or other source	Student is told how to analyse evidence provided by the teacher, materials or other source
<b>EXPLAIN:</b> students formulate explanation based on evidence	Student decides how to formulate evidence based on evidence	Student selects from possible ways to formulate explanation given by the teacher, materials or other source	Student is given a way to formulate explanation based on evidence
<b>CONNECT:</b> students connect explanations to scientific knowledge	Student independently finds and examines other resources and forms links to scientific knowledge	Student is directed to other resources and shown how to form links to scientific knowledge	Student is given other resources and shown the links with scientific knowledge
<b>COMMUNICATE:</b> students communicate with audience(s) and justify explanation	Student chooses how to communicate and justify explanations	Student is given broad guidelines on how to justify and communicate explanations	Student is given all the steps to justify and communicate explanations by the teacher, materials or other source
<b>REFLECT:</b> students reflect on the inquiry process, responses to their work, its value and impact, and their learning	Student decides independently how to structure reflection on the inquiry process and his/her learning	Student is given broad guidelines to structure reflection on the inquiry process and his/her learning by the teacher, materials or other source	Student is given a structured framework for reflection by the teacher, materials or other source
	More-----Amount of Student Self-Direction-----Less		

Table 2: The features of inquiry learning: theory, research and practice – taken from Levy, Lamas, McKinney, & Ford (2011)

## 1.4 What are the different roles for educators and students in IBSE?

The roles of both educators and students have to be modified to accommodate the aims and requirements of inquiry-based styles of instruction. Within the inquiry context, instruction is student-centred, and the student's role has to change from one of 'passive follower to active designer' (Brickman, Gormally, Armstrong, & Hallar, 2009, p. 16). Moreover, teachers are also no longer viewed as sources of all scientific knowledge whose mission it is to transmit their knowledge to students. The teacher's remit is to create an environment for students to design investigations, find, use and generate evidence, practice and critique reasoning, and, through such (and other, more conventional) means, meet the needs of their science curriculum (Drayton & Falk, 2001). Along similar lines, Leonard and Penick propose that 'the teacher's role is to provide appropriate resources, guide students, and react to student actions' (Leonard & Penick, 2009, p. 41). Figure 1 is an extract from Leonard and Penick (2009, p. 41) setting out the 'typical' roles of teachers and students within the inquiry context.

### **In authentic inquiry, *students* typically do the following:**

- ◆ Make initial observations;
- ◆ Pose (or respond to) researchable questions;
- ◆ Formulate predictions or cause-and-effect hypotheses to test these research questions;
- ◆ Plan procedures that identify relevant variables and produce data to test these research questions;
- ◆ Collect, organise, and display data;
- ◆ Analyse data and craft tentative inferences to evaluate predictions or hypotheses;
- ◆ Share ideas, results, and inferences with a group that provides feedback on their potential validity and utility;
- ◆ Revise, if necessary, the evaluation of the data; and
- ◆ Reach a formal consensus on answers to the research questions.

### **In authentic inquiry, *teachers* typically do the following:**

- ◆ Create a safe, stimulating environment where students feel free to explore, question, digress, and communicate;
- ◆ Ask questions that require thinking and thoughtful responses or action on the part of students;
- ◆ Listen to what students say and respond in ways that encourage students to examine and investigate ideas, questions, and suppositions;
- ◆ Promote multiple and creative ideas for researchable questions as well as ways to conduct investigations; and
- ◆ Develop classroom characteristics that place value on student communication, diversity, individuality, and intellectual freedom

**Figure 1: Extract taken from Leonard and Penick (2009, p. 41) outlining students' and teachers' actions when engaged in authentic inquiry-based science education**

Crawford (2000) reports on data collected over the course of one year from a case study where a biology teacher was observed delivering an ecology course, using inquiry, with junior and senior high school students. Drawing on data such as interviews from the teacher, ‘reflections of his students, and from the discourse during critical incidents during instruction’ (p. 931), she observed that not only did the roles that the teacher assumes change with a change in the tasks, but the teacher also assumed additional roles to those suggested in previous studies (Osborne & Freyberg, 1983). Crawford stresses that a teacher, working within an inquiry-based context, needs to take on ‘myriad’ roles ‘that demand a high level of expertise’ (p. 932). The students’ roles, too, are diverse, and often include ‘those roles usually reserved for the teacher’ (p. 932). Emerging from these data, the roles of ‘teacher’ and ‘student’ have been set out as follows (p. 931-932):

#### Educator role

- Motivator
- Diagnostician
- Guide
- Innovator
- Experimenter
- Researcher
- Modeller
- Mentor
- Collaborator
- Learner

#### Student role

- Learner
- Listener
- Receiver of information
- Active collaborator
- Leader
- Apprentice
- Teacher
- Planner

Crawford submits that the findings of her study point to a ‘complex model of inquiry-based teaching’ that she terms ‘collaborative inquiry’ (p. 933), a model that emerged from the six features of the ecology class which she examined in her study (see Figure 2).

1. Instruction situated in authentic problems
2. Focus on grappling with data
3. Collaboration of students and teacher
4. Connections with society
5. Teacher modelling behaviours of a scientist
6. Development of student ownership

**Figure 2: The six characteristics of the ecology class in Crawford’s study (taken from Crawford, 2000, p. 933)**

As already discussed, inquiry-based learning approaches have sometimes been criticized for not being as effective (or efficient), as more prescriptive or directed ways of learning in science, by

Supported by



those who view inquiry approaches as providing minimal guidance for students (Kirschner, Sweller, & Clark, 2006). This viewpoint has been contested by the assertion that neither inquiry-based nor problem-based learning are, in fact, ‘minimally guided instructional approaches but rather provide extensive scaffolding and guidance to facilitate student learning’ (Hmelo-Silver, Duncan, & Chinn, 2007, p. 99). They are not, as Kirschner *et al* suggest, instances of ‘discovery’ learning. In fact, Hmelo-Silver et al. go on to stress the important role played by teachers in scaffolding students’ learning, pointing out that not only does scaffolding support students’ learning about how a task should be done, but it also helps them understand why it should be done that way (Hmelo-Silver et al., 2007; Hmelo-Silver, 2006).

They [teachers] guide students in the learning process, pushing them to think deeply, and model the kinds of questions that students need to be asking themselves, thus forming a cognitive apprenticeship.

(Hmelo-Silver et al., 2007, p. 101)

A common practitioner concern that arises from this therefore relates to how much freedom or direction the educator should provide to their students. There is, of course, no simple answer to this because the amount of freedom or direction will vary depending on the level of difficulty of the task and the experience, capabilities, and motivation of the students in question. We will explore this idea about how much support (scaffolding) a practitioner should provide for the learner in section 2.

In this next section we discuss the effectiveness of IBSE and go on to summarise research that points to the efficacy of IBSE approaches for teaching science to a range of different learners.

## 1.5 Why is inquiry effective and for who?

### 1.5.1 Why is inquiry effective?

There is a substantial and growing literature base suggesting that IBSE is an effective approach for learning and teaching science (Colburn, 2008; Minner, Levy, & Century, 2010; Nantawanit, & Ruenwongsa, 2012; Wilson, Taylor, Kowalski, & Carlson, 2010). In a review of research into the effectiveness of IBSE up to the mid-1990s, Colburn observed:

Most studies I examined supported the collective conclusion that inquiry-based instruction was equal or superior to other instructional models for students producing higher scores on content achievement tests.

(Colburn, 2008, p. 2)

The majority of research studies on the effectiveness of inquiry-based approaches have employed experimental or quasi-experimental methods (Cobern et al., 2010; Leonard, 1983; Lott, 1983; Wilson

Supported by



et al., 2010; Yager & Akcay, 2010) that have focused on measuring student **achievement** ‘through the acquisition of content knowledge, conceptual understanding, and overcoming misconceptions’ (Brickman, Gormally, Armstrong, & Hallar, 2009, p. 2). There have, however, also been some studies that have not used experimental designs. For instance, Wilson *et al* (2010) cite two classic meta-analyses of studies examining various curriculum materials and teaching strategies, and found both showed substantial effect sizes for student learning in favour of an inquiry-based approach (Shymansky, Kyle, & Alport, 1983; Wise & Okey, 1983).

Identifying **reasons** why inquiry approaches are more effective seems to be more elusive because research into the effectiveness of IBSE has largely focused on ascertaining whether or not inquiry is effective when compared with traditional teaching approaches, rather than trying to establish the reasons for this. It is only when the learning goals for a lesson (or set of lessons) have been identified that the reasons for its effectiveness become more evident. For instance, if the learning goals are to verify an already-known outcome or develop the learner’s experimentation skills, then inquiry-based methods may not add much. Since a core feature of IBSE is the aim to **develop independent and critical thinking skills**, where research has focused on comparing teaching approaches with this aim in mind, then inquiry-based approaches have been found to be more effective. If students rigidly follow steps from a lab manual or worksheet, this may not invoke the deep thinking processes that have come to be synonymous with inquiry-based instruction. Colburn (2004, p. 63) states that critical thinking is a complex skill that requires instruction, practice, and feedback’. Thus, if the learning goals are to give students some inkling as to what it is like to conduct scientific research-like tasks, or expose students to scientific methods of investigation, then inquiry-based approaches could be very effective. Hence, the effectiveness of inquiry-based styles of teaching will depend largely upon the learning goals one has in mind.

Wilson *et al*’s study (2010) examined the effects of inquiry-based instruction on multiple, relevant learning goals (knowledge, reasoning, and argumentation) and looked at those effects across different populations. They found that ‘students in the inquiry-based group outperformed students receiving commonplace instruction on each of the knowledge, scientific reasoning, and argumentation measures’ (p. 295). Moreover, they suggest that IBSE has been considerably effective as a way of teaching science because it encompasses **a broader range of student learning goals** than commonplace science teaching which, they contend, focuses on ‘a knowledge transmission model with a much narrower set of student learning goals’ (p. 294). Consequently, an inquiry-based model which begins with soliciting students’ prior understandings and builds on these, and then goes on to **emphasise deep understanding, the value of metacognition, and the social aspect to learning**, might explain why students in their study’s inquiry-based group performed better on the achievement measures.

Additionally, a study by Brickman et al (2009) found that students following an inquiry-based programme over the course of a semester, tended to have a **more realistic perception of their abilities** to do science over this period, than those students following a more traditional curriculum.

Supported by



They argued that students on the inquiry programme were exposed to ‘the actual challenge of attempting and sometimes failing’ (p. 14) in the inquiry activities they were doing, which gave them ‘a more accurate impression of their abilities’ than the group in the ‘traditional labs’. The latter were ‘encouraged by the simple but successful activities of the traditional curriculum into a state of comfortable, but naive, over-confidence’ (p. 15). The students in the inquiry group encountered the same sort of challenges and doubts that scientists in the real world would be exposed to, thus making them better able to cope with such situations in future.

### 1.5.2 Who benefits most from IBSE?

Numerous studies over the years have indicated that learners of varying ages following inquiry-based learning programmes tend to **outperform their peers** instructed through more traditional methods (Leonard, Cavana, & Lowery, 1981; Schneider & Renner, 1980; Scott, 1966, 1973; Scott, 1970; Westbrook & Rogers, 1994). More recently, Wilson *et al* (2010) examined the effectiveness of inquiry-based teaching by implementing a model termed the ‘BSCS 5E Instructional Model’, where the five ‘Es’ stand for ‘engage, explore, explain, elaborate, and evaluate’. This was based on constructivist learning theories that provide ‘strong guidance and support for an approach to teaching that promotes student inquiry’ (p. 280). Fifty-eight 14-16-year-old participants were randomly assigned to one of two groups. One group received instruction following what was termed ‘commonplace science instruction’ (that is, taught using traditional transmission approaches) whereas the other group was taught according to the *BSCS 5E* model (designed along inquiry principles). The findings showed that students receiving inquiry-based instruction outperformed the students who followed the traditional teaching programme. Moreover, the superior effectiveness of the inquiry-based instruction was consistent across a range of learning goals (knowledge, scientific reasoning, and argumentation) and time frames (immediately following the instruction and 4 weeks later).

A study by McCarthy (2005) brought into question the effectiveness of inquiry-based approaches for students with behavioural and emotional needs. Here, a group of middle-school students with ‘serious emotional disturbances’ were taught using an inquiry-based instructional programme, while, at the same time, data was also collected from a ‘control’ group (with comparable emotional needs), instructed using traditional methods, i.e. focusing on learning content from a textbook. Data was collected on both the students’ behaviour as well as their achievement. Although assessment results showed that students on the inquiry programme performed better academically on the whole, there was no significant difference in behaviour between the two groups. On the other hand, a previous study in 2002 (Cawley, Hayden, Cade, & Baker-Kroczyński, 2002) which focused on behavioural issues amongst a group of students with special needs (though not with students with emotional needs) showed improved behaviour using an inquiry approach with the group of children with special needs.

Lynch *et al* (Lynch, Kuipers, Pyke, & Szesze, 2005) highlighted another group of students who seemed to benefit from IBSE approaches. They found that disadvantaged students exposed to inquiry-based methods of teaching outperformed those taught according to traditional methods. Besides achieving higher levels of academic performance, the participants in both of these studies (i.e. the McCarthy and Lynch *et al* studies) were found to do so irrespective of their ethnicity, gender, socioeconomic situation, and ESOL level. This was a particularly interesting finding as post-test scores for the students from the commonplace instruction group showed differences related to their ethnicity, thereby indicating ‘the appropriateness of inquiry and the BSCS 5Es for meeting the need of science for all’ (p. 293). Furthermore, there is also evidence to suggest that **the more time students spend engaged in hands-on inquiry activities, the higher their scores** tend to be in standardized tests, not only in science but also in mathematics and reading. This trend is mirrored by students coming from poorer, urban communities (Klentschy & Molina-De La Torre, 2004; Ruby, 2006; Stohr-Hunt, 1996). What is more, Marshall and Horton (2011) found that the more time students spent exploring concepts themselves (as opposed to having concepts explained to them), the more they engaged with **higher-order thinking**. That is, the inquiry approaches were seen to increase their cognitive ability.

We thus conclude this section on evidence in support of inquiry-based activities as a way to improve students’ cognitive development, experimental procedure, critical thinking skills, and achievement in (and attitude to) science by arguing that there is a case to be made for inquiry-based learning being an effective way to teach science.

## 1.6 How is IBSE assessed?

Teaching students to raise questions and find answers for themselves is the whole aim of science instruction ... we want to know that the students who receive high grades in science have the abilities required for independent thought and success in later life.

(Colburn, 2004, p. 66)

A fundamental feature of any good science teaching is the ability to assess the learner’s prior understanding of a topic and to address any misconceptions that they may have (Leach & Scott, 2002; Li & Li, 2008). Inquiry-based instruction in science has been described by Colburn as a teaching approach that encourages inductive learning with the help of real-world exemplars (Colburn, 2004). Its primary aim of promoting ‘independent thinking’ in students ‘is not a context-free activity’ and hence for learners to ‘actively grapple with the content’, it is essential that the activities selected are compatible with their ‘background knowledge and reasoning skills’ (Colburn, 2004, p. 63). In most cases, therefore, it will not be enough for the educator to simply provide enriching resources and a stimulating question for students: teacher support is required to avoid false starts and prevent frustration and misunderstanding on the part of the learner (Kirschner *et al.*, 2006; Puntambekar & Kolodner, 2005). Equally for any given science

Supported by



topic, concept, curriculum area or theme, a teaching sequence may employ wide-ranging methods and combine transmissive with more learner-centred inquiry approaches based on what content knowledge is being addressed (Ryder, 2011).

The two key goals of assessment are 'to help students while they are learning' and 'to summarize and report it ... to find out what they have learned at a particular time' (Harlen, 2013, p. 16); that is, what Harlen refers to as the formative and summative uses of assessment. As already discussed, inquiry-based approaches go beyond the transmission of scientific facts or phenomena and aim to elicit and develop independent thinking and critical thinking skills on top of content knowledge and scientific competencies (such as data collection, analysis and communication of findings). In this way, IBSE can be seen to address a broader range of learning goals than conventional science teaching may do. This, in turn, makes assessment of inquiry goals more difficult. Assessment practices for IBSE need to incorporate all these learning goals. To this end, Harlen (2013) contends that formative assessment is crucial to the implementation of inquiry-based instruction. Colburn, too, urges the 'continual formative assessment of student understanding through observation, student questioning, and written assignments' arguing that this helps educators to decide when it is appropriate to allow learners to progress onto more open inquiry activities, and when it is best to 'backtrack and scaffold' learners' understanding of concepts (2004, p. 66).

The value of formative assessment for IBSE rests in its use as a way of developing deeper understandings and greater competency skills that are essential for progressing learning (Harlen, 2013). Additionally, formative assessment may be used by educators to evaluate which of the 'multiple levels of inquiry' (e.g. confirmation, structured, guided, or open inquiry) a particular learner is working at, or towards' (Banchi & Bell, 2008, p. 29).

Within the IBSE context, by exploiting classroom dialogues teachers can assess the progress of students and give formative feedback, even when they are engaged in open-ended inquiry activities. According to Alexander, teachers can utilize the 'distinct pedagogical approach' of 'dialogic teaching' (2004, p. 1) to 'steer classroom talk with specific educational goals in mind' (p. 27). However, teachers need to be cautious about when to intervene in student talk and discussions, so as not to stifle learners' creativity or impede them from developing their own ideas and understandings (Harlen, 2013).

Other strategies for the formative assessment of learners in the IBSE classroom include:

- teachers' questions and allowing sufficient time for answering;
- teachers giving feedback on students' work
- teachers listening to students' feedback on their teaching
- student self-assessment and peer-assessment (Harlen, 2013).

The chief purposes of summative assessment practices are various, for instance, making sure students are learning what you want them to learn; for tracking students' learning for teachers, school managers, and parents; and, for providing data which can be used for school improvement. Although such purposes do not necessarily impact students' learning directly, Harlen suggests that they may sometimes do so. Moreover, the gap between 'what can be assessed' and 'what ought to be assessed' tends to be far greater 'in the case of IBSE where goals relate to building understanding and developing 'skills used by scientists' (Harlen, 2013, p. 22).

Some of the methods Harlen (2013) outlines for implementing summative assessment within IBSE are:

- tests that involve the knowledge application as well as simply recall;
- questions and tasks to assess science inquiry skills;
- verbal and/or written explanations justifying events,
- data, and/or predictions;
- portfolios of work generated over a length of time (including accounts, reflections, photos, etc.);
- regular checking of student notebooks and/or electronic postings;
- presentations by groups and/or individuals.

Within the INQUIRE project, methods of formative and summative assessment that have been trialled to support assessment of IBSE activities have been wide-ranging and include concept cartoons, concept maps, small group work, dialogue, presentations and posters, portfolios, observations, photographs, video, rubrics, students' drawings and other work.

Now that we have explored how IBSE is defined, why it is effective and how it can be assessed, in section two we present ideas for designing a wide range of different types of IBSE activities in LOtC settings based on Meyer et al's (2012) recent 'eight strategies' model. We then look at types of teaching approaches to use when implementing IBSE activities and reflect back on the 'open, guided, structured' framework introduced in section one. Finally we explore some of the unique benefits of LOtC settings for conducting IBSE and highlight some of the exceptional IBSE work already underway in LOtC settings across Europe.



www.inquirebotany.org

## 2. Making it happen: designing and implementing effective IBSE activities from a LOTC practitioner perspective.

In pursuing IBSE, educators are not bound by the confines of a classroom or school laboratory. Studying science can go wherever the inquiry leads, and it may often be more appropriate to conduct the inquiry in locations specifically matched to the context or topic being studied. In school, teachers must overcome the challenge of accommodating IBSE within the constraints of crowded, factually-oriented programmes of study and reconcile this with the demands of summative examination assessments that do not sufficiently take into the accounts of the learning goals of IBSE (House of Commons Science and Technology Committee, 2011; Inter Academy Panel, 2010). LOTC practitioners, on the other hand, can take advantage of relative freedom from the suffocating demands of externally prescribed curricula and exploit this flexibility in order to pilot and trial IBSE approaches. Inquiry approaches may be used to design whole programmes of study or can be incorporated into existing activities to help learners understand real-world science and science applications, both inside and outside of the classroom.

### 2.1 Eight ideas for designing IBSE activities

As already discussed, types of effective inquiry activities may be many and varied in their topics, duration, teaching styles and level of teacher support required. One of the aims of EU funded IBSE projects like INQUIRE, PATHWAY and Fibonacci has been to help disseminate high-quality IBSE activities to practitioners working in both schools and LOTC environments.<sup>1</sup>

In a recent study that focused on identifying different types of IBSE activities, Meyer et. al. (2012) analysed over 300 inquiry teaching and learning activities. By identifying emerging patterns and commonalities in these activities, they propose eight categories of inquiry 'strategies' that can be used by educational practitioners across a wide-ranging science subject areas (Meyer et al., 2012a, 2012b, 2012). The eight inquiry strategies are summarized in Table 3.

---

<sup>1</sup> See for example inquirebotany.org; <http://www.plantscafe.net/en/home.htm>; <http://www.pathway-project.eu/pathway-resources>; and <http://fibonacci.uni-bayreuth.de/resources/examples-of-activities/in-science.html> )

Supported by



<b>1. Protocol</b>	
Features	<ul style="list-style-type: none"> <li>A well-defined procedure for collecting data for which the data collected round may also suggest what to investigate next.</li> <li>The learner is brought on board with the knowledge development cycle.</li> </ul>
Example	Investigating the effect of different salt concentrations on the rate of lettuce seed germination.
<b>2. Design challenge</b>	
Features	<ul style="list-style-type: none"> <li>An explicit task to produce a product.</li> <li>Requires students to acquire certain knowledge to complete successfully. This might be taught in a non-inquiry way but the design challenge itself is structured around solving a problem.</li> <li>Students could divide into speciality groups to learn different knowledge then form design teams made up of representatives from different knowledge areas.</li> </ul>
Example	Designing and making an imaginary seed that is dispersed by wind, animals, explosion or water.
<b>3. Product testing</b>	
Features	<ul style="list-style-type: none"> <li>The learner evaluates and compares performance.</li> <li>They must devise ways to consistently compare items and perhaps even quantify those comparisons.</li> <li>Rather than create a product to meet certain criteria, students create the criteria to make the product.</li> </ul>
Example	Comparing different fruit varieties and deciding which attributes affect desirability (size, taste, colour, smell, shape, price) and devising ways to test those attributes
<b>4. Black box</b>	
Features	<ul style="list-style-type: none"> <li>Challenges the learner to determine the nature of things hidden from view.</li> <li>They must form logical arguments from which they could draw conclusions but without direct observations.</li> <li>They illustrate the ability to reach conclusions from evidence other than direct observation.</li> </ul>
Example	Determining what objects are inside a closed, sealed box or trying to work out the size and shape of objects hidden from view by probing them with small objects like marbles.
<b>5. Intrinsic data space</b>	
Features	<ul style="list-style-type: none"> <li>Immersing the learner in a data space that inherently implies a question.</li> <li>Often involves using a simulated environment that allows the learner to investigate the effect of changing particular variables in a given environment.</li> </ul>
Example	Providing students with model or real bone specimens so that the task of trying to piece them together immediately presents itself.
<b>6. Taxonomy challenge</b>	
Features	<ul style="list-style-type: none"> <li>Learners are presented with a wide variety of samples and are challenged to</li> </ul>

	<p>organize them in a meaningful way.</p> <ul style="list-style-type: none"> <li>• A sufficient number and variety of samples is important to ensure the exercise is not reduced to the learner simply finding predetermined categories.</li> <li>• The learner needs sufficient context to motivate the formation of organisation to guide decisions as to what aspects of sample are more important than others.</li> </ul>
Example	Most naturally apply to biology themes but need not be limited to this. For example, in astronomy, students could be presented with a variety of celestial objects and challenged to categorize these based on data about the objects.
<b>7. Discrepant event</b>	
Features	<ul style="list-style-type: none"> <li>• Centre on distinct, non-intuitive, surprising and impressive events.</li> <li>• Naturally pose the question 'what is going on?'</li> <li>• Often done as a facilitated demonstration with the learner generating and answering questions.</li> </ul>
Example	The 'ammonia fountain' demonstration where students see water rise up a tube and turn into a pink fountain.
<b>8. Modelling</b>	
Features	<ul style="list-style-type: none"> <li>• Learners are challenged to construct a functioning model of a natural phenomenon.</li> <li>• Often used when the phenomenon being modelled is too small or too complex for the students to observe directly.</li> </ul>
Example	Creating a working model of transpiration recreating water moving up a xylem vessel.

**Table 3: Eight strategies for developing inquiry activity adapted from Meyer et. al (2012).**

To suggest that there are only eight possible models for developing an inquiry activity would of course be a gross oversimplification and there will certainly be some blurring of the edges. Indeed, Meyer et. al. (2012) themselves point out that the above inquiry strategies are not necessarily distinct and that activities may be designed which combine or overlap with the other strategies. These categories do, however, at least provide a tangible framework to start to talk about the types of inquiry activity that can be developed either as stand-alone activities or as part of existing programmes. These sorts of inquiry strategies may also serve as a useful tool to help develop 'cookbook' style activities into more open forms of inquiry.

## 2.2 Utilising mobile technology for inquiry outdoors

Other types of inquiry activities that lend themselves particularly well to LOtC and outdoor settings are those that utilise mobile phone technologies. A growing body of research is pointing to the efficacy of such technologies for supporting and enhancing both personalised and collaborative inquiry learning (Chang et al., 2012; Laru, Jarvela, & Clariana, 2012; Looi et al., 2011; Schaal, Grübmeier, & Matt, 2012; Song, Wong, & Looi, 2012).

Chang et al., (2012) and Schaal et al., (2012) both investigated the use of mobile technologies to support learners working together on a common outdoor inquiry activity. Both studies indicate that the mobile technologies can help increase learner collaboration and that this can contribute to enhanced knowledge gains as well as learner motivation. Utilising mobile phone satellite mapping applications, geocaching and a simple wiki as a content sharing platform, Schaal et al. (2012) developed and tested a new IBSE approach for teaching biodiversity elements of a pre-service science teacher course (InquiBiDT: The Inquiry-Based Biodiversity Teaching approach). Student science teachers were challenged to take part in a large-scale outdoor 'treasure hunt' using a mobile mapping application to find species of plants, answer questions about them (from both on-site observations and internet research) and then contribute notes and answers to a group wiki. The students who took part in the IBSE activity performed better in terms of conceptual knowledge gains and motivation in post-tests as compared to peers taught via a traditional lecture course. Schaal et. al (2012) postulate that the students taking part in the IBSE activity performed better because they 'acted as learners and lecturers at the same time by processing and creating knowledge as a part of IBSE ' (Schaal et al., 2012 p. 115).

In a similar way, Chang et al. (2012) used mobile technology to support learners in a collaborative environmental field inquiry to investigate different types of rock. Like Schaal et al. (2012), this study used mapping technologies familiar to the students (Google Maps) along with simple collaboration tools that allowed the learners to share photos, make notes and annotations and, importantly, build upon each other's notes, as they conducted their fieldwork inquiry. The findings indicated that the groups of learners were able to 'derive new learning from the inquiry activity, through much collaborative work and collaborative meaning making', and that the use of the mobile technology 'brought about a more mediated learning process within a real-world context' (Chang et al. 2012, p56).

As well as enhancing collaborative learning for fieldwork inquiry tasks, there is also evidence that suggests that mobile technologies can help develop individual inquiry learning. Song et al. (2012) showed how personalised learning in science inquiry can be fostered in primary aged students through a process of 'experiential learning in a mobile learning environment' (MLE). Forty primary students were given a smartphone to use during a personalised learning programme in which they investigated the life cycles of spinach plants and butterflies. While on a farm field trip and then back in the classroom, the 3G-enabled smartphones provided ease of access to web resources to support their learning. The students utilised the smart phone resources to build up a personal portfolio of evidence and notes as part of their research. The individual mobile usage behaviours of each student were recorded on a server in real-time to help the teachers monitor individual student progress. While the students were provided with a pre-defined learning goal (to investigate the life cycles of living things), the teaching approach for the inquiry was open: the students conducted their own independent research at their own pace and the teachers facilitated learning based on the learning artefacts created by the students (images, diagrams, notes, presentations). The results indicated that personalised learning was supported by the use of smartphone technology and that the field-based inquiry

Supported by





mobile trail served to provide learning context while post-trail activities supported deeper learning against the learning goals back in the classroom.

### 2.3. Approaches for implementing IBSE activities

There are challenges for any educator wishing to develop IBSE activities within new or existing educational programmes, largely because the pedagogies required to implement them are more complex than for direct transmission of knowledge, rely heavily on the skills of the practitioner in understanding how to facilitate them and demand a considerable investment in time and planning (Achiam, Solberg, & Evans, 2013; Barron & Darling-Hammond, 2010). Therefore, when it comes to discussing how to design and implement IBSE activities in practice, as with all good teaching, planning must start by defining the intended learning goals followed by selecting the most appropriate teaching and learning approaches to help achieve them.

In the case of IBSE, it is helpful to distinguish between learning goals that aim to support learning ‘about’ scientific inquiry and those aiming to support the learning science ‘through’ inquiry. We may want students to come to understand what scientific inquiry is by giving them opportunities to experience the scientific inquiry first-hand. We may also be interested in helping the learners to learn scientific content through a process of inquiry. We must bear in mind, however, that experiencing inquiry-based science as a learner is not the same as engaging in inquiry as a scientific expert and we need to be cautious not to confuse the two (Kyle, 1980).

A challenge for practitioners wanting to adopt IBSE approaches in their teaching, particularly when working with large groups, is that if they follow a very open approach, the students may have very divergent learning goals. Recent research from Denmark suggests that a practical way to overcome this is by directing the learners toward specific learning goals through a carefully constructed learning environment that provides the learner with data that they can use to validate their own hypotheses (Achiam, Solberg, & Evans, 2013). This guided but not overly structured approach was adopted by Song et al. (2012) in their investigation into the use of smartphones to support personalised inquiry learning and is also advocated by Colburn (2008) who points to evidence which suggests that ‘students who are not challenged mentally will not develop their cognitive abilities as much as students who are challenged’ and thus that ‘structured inquiry will not affect the students’ cognitive abilities nearly as much as guided inquiry activities’ (Colburn, 2008, p3).

While there is clearly no ‘one-size-sits-all’ formula for designing an effective IBSE session or activity, it is possible to look for common features. As already discussed in the first section on this review, on one side of the spectrum they can include highly prescriptive tasks where the teacher sets out the questions and offers clear directions for students to follow in order to get the desired answers (i.e. ‘cookbook-style’ tasks). At the other end of the spectrum teachers may encourage their students to come up with their own inquiry question (within an area of study),

Supported by



which they will then attempt to answer by researching the topic as well as the methods of inquiry, all by themselves. Anything in-between may also be termed inquiry, although Bell *et al* (Bell, Smetana & Binns, 2005) hasten to emphasise that most students will need substantial teacher support (or ‘scaffolding’) ‘before they are ready to develop scientific questions and design effective data collection procedures to answer these questions’ (p. 30).

Coburn (2004) presents inquiry-based instruction as a ‘middle ground between the extremes of verification activities and discovery learning’. He reflects that science educators do often agree in identifying three main teaching approaches to support inquiry-based instruction, structured, guided, and open inquiry (Colburn, 2004, p. 65). Table 4 thus sets out the kinds of information that educators could provide to students together with the sorts of questions learners would need to ask themselves for each of these three approaches.

	Structured	Guided	Open
Information provided	<ul style="list-style-type: none"> <li>The question to investigate</li> <li>The materials to use</li> <li>Step-by-step instructions</li> </ul>	<ul style="list-style-type: none"> <li>The question to investigate</li> <li>The materials to use</li> </ul>	<ul style="list-style-type: none"> <li>None given</li> <li>Learner makes all the decisions about what/how/why to research</li> </ul>
Questions learners must explore/ask themselves	<ul style="list-style-type: none"> <li>What observations should I make?</li> <li>How should I record these observations?</li> <li>What do the observations mean?</li> </ul>	<ul style="list-style-type: none"> <li>How should I go about answering the question?</li> <li>What procedure(s) should I design to answer the question?</li> <li>What observations should I make?</li> <li>How should I record these observations?</li> <li>What do the observations mean?</li> <li>How have other groups/individuals gone about answering the question?</li> </ul>	<ul style="list-style-type: none"> <li>What question shall I investigate?</li> <li>What will I need to research before continuing?</li> <li>How shall I investigate this question? / How should I go about answering the question?</li> <li>What procedure(s) should I design to answer the question?</li> <li>What observations should I make?</li> <li>How should I record these observations?</li> <li>What do the observations mean?</li> <li>How have other groups/individuals gone about answering the question?</li> <li>What is the best way for me to present my findings to the class and can I defend the decisions I have made?</li> </ul>

**Table 4** Information teachers generally provide to students and the sorts of questions explored by learners for *structured, guided* and *open* inquiry

## 2.4 Final reflections: LotC settings as champions for IBSE

Rich with real-world phenomena, these are places where people can pursue and develop scientific interests, engage in science inquiry, and reflect on their experiences through sense-making conversations.

(National Academy of Sciences, 2007, p. 2 )

In this review, we have explored some broad definitions of IBSE in order to present a working definition. We have also attempted to identify types of IBSE activities in order to show what IBSE can look like in practice and have presented a range of teaching approaches that practitioners could adopt for developing and implementing IBSE in their practice. What we want to emphasize in these final reflections is that LOTCs across Europe and beyond are already championing IBSE, whether they do so explicitly or not and that LOTC settings are thus very well-placed to lead the way in disseminating best practice in IBSE.

A robust and growing body of research into learning in LOTC or 'informal learning' settings has been revealing what and how visitors learn best within them. Much of this research has centred on science-based settings (science museums, science discovery centres, zoos, botanical gardens, aquariums) where empirical studies on visitor learning have shown that it is characterized as learner-driven, personal, on-going, contextually relevant, collaborative, nonlinear, and open-ended (Eshach, 2007; Falk & Dierking, 2000; Falk & Storksdieck, 2005; Gutwill & Allen, 2012; Hein, 1998; Hofstein & Rosenfeld, 1996). Research by Falk and Dierking, in particular (Dierking & Falk, 1994; Falk & Dierking, 2000; Falk, 1983, 1991, 1997) has shaped thinking about how visitors learn in LOTC settings and led to the much-cited 'contextual model' of learning (Falk & Dierking, 2000). Echoing Vygotskian perspectives on the social dimensions of learning and conveying a strongly constructivist approach, this model synthesises emerging ideas about how people learn in informal settings from visitor research. It has helped demonstrate that far from a 'transmission' model for learning in which visitors passively absorb knowledge transmitted by the exhibition designers and curators of LOTC spaces, learning processes in these settings are highly active on the part of the learner and are influenced by personal, social, physical, cultural and emotional factors. Although it was developed before the term 'IBSE' was popularly coined, this contextual model can be viewed as very closely aligned with features of IBSE in that it focuses on personal meaning-making on the part of the learner supported by a stimulating and highly social environment (Allen, 2004; Dierking, Ellenbogen, & Falk, 2004; Falk & Dierking, 2000; Falk & Storksdieck, 2005; Griffin, 1994, 2004; Rennie & Johnston, 2004; Zimmerman, Reeve, & Bell, 2010).

LOTCs represent ideal environments for IBSE. They support learning that starts from the individual learner's prior ideas and understandings and then builds on this by introducing new, varied and authentic science experiences. From inspiring botanical displays and realistic biological dioramas to interactive space exhibits, learners in LOTCs are supported to observe and investigate real-world science concepts and phenomena that are difficult, if not impossible, to replicate in school (Griffin, 1994; Gutwill & Allen, 2012; National Research Council., 2009). LOTCs also provide opportunities to interact with living things and authentic scientific artefacts. They

Supported by





provide immersive, hands-on experiences with interactions and encounters that cannot be replicated in a school classroom or laboratory. Museums, for example, provide opportunities to explore and handle objects which themselves can provide evidence for lines of inquiry (Dutton, 2012; Talboys, 2005). Field centre sites allow students to experience and practise the skills of real ecologists. Equally, many LOfC science settings also provide opportunities for visitors to meet with or learn about the work of professional scientists, especially where the primary function of the organisation may be scientific research. From curators and conservators of museum science collections to the research scientists working on the latest atomic or genetic research, LOfC settings are in a unique position to help their audiences connect to real-world science and scientists. Indeed, recent research is suggesting that the great potential of LOfC settings to offer high-quality learning in the area of scientific inquiry skills could serve to build stronger bridges between schools and those settings (DeWitt & Storksdieck, 2008; Gutwill & Allen, 2012). This linking of schools with real-world science has been a key aim of many of the recent EU funded Inquiry Based Science Education projects of which INQUIRE is part.

We can see then that LOfCs comprise unique places for IBSE learning. Whether they are a living collection like a botanical garden in which the visitor can experience the wonder and diversity of the natural world, a museum full of authentic science objects or a discovery centre packed with interactive displays, LOfCs can stimulate natural learner curiosities and provide far richer learning environments than traditional classroom or laboratory settings. Scaffolding need not be restricted to interactions between individuals either; artefacts, resources, and outdoor environments themselves can also be designed as scaffolds (Puntambekar & Kolodner, 2005). Thus, as advocated by the Reggio Emmelio approach, the LOfC environment can itself be viewed as 'the third teacher' in that a well-designed learning environment can act to scaffold students' learning as they progress through their own voluntary or discovery learning paths (Branzi, Bruner, Rinaldi, & Vecchi, 1998). A key role of the IBSE practitioner thus is, and always will be, to help provide the sort of stimulating learning environment that allows learners to pursue their learning wherever their inquiry takes them.

Supported by



## References

- Achiam, M., Solberg, J., & Evans, R. (2013). Dragons and Dinosaurs: Directing Inquiry in Biology Using the Notions of 'Milieu' and 'Validation'. *Journal of Biological Education*, 47(1), 39–45.
- Alake-Tuenter, E., Biemans, H. J. A., Tobi, H., Wals, A. E. J., Oosterheert, I., & Mulder, M. (2012). Inquiry-Based Science Education Competencies of Primary School Teachers: A literature study and critical review of the American National Science Education Standards. *International Journal of Science Education*, 34(17), 2609–2640.
- Alexander, R. (2004). *Towards dialogic teaching. Rethinking classroom talk*. Cambridge, U.K.: Dialogos.
- Allen, S. (2004). Designs for learning: Studying science museum exhibits that do more than entertain. *Science Education*, 88(S1), S17–S33.
- Anderson, R. (2002). Reforming Science Teaching: What Research Says About Inquiry. *Journal of Science Teacher Education*, 13(1), 1–12.
- Asay, L. D., & Orgill, M. (2009). Analysis of Essential Features of Inquiry Found in Articles Published in The Science Teacher, 1998–2007. *Journal of Science Teacher Education*, 21(1), 57–79.
- Ausubel, D., Novak, J., & Hanesian, H. (1978). *Educational Psychology: A Cognitive View* (2nd ed.). New York: Holt, Rinehart & Winston.
- Ausubel, D. P. (1963). Cognitive Structure and the Facilitation of Meaningful Verbal Learning. *Journal of Teacher Education*, 14(2), 217–222.
- Banchi, H., & Bell, R. L. (2008). The Many Levels of Inquiry. *Science and Children*, 26–29.
- Barron, B., & Darling-Hammond, L. (2010). Prospects and challenges for inquiry-based approaches to learning. In *Educational Research and Innovation* (pp. 199–225). Organisation for Economic Co-operation and Development. Retrieved from <http://www.oecd-ilibrary.org/content/chapter/9789264086487-11-en>
- Bell, R. L., Smetana, L., & Binns, I. (2005). Simplifying Inquiry Instruction. *The Science Teacher*, 30–33.
- Bhattacharyya, S., Volk, T., & Lumpe, A. (2009). The Influence of an Extensive Inquiry-Based Field Experience on Pre-Service Elementary Student Teachers' Science Teaching Beliefs. *Journal of Science Teacher Education*, 20(3), 199–218.
- Branzi, A., Bruner, J., Rinaldi, C., & Vecchi, V. (1998). *Children, spaces, relations Metaproject for an environment for young children*. Reggio Children Publisher accessed on 17 July 2013 from: <http://www.reggiochildren.it/?libro=bambini-spazi-relazioni&lang=en>

Brickman, P., Gormally, C., Armstrong, N., & Hallar, B. (2009). Effects of inquiry-based learning on students' science literacy skills and confidence. *International Journal for the Scholarship of Teaching and Learning*, 3(2), 1–22.

Bruner, J. (1983). Play, thought, and language. *Peabody Journal of Education*, 60(3), 60–69.

Bruner, J. S. (1962). *A Study of Thinking*. New York: Science Editions, Inc.

Bruner, J. S. (1986). *Actual Minds, Possible Worlds*. Cambridge, Mass: Harvard University Press.

Bybee, R. (2000). Teaching Science as Inquiry. In *Inquiring into Inquiry Learning and Teaching in Science* (pp. 20–46). Washington, DC: The American Association for the Advancement of Science (AAAS).

Cakir, M. (2008). Constructivist approaches to learning in science and their implication for science pedagogy: A literature review. *International Journal of Environmental and Science Education*, 3(4), 193–206.

Cawley, J., Hayden, S., Cade, E., & Baker-Kroczyński, S. (2002). Including students with disabilities into the general education science classroom. *Exceptional Children*, 68, 423–435.

Chang, C.-H., Chatterjea, K., Goh, D. H.-L., Theng, Y. L., Lim, E.-P., Sun, A., ... Nguyen, Q. M. (2012). Lessons from Learner Experiences in a Field-Based Inquiry in Geography Using Mobile Devices. *International Research in Geographical and Environmental Education*, 21(1), 41–58.

Choi, S., & Ramsey, J. (2009). Constructing Elementary Teachers' Beliefs, Attitudes, and Practical Knowledge Through an Inquiry-Based Elementary Science Course. *School Science and Mathematics*, 109(6), 313–324.

Cobern, W. W., Schuster, D., Adams, B., Applegate, B., Skjold, B., Undreiu, A., ... Gobert, J. D. (2010). Experimental Comparison of Inquiry and Direct Instruction in Science. *Research in Science & Technological Education*, 28(1), 81–96.

Colburn, A. (2004). Inquiring scientists want to know. *Association for Supervision and Curriculum Development*, 63–66.

Colburn, A. (2008). What Teacher Educators Need to Know about Inquiry-Based Instruction. Retrieved from <http://www.csulb.edu/~acolburn/AETS.htm>

Crawford, B. A. (2000). Embracing the essence of inquiry: New roles for science teachers. *Journal of Research in Science Teaching*, 37(9), 916–937.

Crippen, K. J., & Archambault, L. (2012). Scaffolded Inquiry-Based Instruction with Technology: A Signature Pedagogy for STEM Education. *Computers in the Schools*, 29(1), 157–173.

Supported by



- Dewey, J. (1910). Science as Subject-Matter and as Method. *Science*, 31(787), 121–127.
- DeWitt, J., & Storksdieck, M. (2008). A Short Review of School Field Trips: Key Findings from the Past and Implications for the Future. *Visitor Studies*, 11(2), 181–197.
- Dierking, L., Ellenbogen, K., & Falk, J. (2004). In principle, in practice: Perspectives on a decade of museum learning research (1994–2004). *Science Education*, 88(S1), S1–S3.
- Dierking, L., & Falk, J. (1994). Family behavior and learning in informal science settings: A review of the research. *Science Education*, 78(1), 57–72.
- Dillon, J. (2012). Panacea or passing fad - how good is IBSE? *Roots*, 9 (2), 5–9.
- Drayton, B., & Falk, J. (2001). Tell-Tale signs of the Inquiry-Oriented Classroom. *National Association of Secondary Schools Principals (NAASP) Bulletin*, 85(623), 24–34.
- Driver, R., & Easley, J. (1978). Pupils and Paradigms: a review of literature related to concept development in adolescent science students. *Studies in Science Education*, 5(1), 61–84.
- Driver, R., & Oldham, V. (1986). A Constructivist Approach to Curriculum Development in Science. *Studies in Science Education*, 13, 105–122.
- Dutton, E. (2012). Objects and questions: along avenues of learning. *Roots*, 9 (2), 5–9.
- Eshach, H. (2007). Bridging In-school and Out-of-school Learning: Formal, Non-Formal, and Informal Education. *Journal of Science Education and Technology*, 16(2), 171–190.
- Falk, J. (1983). Time and behavior as predictors of learning. *Science Education*, 67(2), 267–276.
- Falk, J. (1991). Analysis of the Behaviour of Family Visitors in Natural History Museums. *Curator*, 34(1), 44–57.
- Falk, J. (1997). Testing a Museum Exhibition Design Assumption: Effect of Explicit Labeling of Exhibit Clusters on Visitor Concept Development. *Science Education*, 81(6), 679–87.
- Falk, J., & Dierking, L. (2000). *Learning from museums: visitor experiences and the making of meaning*. California: Altamira.
- Falk, J., & Storksdieck, M. (2005). Using the contextual model of learning to understand visitor learning from a science center exhibition. *Science Education*, 89(5), 744–778.
- Gibson, H. L., & Chase, C. (2002). Longitudinal impact of an inquiry-based science program on middle school students' attitudes toward science. *Science Education*, 86(5), 693–705.

Gilbert, J. K., & Watts, D. M. (1983). Concepts, Misconceptions and Alternative Conceptions: Changing perspectives in science education. *Studies in Science Education*, 10, 61–98.

Griffin, J. (1994). Learning to learn in informal science settings. *Research in Science Education*, 24(1), 121–128.

Griffin, J. (2004). Research on students and museums: Looking more closely at the students in school groups. *Science Education*, 88(S1), S59–S70.

Gutwill, J. P., & Allen, S. (2012). Deepening Students' Scientific Inquiry Skills during a Science Museum Field Trip. *Journal of the Learning Sciences*, 21(1), 130–181.

Harlen, W. (2013). *Assessment & Inquiry-Based Science Education: Issues in Policy and Practice*. Trieste, Italy: Global Network of Science Academies (IAP) Science Education Programme (SEP). Retrieved from [www.interacademies.net/activities/projects/12250.aspx](http://www.interacademies.net/activities/projects/12250.aspx)

Hein, G. E. (1998). *Learning in the museum*. London: Routledge.

Herron, M. D. (1971). The Nature of Scientific Enquiry. *The School Review*, 79(2), 171–212.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Swiller, and Clark (2006). *Educational Psychologist*, 42(2), 99–107.

Hofstein, A., & Rosenfeld, S. (1996). Bridging the Gap Between Formal and Informal Science Learning. *Studies in Science Education*, 28(1), 87.

House of Commons Science and Technology Committee. (2011). *Practical Experiments in School Science Lessons and Science Field Trips: Report, Together with Formal Minutes, Ninth Report of Session 2010-2012*. The Stationery Office.

Inter Academy Panel. (2010). Taking Science into Secondary Education, report of the Inter Academy Panel Conference 2013, accessed on June 17 2013 from: [http://www.allea.org/Content/ALLEA/WG%20Science%20Education/ProgrammeIBSE\\_YORK.pdf](http://www.allea.org/Content/ALLEA/WG%20Science%20Education/ProgrammeIBSE_YORK.pdf)

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41, 75–86.

Klentschy, M. P., & Molina-De La Torre, E. (2004). Students' Science Notebooks and the Inquiry Process. In *Crossing Borders in Literacy and Science Instruction: Perspectives on Theory and Practice*. Arlington, VA: NSTA Press.

Kyle, W. C. (1980). The distinction between inquiry and scientific inquiry and why high school students should be cognizant of the distinction. *Journal of Research in Science Teaching*, 17(2), 123–130.

Laru, J., Jarvela, S., & Clariana, R. B. (2012). Supporting Collaborative Inquiry during a Biology Field Trip with Mobile Peer-to-Peer Tools for Learning: A Case Study with K-12 Learners. *Interactive Learning Environments*, 20(2), 103–117.

Leach, J., & Scott, P. (2002). Designing and Evaluating Science Teaching Sequences: an approach drawing upon the concept of learning demand and a social constructivist perspective on learning. *Studies in Science Education*, 38(1), 115–142.

Lee, H.-S., Linn, M. C., Varma, K., & Liu, O. L. (2010). How do technology-enhanced inquiry science units impact classroom learning? *Journal of Research in Science Teaching*, 47(1), 71–90.

Leonard, J., Boakes, N., & Moore, C. M. (2009). Conducting science inquiry in primary classrooms: Case studies of two pre-service teachers' inquiry-based practices. *Journal of Elementary Science Education*, 21(1), 27–50.

Leonard, W. H. (1983). An experimental study of a BSCS-style laboratory approach for university general biology. *Journal of Research in Science Teaching*, 20, 807–813.

Leonard, W. H., Cavana, G. R., & Lowery, L. F. (1981). An experimental test of an extended discretion approach for high school biology laboratory investigations. *Journal of Research in Science Teaching*, 18, 497–504.

Leonard, W. H., & Penick, J. E. (2009). Is the Inquiry Real? Working Definitions of Inquiry in the Science Classroom. *Science Teacher*, 76(5), 40–43.

Levy, P., Lameris, P., McKinney, P., & Ford, N. (2011). *The features of inquiry learning: theory, research and practice*. Pathway to Inquiry Based Science Teaching, (Deliverable 2.1). European Commission: CSA-SA Support Actions, Project Number 266624. Retrieved from <http://www.pathwayuk.org.uk/what-is-ibse.html>

Li, X., & Li, Y. (2008). Research on Students' Misconceptions to Improve Teaching and Learning in School Mathematics and Science. *School Science and Mathematics*, 108(1), 4–7.

Looi, C.-K., Zhang, B., Chen, W., Seow, P., Chia, G., Norris, C., & Soloway, E. (2011). 1:1 Mobile Inquiry Learning Experience for Primary Science Students--A Study of Learning Effectiveness. *Journal of Computer Assisted Learning*, 27(3), 269–287.

Lott, G. W. (1983). The effect of inquiry teaching and advance organizers upon student outcomes in science education. *Journal of Research in Science Teaching*, 20, 437–451.

- Luera, G. R., & Otto, C. A. (2005). Development and Evaluation of an Inquiry-Based Elementary Science Teacher Education Program Reflecting Current Reform Movements. *Journal of Science Teacher Education, 16*(3), 241–258.
- Lynch, S., Kuipers, J., Pyke, C., & Szesze, M. (2005). Examining the effects of a highly rated science curriculum unit on diverse students: Results from a planning grant. *Journal of Research in Science Teaching, 42*, 921–946.
- Marshall, J. C., & Horton, R. M. (2011). The Relationship of Teacher-Facilitated, Inquiry-Based Instruction to Student Higher-Order Thinking. *School Science and Mathematics, 111*(3), 93–101.
- McCarthy, C. B. (2005). Effects of Thematic-Based, Hands-On Science Teaching versus a Textbook Approach for Students with Disabilities. *Journal of Research in Science Teaching, 42*(3), 245–263.
- Meyer, D. Z., Kedvesh, J., Kubarak-Sandor, J., Heitzmann, C., Faik, S., & Pan, Y. (2012a). How do we do inquiry? Let us count the ways. In *National Association for Research in Science Teaching*.
- Meyer, D. Z., Kedvesh, J., Kubarak-Sandor, J., Heitzmann, C., Faik, S., & Pan, Y. (2012b). Creating science and engineering practices in the K–12 classroom: An initial survey of the field. In *Annual Meeting of the American Society for Engineering Education*.
- Meyer, D. Z., Kedvesh, J., Kubarak-Sandor, J., Heitzmann, C., Pan, Y., & Faik, S. (2012). Eight Ways to Do Inquiry. *Science Teacher, 79*(6), 40–44.
- Minner, D. D., Levy, A. J., & Century, J. (2010). Inquiry-based science instruction-what is it and does it matter? Results from a research synthesis years 1984 to 2002. *Journal of Research in Science Teaching, 47*(4), 474–496.
- Nantawanit, N., P., B., & Ruenwongsa, P. (2012). Promoting students' conceptual understanding of plant defence responses using the fighting plant learning unit(FPLU). *International Journal of Science and Mathematics Education, 10*, 827–864.
- National Academy of Sciences. (2007). *Learning Science in Informal Environments: People, Places, and Pursuits*. Washington D.C.: National Academies Press.
- National Research Council. (1996). *National Science Education Standards*. Washington, DC: National Academy Press.
- National Research Council (NRC). (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington, DC: National Academy Press.
- National Research Council. (2009). *Learning Science in Informal Environments: People, Places, and Pursuits*. Washington, D.C.: The National Academies Press.



Nussbaum, J., & Novick, S. (1982). Alternative Frameworks, Conceptual Conflict and Accommodation: toward a principled teaching strategy. *Instructional Science*, 11, 183–200.

Osborne, R., & Freyberg, P. (Eds.). (1983). Roles for the science teacher. In *Learning in science: the implications of children's science* (p. 91–99). Birkenhead, Aukland: Heinemann.

Puntambekar, S., & Kolodner, J. L. (2005). Toward Implementing Distributed Scaffolding: Helping Students Learn Science from Design. *Journal of Research in Science Teaching*, 42(2), 185–217.

Rennie, L. J., & Johnston, D. L. (2004). The nature of learning and its implications for research on learning from museums. *Science Education*, 88(S1), S4–S16.

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*. Brussels: Brussels, Directorate General for Research, Science, Economy and Society. Retrieved from [http://ec.europa.eu/research/sciencesociety/document\\_library/pdf\\_06/report-rocard-on-science-education\\_en.pdf](http://ec.europa.eu/research/sciencesociety/document_library/pdf_06/report-rocard-on-science-education_en.pdf)

Rogers, M. A. P. (2009). Elementary preservice teachers' experience with inquiry: Connecting evidence to explanation. *Journal of Elementary Science Education*, 21(3), 47–61.

Ruby, A. (2006). Improving science achievement at high-poverty urban middle schools. *Science Education*, 90(6), 1005–1027.

Ryder, J. (2011). *Scientific Inquiry: learning about it and learning through it*. The Wellcome Trust. Retrieved from <http://www.wellcome.ac.uk/About-us/Publications/Reports/Education/Perspectives/index.htm>

Schaal, S., Grübmeier, S., & Matt, M. (2012). Outdoors and Online- inquiry with mobile devices in pre-service science teacher education. *World Journal on Educational Technology*, 4(2), 113–125.

Schneider, L. S., & Renner, J. W. (1980). Concrete and Formal Teaching. *Journal of Research in Science Teaching*, 17, 503–517.

Schwab, J. J. (1958). The Teaching of Science as Inquiry. *Bulletin of the Atomic Scientists*, 14(9), 374–379.

Schwab, J. J. (1962). The Teaching of Science as Inquiry. In *The Teaching of Science* (p. 3–103). Cambridge, MA: Harvard University Press.

Scott, N. (1970). Strategy of Inquiry and Styles of Categorization: a three year exploratory study. *Journal of Research in Science Teaching*, 7, 95–102.

Supported by



- Scott, N. C. (1966). The Strategy of Inquiry and Styles of Categorization. *Journal of Research in Science Teaching*, 4, 143–153.
- Scott, N. C. (1973). Cognitive Style and Inquiry Strategy: a five-year study. *Journal of Research in Science Teaching*, 10, 323–330.
- Shymansky, J. A., Kyle, W. C., & Alport, J. M. (1983). The effects of new science curricula on student performance. *Journal of Research in Science Teaching*, 20, 387–404.
- Song, Y., Wong, L.-H., & Looi, C.-K. (2012). Fostering Personalized Learning in Science Inquiry Supported by Mobile Technologies. *Educational Technology Research and Development*, 60(4), 679–701.
- Stohr-Hunt, P. M. (1996). An Analysis of Frequency of Hands-on Experience and Science Achievement. *Journal of Research in Science Teaching*, 33(1), 101–109.
- Strike, K. A., & Posner, G. J. (1985). A Conceptual Change View of Learning and Understanding. In *Cognitive Structure and Conceptual Change* (p. 211–231). Orlando: Academic Press Inc.
- Taber, K. S. (2001). The Mismatch between Assumed Prior Knowledge and the Learner's Conceptions: a typology of learning impediments. *Educational Studies*, 27(2), 159–171.
- Taber, K. S. (2006). Beyond Constructivism: the progressive research programme into learning science. *Studies in Science Education*, 42, 125–184.
- Taber, K. S. (2009). *Progressing Science Education: constructing the scientific research programme into the contingent nature of learning science*. Dordrecht: Springer.
- Talboys, G. . (2005). *Museum educator's handbook*. Aldershot, UK: Ashgate Publishing, Ltd.
- Varma, T., Volkmann, M., & Hanuscin, D. (2009). Preservice elementary teachers' perceptions of their understanding of inquiry and inquiry-based science pedagogy: Influence of an elementary science education methods course and a science field experience. *Journal of Elementary Science Education*, 21(4), 1–22.
- Vygotsky, L. (1978). *Mind in Society: Development of Higher Psychological Processes* (New edition.). Cambridge, Mass: Harvard University Press.
- Westbrook, S. L., & Rogers, L. N. (1994). Examining the development of scientific reasoning in ninth-grade physical science students. *Journal of Research in Science Teaching*, 31, 65–76.
- Wilson, C. D., Taylor, J. A., Kowalski, S. M., & Carlson, J. (2010). The Relative Effects and Equity of Inquiry-Based and Commonplace Science Teaching on Students' Knowledge, Reasoning, and Argumentation. *Journal of Research in Science Teaching*, 47(3), 276–301.



Windschitl, M. (2003). Inquiry projects in science teacher education: What can investigative experiences reveal about teacher thinking and eventual classroom practice? *Science Education*, 87(1), 112–143.

Wise, K. C., & Okey, J. R. (1983). A meta-analysis of the effects of various science teaching strategies on achievement. *Journal of Research in Science Teaching*, 20(5), 419–435.

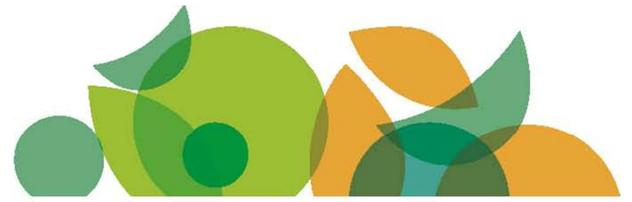
Yager, R. E., & Akcay, H. (2010). The Advantages of an Inquiry Approach for Science Instruction in Middle Grades. *School Science and Mathematics*, 110(1), 5–12.

Yoon, H.-G., Joung, Y. J., & Kim, M. (2012). The Challenges of Science Inquiry Teaching for Pre-Service Teachers in Elementary Classrooms: Difficulties on and under the Scene. *Research in Science Education*, 42(3), 589–608.

Zimmerman, H. T., Reeve, S., & Bell, P. (2010). Family Sense-Making Practices in Science Center Conversations. *Science Education*, 94(3), 478–505.

Supported by





[www.inquirebotany.org](http://www.inquirebotany.org)

# Manual about Ethical Issues in the INQUIRE Project



Author: SBZH

Prof. Dr. D. Elster (UniHB)

Supported by



## Table of Contents

<b>Manual about Ethical Issues in the INQUIRE Project</b> .....	1
1. The INQUIRE Project .....	4
2. Why do we need ethical guidelines? .....	4
2.1. Ethical principles for reflective practice.....	5
2.1.1. Data protection:.....	5
2.2. Ethical principles for working with plants.....	6
2.3. Ethical principles for working with children outdoors / in out-of-school learning environments / in botanic gardens.....	7
3. Developing the guidelines framework.....	7
3.1. Guidelines adopted:.....	7
3.1.1. BERA Guidelines underpinning the INQUIRE ethical principles concerning reflective practice .....	7
3.1.2. How to handle children with care.....	8
3.1.3. How to protect personal data.....	8
3.1.4. How to handle intellectual property rights.....	8
3.2. Royal Botanic Gardens Kew ethical guidelines for educational programs at Botanic Gardens... 8	
3.3. National guidelines about teacher ethics .....	9
4. Process for developing the guidelines .....	9
Inquire Ethical Guidelines .....	10
4.1. Ethical principles for reflective practice.....	10
4.1.1. General ethical principles .....	11
4.1.2. Consent of those involved .....	11
4.1.3. Honesty and openness.....	12
4.1.4. Anonymity of those involved .....	13
4.1.5. Access to findings.....	14
4.1.6. Working with children and young people.....	14
4.1.7. Compliant with the laws of the country .....	16
4.2. Ethical principles for working with plants.....	16



[www.inquirebotany.org](http://www.inquirebotany.org)

4.2.1. Botanic gardens as hotspots of biodiversity .....	16
4.2.2. General information about the European guidelines of plant protection.....	17
4.2.3. INQUIRE ethical issues regarding plant protection.....	19
4.3. Ethical principles for learning outdoors / in out-of-school environments / in botanic gardens	19
4. 3.1. General information about working with children outdoors .....	19
4. 3.2. INQUIRE ethical guidelines regarding learning in botanic gardens including safety and risk management.....	20
5. References .....	22
ANNEXE: .....	23

PARENTAL CONSENT FOR CHILDREN UNDER THE AGE OF 16 YEARS PARTICIPATING IN A PROJECT

KEW: HEALTH AND SAFETY ON YOUR VISIT

KEW: HEALTH AND SAFETY RISK ASSESSMENT

Supported by





## 1. The INQUIRE Project

INQUIRE (Inquiry based Teacher Training for a Sustainable Future) is an EU FP7 project that supports the development of science literacy in Europe by planning and delivering one-year practical training courses promoting Inquiry Based Science Education (IBSE) in the context of biodiversity loss and climate change. 14 partners from botanic gardens and natural history museums that come from 11 countries take part in the project INQUIRE which is coordinated by the University of Innsbruck in Austria. Botanic gardens act as a stimulating environment, training and supporting teachers and garden educators to develop their proficiency in IBSE and to become reflective practitioners. To support this process, teachers and garden educators get opportunities to participate in a variety of professional development experiences that foster their understanding of IBSE and their motivation for teaching and learning activities in outdoor learning environments.

Teachers and educators work together in Communities of Practice to develop their proficiency in IBSE. In processes of co-construction, botanic garden educators and teachers develop IBSE activities and modules and test them with school classes. This requires agreement on the working process, shared goals, evidence collected as well as a critical rethinking and reflection of one's own practice. Teachers and garden educators shall be encouraged to establish a critical relationship to their own practice and be empowered to act as 'reflective practitioners'. To ensure excellence, INQUIRE applies a reflective practitioner approach on two levels: 1) on the consortium level within the community of practice between partners and 2) on the school and botanic garden level when training course participants apply IBSE activities at school and at the botanic garden. Regarding ethical aspects the latter learning environment includes pupils and therefore needs to be handled with particular care.

## 2. Why do we need ethical guidelines?

The development, delivery and evaluation of the INQUIRE project includes ethically sensitive aspects which need to be addressed and make the definition of common shared INQUIRE ethical guidelines necessary. Responsibility for this process has been with UniHB, who has been responsible for coordinating and discussing the INQUIRE specific ethical guidelines with consortium partners at the consortium meetings, and for the refinement of the guidelines in several steps.

Supported by





The *Cambridge Dictionary of Philosophy* (Audi, 1995) states that the word ethics is “commonly used interchangeable with “morality” ... and sometimes it is used more narrowly to mean the moral principles of a particular tradition, group, or individual.” The **principles** underpinning the INQUIRE ethical guidelines are an ethic of respect to the person, knowledge and democratic values. Individuals should be treated fairly, sensitively and with dignity. The ethic of respect should apply to all individuals participating in the INQUIRE project. The **aim** of the ethical guidelines is to enable INQUIRE Partner and course participants (teachers and educators) to weigh up all aspects of the process of designing, conducting and evaluating the INQUIRE courses within the national context and to reach an ethically acceptable position in which they are considered justifiable and sound.

In guiding INQUIRE partners and their course participants (teachers and educators) on their conduct within the framework we set out the guidelines under the following headings:

- 1) Ethical principles for reflective practice
- 2) Ethical principles for working with plants
- 3) Ethical principles for learning outdoors / learning in out-of-school environments

### **2.1. Ethical principles for reflective practice**

Within the INQUIRE project, INQUIRE partners (teacher trainers) and INQUIRE training course participants (teachers and botanic garden educators) will either evaluate their national training courses or their IBSE learning activities with children. The goal is to enable individuals to act as a reflective practitioner. The ethical considerations dealt with here are based on European as well as on national principles.

#### **2.1.1. Data protection:**

Legislation regarding data protection in all European countries are based on the respective *EU Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data* (<http://eur-lex.europa.eu>), which contains basic rules for research and science.

*Good practice in educational research*

Supported by





These European rules mentioned above are supplemented by the ethical principles contained in the *European Charter for Researcher* (<http://ec.europa.eu/euraxess/index.cfm/rights/europeanCharter>), which is a set of general principles and requirements, which specifies the roles, responsibilities and entitlements of researchers.

In the UK, the British Educational Research Association (BERA) has designed guidelines to support educational researcher to the highest ethical standards in whatever context is needed. They are summarized as *Ethical Guidelines for Educational Research* ([www.bera.ac.uk/system/files/3/BERA-Ethical-Guidelines-2011.pdf](http://www.bera.ac.uk/system/files/3/BERA-Ethical-Guidelines-2011.pdf)) and form the basis of the INQUIRE ethical guidelines.

In addition, further national legislation to ensure good practice in educational research comes into practice. In Germany, the German Association of Research (DFG) published recommendations *Self-control in Research and Safeguarding Good Scientific Practice* to ensure high quality. In Austria, the directives of the former Austrian Rectors' Conference (now Universities Austria) safeguard good scientific practice. Based on these and other principles the *Directives to safeguard good scientific practice* of the University of Innsbruck, published in a revised version in the Official Journal of the University of January 5, 2011 (<http://www.uibk.ac.at/fakten/leitung/forschung/regeln>), which are binding for academic research and establish a certain procedure in cases of infringement.

## 2.2. Ethical principles for working with plants

As the INQUIRE courses are conducted in botanic gardens, global, national and regional regulations regarding the working with plants are of relevance. Botanic gardens are important environments to protect our natural heritage. In 2002 the UN Convention on Biological Diversity (CBD) adopted the Gran Canarias Declaration for a *Global Plant Conservation Strategy (GPCS)*. This has to be applied in the INQUIRE project. The Strategy promotes action towards a better understanding of species which are most at risk. It includes international targets for the conservation of threatened species. As a further goal it promotes education and the awareness of plant diversity (<http://www.cbd.int/decision/cop/?id=7183>).

In addition, the INQUIRE partners and participants follow the ethical considerations of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)*. The Convention aims to protect listed species of plants and animals against overexploitation caused by international trade.

Supported by





### 2.3. Ethical principles for working with children outdoors / in out-of-school learning environments / in botanic gardens

Learning outdoors and in botanic gardens within the INQUIRE project should be an enjoyable experience for children, teachers and garden educators. Guidelines developed by the Royal Botanic Gardens, Kew as an example of how to safely and ethically manage visits to a botanic garden, build an important basis for the development of the INQUIRE ethical principles in this area. The guidelines are based on European safeguards to protect children and teenagers from abuse, the physical, sexual or emotional mistreatment or neglect of the young person (<http://www.childsafetyeurope.org/index.html>). In addition, the *Health and Safety at Work Act* (<http://ec.europa.eu/social/main.jsp?catId=148>) and national guidelines, the *Protection of Children Act* requires all organizations to check those who are involved in “caring for” or “supervising” minors.

## 3. Developing the guidelines framework

### 3.1. Guidelines adopted:

#### 3.1.1. BERA Guidelines underpinning the INQUIRE ethical principles concerning reflective practice

The INQUIRE project is a Cooperation Support Action and therefore not dedicated to research activities. However to evaluate work in progress and find evidence as to whether the consortium has reached given goals, a systematic approach of collecting evidence is applied. In addition, knowledge within the project is generated in a participatory process and is presented publicly. To this end, the INQUIRE project mirrors an evaluation process and has therefore adopted ethical principles.

The use of the **BERA guidelines** to define our INQUIRE ethical guidelines is based on the recommendation by the European Commission.

In short, the underpinning aim of the BERA guidelines is to enable educational researchers to weigh up all aspects of the process of conducting educational research within any given context (from student research projects to large-scale funded projects) and to reach an ethically acceptable position in which their actions are considered justifiable and sound. ([www.bera.ac.uk/system/files/3/BERA-Ethical-Guidelines-2011.pdf](http://www.bera.ac.uk/system/files/3/BERA-Ethical-Guidelines-2011.pdf))

Supported by





### **3.1.2. How to handle children with care**

With respect to working with children, vulnerable young people and adults, BERA requires researchers to comply with Articles 3 and 12 of the *United Nations Convention on the Rights of the Child* (<http://www.unicef.org/crc/>). Article 3 requires that in all actions concerning children, the best interests of the child must be the primary consideration. Article 12 requires that children who are capable of forming their own views should be granted the right to express their views freely in all matters affecting them, commensurate with their age and maturity. Children should therefore be facilitated to give fully informed consent.

### **3.1.3. How to protect personal data**

INQUIRE complies with the legal requirements in relation to the storage and use of personal data as set down by the *Data Protection Act* (<http://www.admin.ox.ac.uk/dataprotection/>). That includes the confidential and anonymous treatment of data and the respect of privacy. Partners and participants are entitled to know how and why their personal data are stored, to what it is put to use and to whom it may be made available.

### **3.1.4. How to handle intellectual property rights**

By making the outcomes of the INQUIRE project public we follow the BERA research writing guidelines: Good practice on Educational Research Writing ([www.bera.ac.uk/system/files/goodpr1\\_0.pdf](http://www.bera.ac.uk/system/files/goodpr1_0.pdf)). The right of the INQUIRE partners to publish own findings independently is considered the norm.

## **3.2. Royal Botanic Gardens Kew ethical guidelines for educational programs at Botanic Gardens**

It is vitally important to safeguard the wellbeing of children visiting botanic gardens. Therefore, Royal Botanic Gardens Kew has a comprehensive number of policies and guidelines to ensure the health and safety of the young visitors. Guidelines on appropriate and inappropriate behavior when working with minors aim to protect and prevent the young people with whom they come into contact with, from becoming the victims of abuse (see attachment 2.1). At Kew each educational activity requires a prior written planning of the educational objectives of the proposed activity and a prior written risk assessment of the activity that include a general risk assessment, and a risk assessment for indoor

Supported by





workshops and outdoor activities (see attachment 2.2). Teachers, who want to visit the botanic garden with their pupils, get guidelines about plant protection and work with plants and guidelines at their own risk assessment (see attachment 2.3). For detailed handouts see the Kew website on [www.kew.org/learn](http://www.kew.org/learn).

### **3.3. National guidelines about teacher ethics**

National school systems have guidelines to frame teacher actions in terms of their profession, and about appropriate ways to conduct their work in respect of the rights of students to whom teachers offer duty and care. Because teachers will be responsible for the students not only while working with them at school but also when taking them out to the botanic garden, INQUIRE partners rely on teachers to follow these ethics.

Different countries consider ethical issues in greater or lesser extent with Britain being one example where health and safety issues are of very highly considered. This has been a challenge for the project, deciding which extent of consideration for ethical issues (high or low) we should adopt.

By no means do we imply that all Partners and course participants should adhere to these guidelines but we recommend them as a common ground for import issues to be considered within the INQUIRE project (e.g. to reflect good practice).

## **4. Process for developing the guidelines**

The INQUIRE Ethical Issues have been negotiated within the INQUIRE Consortium democratically in several steps. The process of negotiation has been in the responsibility of UniHB. During the Inaugural Meeting in Meise, Belgium, a framework for the development of the INQUIRE relevant issues – divided into the sections “plant protection” and “child protection, safety, data protection” – was presented and discussed in the Consortium. The ethical issues were based on the UK BERA guidelines and the Partners were asked to add their national guidelines. At the consortium meeting in Wakehurst, London, the elaborated version was discussed. Countries like the UK, Germany and Austria with high standards in educational research, agreed to the version, other countries like Norway, Russia and Bulgaria remarked that some issues are not relevant in their country or that they were in the responsibility of others e.g. the school authority, the school head or the teachers. We therefore asked each Partner for a detailed comment on each ethical issue. The results were summarized in Deliverable 9.1, the Manual of Ethical Issues draft. After conducting the Pilot

Supported by





INQUIRE Course, we asked the INQUIRE Partners at the consortium meeting in Madrid, to give us feedback on whether they have used the ethical issues in their courses and which changes they recommend. The final stage of the Ethical Issues is reported here.

Inquire Ethical Guidelines

## 4.1. Ethical principles for reflective practice

The concept of Reflective Practice centers on the idea of lifelong learning where a practitioner analyses experiences in order to learn from them. It is based on ideas of John Dewey (1933) who developed concepts about reflective practice with the exploration experience, interaction and reflection. Schön (1983) defines **Reflective Practice** as “the capacity to reflect on action so as to engage in a process of continuous learning”. He introduces concepts such as ‘reflection on action’ and ‘reflection in-action’ where professionals meet the challenges of their work with a kind of improvisation learned in practice.

Reflective practice has now widely been accepted as an important tool in professional learning where individuals learn from their own professional experiences, rather than from formal teaching or knowledge transfer. As Boud *et al* state: "Reflection is an important human activity in which people recapture their experience, think about it, mull it over and evaluate it. It is this working with experience that is important in learning." (Boud et al., 1985)

In the INQUIRE project Reflective Practice is used to promote independent professionals who are continuously engaged in the reflection of situations they encounter in their INQUIRE Communities of Practice (Wenger, 1998). Ethical principles for reflective practice within the communities of practice should be addressed on three levels:

- 1) The INQUIRE Consortium Level (addresses the INQUIRE Quality Management)
- 2) The INQUIRE course trainer’s level (addresses mostly the INQUIRE consortium partner) and
- 3) The INQUIRE course participant’s level (addresses teachers and educators).

Supported by





#### **4.1.1. General ethical principles**

Reflective practice within the Communities of Practice is based on the belief that effective change is only possible in cooperation with all the participants in the situation – it cannot be achieved against their will. Therefore democratic and cooperative relationships between consortium partners and INQUIRE course participants (teachers and educators) and between the course participants and the course trainer should be developed. The process is governed by the following general ethical principles:

#### **4.1.2. Consent of those involved**

Evaluation and reflection techniques may only be used with the consent of those concerned. In practice that means that the INQUIRE quality management as well as the course trainer have to inform the participants (consortium partners or teachers and educators) about the aims of the evaluation and ask for their cooperation. This process of informing and asking for cooperation has to be repeated at every project stage.

Participants (consortium partners; Teachers/educators) are encouraged to bring in their own ideas, concepts and strategies for reflection and to negotiate them with each other, the course trainer respectively the quality management. If one of the evaluation methods is not acceptable, alternative methods have to be negotiated.

The evaluation and the reflective processes remain open to negation during the whole course of the INQUIRE project. Even if those concerned have fully agreed from the start, misunderstandings and conflicts can emerge during the course of working. Therefore “negation” continues to be important and in the event of a conflict, existing agreements must be open for further negotiation.

- ❖ The INQUIRE Quality Management must take the steps necessary to ensure that all the Consortium Partners understand the aims and objectives of the INQUIRE project and why their participation is necessary, including their involvement in the evaluation process.
- ❖ The INQUIRE Quality Management recognizes the right of any partner to withdraw from the evaluation process for any or no reason and at any time and they must inform them of this right. In all such circumstances INQUIRE Quality

Supported by



Management must examine their own actions to assess whether they have contributed to the decision to withdraw and whether a change of approach might persuade the participants to re-engage.

- ❖ The INQUIRE course trainer must take the steps necessary to ensure that all the participants (teachers and garden educators) understand the aims and objectives of the INQUIRE project and why their participation is necessary, including their involvement in the evaluation process.
- ❖ The INQUIRE course trainer recognize the right of any participant (teacher, educator, child) to withdraw from the project for any or no reason and at any time and they must inform them of this right. In all such circumstances INQUIRE course trainers must examine their own actions to assess whether they have contributed to the decision to withdraw and whether a change of approach might persuade the participants to re-engage.
- ❖ Consent needs to be obtained from all parents and children participating in the INQUIRE project. Without parental permission, no child can take part in the INQUIRE project.
- ❖ The participating teachers – supported by the partners - must take the steps necessary to ensure that all the children (including their parents) understand the aims and objectives of the INQUIRE project aims and why their participation is necessary, including their involvement in the evaluation process.

#### **4.1.3. Honesty and openness**

Professionalism in teaching involves the acceptance of the value-laden character of practice and allows the INQUIRE partners and course participants to reflect on it. Reflection is seen as an element of professional practice. In the reflection about their teaching-learning strategies, in a light of a set of aims and principles participants will ask whether such strategies constitute a valid interpretation of them (Elliott, 1998). Honesty and openness are required by all participants to create an atmosphere of trust and respect in order that reflection on a very personal level can develop.

Supported by



- ❖ The INQUIRE Quality Management must recognize that participants may experience distress or discomfort in the evaluation process and must take all necessary steps to reduce the sense of intrusion and to put them at ease.
  
- ❖ The INQUIRE partners must recognize that participants (teachers, garden educators) may experience distress or discomfort in the evaluation process and must take all necessary steps to reduce the sense of intrusion and to put them at ease.
  
- ❖ Teachers, who conduct evaluation in their own classroom, are required to be aware that they have ethical responsibilities towards their research participants and be aware that complications may arise from the potential abuse of power of the privileged position the teacher holds in his or her own class/school.

#### **4.1.4. Anonymity of those involved**

The data are the property of those from whom they originate. They may not be passed to others without permission. The Quality Management respectively the course trainer has to take care that reports and case studies may not be published without giving the participating partner or teachers and educators the opportunity to comment. Their changes have to be incorporated in the writing. The Quality Management respectively the course trainer is responsible for making the data anonymous. If individuals can be identified they have to be asked for permission before the data is published.

- ❖ The confidential and anonymous treatment of participants' data is considered the norm for the conduct of evaluation. The INQUIRE Quality Management recognize the participants' entitlement to privacy and must accord them their rights to confidentiality and anonymity, unless they, specifically and willingly waive that right. In such circumstances it is in the INQUIRE Quality Management interests to have such a waiver in writing.
  
- ❖ Data collected for evaluation will be used for this purpose only.
  
- ❖ Images taken at consortium meeting will be securely stored and used only by those authorized to do so. Images are only used publicly after permission is given by those appearing on these images

Supported by



- ❖ The confidential and anonymous treatment of participants' data is considered the norm for the conduct of evaluation. The INQUIRE course trainer recognizes the participants' entitlement to privacy and must accord them their rights to confidentiality and anonymity, unless they or their guardians or responsible others, specifically and willingly waive that right. In such circumstances it is in the INQUIRE partners' interests to have such a waiver in writing.
- ❖ Data collected for evaluation will be used for this purpose only. If data is exchanged between INQUIRE partners (incl. the Quality Management) the names of participants will be changed for confidentiality reasons.
- ❖ Images will be securely stored and used only by those authorized to do so, particularly if images of children are to be used on the Internet.
- ❖ The INQUIRE partners, participating teachers and educators will not use photographs or video footage which clearly identifies the child, school, college or institutions. We will achieve this by blocking out school ties, badges, crests or other identifying features.
- ❖ The INQUIRE partners and participants will avoid using real names of any child. Where a child has been named, under an approved agreement, INQUIRE partners and participants will avoid using linked photographs or video footage.

#### **4.1.5. Access to findings**

The INQUIRE Quality Management, course trainers and participating teachers and educators keep control of the evaluation process and its products. This ethical principle is of great importance in building trust between people involved. According to Stenhouse (1975) control over the evaluation process and any changes resulting from it should be in the hands of those who have to live with the consequences.

#### **4.1.6. Working with children and young people**

Supported by





- ❖ Each INQUIRE partner institution may need to obtain permission from the school's local education authority for conducting evaluation with teachers and children. Where appropriate in the country, the local education authority needs to approve schools, teachers and student participation in the INQUIRE project, particularly in relation to data collection and data protection.
  
- ❖ In the case of pupils whose age, intellectual capability or other vulnerable circumstance may limit the extent to which they can be expected to understand or agree voluntarily to participate in the INQUIRE project, the INQUIRE course trainer in close cooperation with the participating teachers and educators must fully explore alternative ways in which pupils can be enabled to make authentic responses. In such circumstances, the collaboration and approval of those who act in guardianship (e.g. parents) has to be acquired.
  
- ❖ Each teacher participating in the INQUIRE project must obtain permission from the head teacher in order to carry out evaluation with children. The school head teacher will confirm his/her support of the teacher and will grant permission for school trips to the botanic garden. The head teacher has the overall responsibility for the communication and dissemination of the INQUIRE project in the school.
  
- ❖ For the participation of children in the INQUIRE project, parents' permission are required prior to any specific INQUIRE work / evaluation and before each visit to the botanic garden or science center. Wherever possible, it is recommended that the school requests one permission from parents for their child/ren to participate in the entire INQUIRE project. Parents and children need to be informed about the potential risks their children may face, as well as give their permission for use of pictures, videos etc. that may be used in publications or for public relation activities linked to the project.

Supported by



#### 4.1.7. Compliant with the laws of the country

The ethical principles which are set out in the INQUIRE ethical guidelines are only to be applied, when in accordance with the country's regulations.

- ❖ The INQUIRE partners must ensure that they themselves, participating teachers and any collaborators or research assistants and students under their supervision, comply with legal requirements in relation to working with school children or vulnerable young people and adults.
- ❖ Where required in a country, the child protection policy of the INQUIRE partner organization should be in place and available on request.

## 4.2. Ethical principles for working with plants

### 4.2.1. Botanic gardens as hotspots of biodiversity

“Botanic gardens are institutions holding documented collections of living plants for purposes of scientific research, conservation, display and education.” (Wyse Jackson, 1999: 27) In total, there are 2,178 botanic gardens known in the world, in 153 countries. It is estimated that there are 42 million herbarium specimens in botanic garden herbaria and 6.13 million accessions in their living collections. Therefore, botanic gardens are widely recognized as major repositories of plant material both in their living collections, seed banks and as preserved plant specimens in their herbaria.

The botanic garden community operates as a closely co-operating network worldwide, working to implement the *International Agenda for Botanic Gardens in Conservation* (Wyse Jackson & Sutherland, 2000), an agreed global policy for botanic gardens prepared by Botanic Garden Conservation International (BGCI). Within the agenda the general characteristics of botanic gardens are defined:

- open to the public with adequate labeling of the plants
- an underlying scientific basis for the collections including a proper documentation of the collection, including wild origin

Supported by



- exchange of seeds or other materials with other botanic gardens, arboreta or research stations (within the guidelines of international conventions and national laws and customs regulations)
- long term commitment to, and responsibility for, the maintenance of plant collections
- communication of information to other gardens, institutions, organizations and the public
- promoting conservation through extension and environmental education activities

(IUCN-BGCS and WWF 1989:5)

A central role for botanic gardens has traditionally been to act as ex situ repositories of wild plants. However, many botanic gardens are now changing to botanical resource centers to study and conserve biodiversity. They possess the techniques, equipment and expertise to protect threatened plants and are hotspots of biodiversity with broad knowledge in botany, horticulture, ecology, and species conservation.

Education has a key role to play in ensuring plant conservation action in the future. Here, botanic gardens provide an important link in the education of future generation (Oldfield & McGough, 2007). They help to overcome the so-called “plant blindness” of the young generation, failing to see, take notice of, or focus attention on plants in everyday life (Wandersee & Clary, 2006).

#### 4.2.2. General information about the European guidelines of plant protection

There are global, national and regional regulations in place to conserve protect and manage our natural heritage. The *Convention on Biological Diversity (CBD)* - entered in force in 1993 - recognized in international law for the first time that the conservation of biological diversity is "a common concern of humankind" and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably (<http://www.cbd.int/convention/>).

In responds to the need of a greater focus on plants within the CBD agenda the *Global Plant Conservation Strategy (GSPC)* was agreed upon in 2002. It motivated action to save plant diversity from extinction on national, regional and international level and adopted a 16

Supported by



point plan aiming to slow the rate of plant extinctions around the world by 2010 (CBD, 2002). The Strategy includes actions to maintain ecosystems as carbon sinks and promotes action towards a better understanding of which species are most at risk. It includes international targets for the conservation of threatened species. As a further goal it promotes education and the awareness of plant diversity (<http://www.cbd.int/decision/cop/?id=7183>).

The *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) aims to protect listed species of plants and animals against overexploitation caused by international trade. CITES has been in force for more than 30 years but shares similarities with GSPC: GSPC Target 11 calls for “*No species of wild flora endangered by international trade*”. It is consistent with the CITES objective “*No species of wild fauna or flora subject to unsustainable exploitation because of international trade*”. Botanic gardens play an important role in the implementation of CITES for plant species and in raising awareness of the aims and requirements of the Convention. They provide a unique resource in collections, expertise and contact with visitors and local communities to contribute to and promote to sustainable international trade in plants (Oldfield & McGough, 2007:05).

In order to safeguard biodiversity and combat the extinction of species, the European Union has set up a network of protected areas – the Natura 2000 network – and made the protection of biodiversity one of the key objectives in the *Sixth Environment Action Programme*. Beginning 2013, the European programme *Living Well with the Limits of our Planet* draws on a number of recent strategic initiatives in the field of environment, including the *2020 Biodiversity Strategy*. It should secure the commitment of EU institutions, Member States, regional and local administrations and other stakeholders to a common agenda for environment policy action up to 2020. (<http://ec.europa.eu/environment/newprg/index.htm>)

*National Biodiversity Strategies and Action Plans* (NBSAPs) are the principal instruments for implementing the GSPC at the national level. It requires countries to prepare a national biodiversity strategy (or equivalent instrument) and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity. Here you will find examples for national strategies for the implementation of the UK Biodiversity Action Plans (<http://uk.chm-cbd.net/default.aspx?page=6865>) or the German Biodiversity Action Plans ([http://www.umweltbundesamt.at/umweltsituation/naturschutz/naturrecht/int\\_konventionen/biodiv\\_konvention/](http://www.umweltbundesamt.at/umweltsituation/naturschutz/naturrecht/int_konventionen/biodiv_konvention/)).

Supported by



### 4.2.3. INQUIRE ethical issues regarding plant protection

- ❖ All INQUIRE Partners should work within required European, national and local regulations and follow best practice guidelines wherever possible.
  
- ❖ Project participants need to be aware of any plant protection issues that could fall within the remit of this project, in terms of activities carried out. The INQUIRE project partners should ensure that teachers and educators understand these issues and communicate these to their audiences. Such issues may include plant collection and management policies and CITES legislation as appropriate in order to:
  - Avoid the collection of or damage to rare and endangered species either in the wild or in the botanic garden
  - Minimize disturbance of habitats
  - Ensure that 'alien' plants are not introduced to the wild
  
- ❖ Project participants (teachers and/or garden educators) need to be aware that before visiting the botanic garden the children will be informed about any nature protection rules.

## 4.3. Ethical principles for learning outdoors / in out-of-school environments / in botanic gardens

### 4.3.1. General information about working with children outdoors

Learning outdoors in botanic gardens should provide a stimulating and enjoyable educational experience. Whilst providing this experience, it is vitally important to safeguard the wellbeing of the young visitors.

Botanic garden educators and teachers have to work together to protect the children and to prevent possible risks. Working outdoors involving plant material, soil and pond creatures has to be planned carefully. The planning starts in the school where the teacher has to ask the children for possible allergic responses to plant materials including sap. In that case the outdoor learning should be modified (e.g. change of plants). Working in the grassland, sun

Supported by



exposure, stings and bites are possible hazards. The children must be advised to wear suitable clothing covering legs and arms and/or protect against direct sun. They should take enough water to drink with them. In the woodland, children should be advised to wear suitable footwear and to move through woodland with care. Children undertaking examination of pond creatures, leaf litter or soils can be exposed to water or soil pathogens. This is particular relevant when cuts or grazes are present on hands.

If the outdoor environment is unfamiliar to pupils and their supervising teachers at point of entry in the botanic garden, children and adults are made aware of hazards and advised suitable ways of responding. Children should stay in their groups in sight of their group leaders so that no child gets lost.

Working with children outdoors should be planned carefully by garden educators and teachers. Safeguards exist within the European law to protect children and teenagers from abuse, the physical, sexual or emotional mistreatment or neglect of the young person (<http://www.childsafetyeurope.org/index.html>). In addition, the *Health and Safety at Work Act* (<http://ec.europa.eu/social/main.jsp?catId=148>) requires every employer to protect the health, safety and welfare of their employees, official visitors and the public on their premises. In the UK the key legal documents under which these guidelines are drawn up are the *Protection of Children Act* (1990) which requires all organizations to check those who are involved in “caring for” or “supervising” minors. As an example, the RBG Kew seeks to ensure that minors are protected and kept safe from harm while they are with staff. No educational activity in the botanic garden should be arranged without prior written risk assessment of the activity. You can read an example of this in annex X.

#### **4. 3.2. INQUIRE ethical guidelines regarding learning in botanic gardens including safety and risk management**

- ❖ The INQUIRE project partner will clarify the responsibility for the safety and risk management in close cooperation with local school authorities, schools and botanic gardens.
- ❖ The INQUIRE project partner will have to undertake a risk assessment for any INQUIRE activity which involves children visiting the botanic garden or any other outside learning site such as a Natural History Museum, conducting lab work or completing any other task developed for the INQUIRE project. If possible, the risk assessment will be held on file and will be available for local inspection.

Supported by



- ❖ Parents need to be informed either by the teacher or by the garden educator about the fact that visiting a botanic garden includes activities done outdoors. In cases where a child is allergic to pollen, insect stings, particular food, sun light etc., parents are responsible for ensuring that their child carries first aid equipment or medicine that is needed in case an allergic reaction will arise. The child/parent needs to inform the teacher where this equipment can be found in the case of an emergency occurring.
- ❖ Strategies for locating lost children should be developed by in the INQUIRE project participating garden educators, in line with their garden's security procedures. This may involve helping the children with spatial orientation and offering advice on what to do if they find themselves lost in a garden. Telephone help-lines may be made available, where appropriate and allowed, for children in the case of an emergency (e.g. the mobile telephone of the teacher or the garden educator or signs with a phone number on it that indicate how to get help in case you need it).
- ❖ If children have inquiry-based tasks that require them to leave the full school group, they must act in small groups with other class-mates. They should not be required to carry out any task where they are physically on their own.
- ❖ In certain cases, risk assessment for the journey from the school to any INQUIRE site may be required, e.g. ensuring the use of coaches with seat belts, unless this is the explicit responsibility of the school authorities.

## 5. References

Boud D, Keogh R and Walker D (1985). *Reflection, Turning Experience into Learning*, Routledge.

CBD (2002). *Global Strategy For Plant Conservation*. The Secretariat of the Convention on Biological Diversity. Montreal, Canada.

Robert Audi (ed), *The Cambridge Dictionary of Philosophy*, 1995.

Dewey, J. (1933). *How We Think. A restatement of the relation of reflective thinking to the educative process* (Revised edition.), Boston: D. C. Heath

IUCN-BGCS and WWF (1989). *The Botanic Garden Conservation Strategy*. IUCN Botanic Gardens Conservation Secretariat, Richmond, UK and WWF and IUCN Gland, Switzerland.

Oldfield, S., McGough, N. (2007). *A CITES Manual for Botanic Gardens*. 2<sup>nd</sup> edition. Botanic Gardens Conservation International, Richmond, UK.

Schön, D.A. (1983). *The Reflective Practitioner: How Professionals think in Practice*, New York: Basic Books

Stenhouse, L. (1975). *An Introduction to Curriculum Research and Development*, London: Heinemann.

Wandersee, J. , Clary, R. (2006). Advances in Research towards the Theory of Plant Blindness. In: *Proceedings of the 6<sup>th</sup> International Congress on Education in Botanic Gardens, The Nature of Success, Success of Nature*. Botanic Gardens Conservation International, Richmond, UK.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.

Wyse Jackson, P.S. (1999). *Experimentation on a Large Scale – An Analysis of the Holdings and Resources of Botanic Gardens*. Botanic Gardens Conservation News Vol 3 (3) December 1999. Botanic Gardens Conservation International, Richmond, UK.

Wyse Jackson, P.S., Sutherland, L.S. (2000). *The International Agenda for Botanic Gardens in Conservation*. Botanic Gardens Conservation International, U.K.

Supported by





## **ANNEXE:**

**PARENTAL CONSENT FOR CHILDREN UNDER THE AGE OF 16 YEARS PARTICIPATING IN A PROJECT**

**KEW: HEALTH AND SAFETY ON YOUR VISIT**

**KEW: HEALTH AND SAFETY RISK ASSESSMENT**

**Supported by**





**Parental Consent for Children under the age of 16 years participating in a project**

I (adult's name) .....

of (address) .....

.....

.....

being the child/children's parent or legal guardian, hereby give permission for my child/children to participate in a project run in association with the Royal Botanic Gardens, Kew and permission for Kew to take and use publicity photographs/film of

(child/children's name/s).....Age of child.....

.....Age of child .....

..... Age of child .....

I understand that the child's/children's name/s will not be given to press or public without my consent. I also understand that I may cancel this permission in writing, and that RBG Kew will take all reasonable steps to ensure that the any sensitive information and or any photograph/film is withdrawn from future use.

I further understand that I shall receive no remuneration for this assistance.

Signed:..... Date: .....

Supported by



### Useful Information

#### Emergency

In the event of a *FIRST AID EMERGENCY ONLY* please contact the nearest member of Kew staff or a Kew constable. The emergency number on an internal telephone is 333, and on an external telephone dial 020 8332 5121.

**Please do not call 999 as ambulance crews may take time to find your location. This is best coordinated through Kew's own police force.**

#### Supervision

You are responsible for your students' supervision and behaviour while at Kew. If your pupils are disruptive there will be follow-up contact with the headteacher.

These guidelines allow you to do your own risk assessment.

Please discuss suitable behaviour in Kew Gardens, and the importance of showing respect to everyone else in the Gardens (especially the disabled and small children), particular attention in glasshouses where pathways are narrow.

We take great care of our plants and the wildfowl, please do the same.

#### Take care

To protect themselves some plants have sharp leaves or spines, so take care.

Remember, plants can be poisonous or have irritant sap, so do not touch them unless Kew staff say it is safe to. Don't forget to wash your hands before eating.

Do not climb the trees, you could damage them and harm yourself.

Groups should be accompanied by the correct number of adults.

SEN 1:1 ; Reception - 1:2; Key Stage 1 - 1:5; Key Stage 2 - 1:8; Key Stage 3 - 1:10; Key Stage 4/5 - 1:10

#### Kew is a busy working garden.

Keep clear of horticultural equipment and watch out for moving vehicles.

It is very dangerous for students to try and climb on, or run alongside, the slow-moving Kew Explorer.

#### What to wear

Wear layered clothing to cope with the contrast between hot houses and the weather outside.

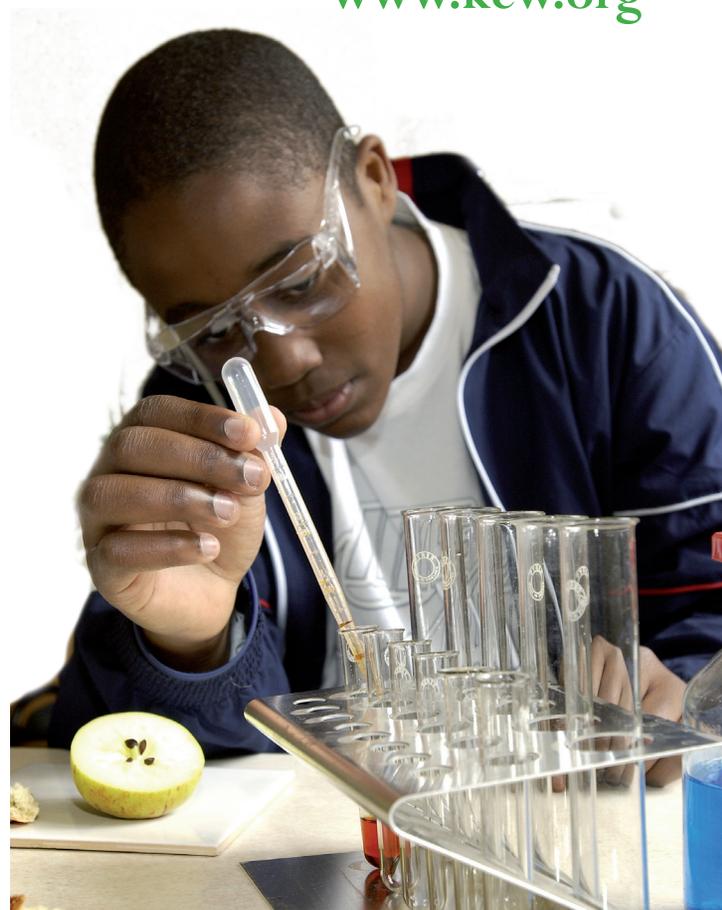
You will need to be prepared for all types of weather and a waterproof jacket is essential for the British climate.

Students may find trousers more comfortable for some of our activities, eg: working in long grass, and may wish to use insect repellent.

Comfortable shoes will help as there is lots of walking during the day.

On sunny days remember to wear a hat and use sun protection, and bring water bottles.

[www.kew.org](http://www.kew.org)



# HEALTH AND SAFETY RISK ASSESSMENT

Risk assessment ref no:	1	Name of responsible person: (Print)	Amber Waite
Date risk assessment completed:	25 June 2009	Review date:	May 2010
Task/Activity:	Visiting school parties		
Department:	Education visits	Location:	Royal Botanic Gardens Kew
Persons at risk:	Members of public, RBG Kew staff, Contractors, visitors		

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks <i>(provide timescales and initials of person responsible)</i>
		High	Med	Low	
Welfare facilities	<ul style="list-style-type: none"> <li>■ Public toilet blocks are available (with disabled facilities).</li> <li>■ All public toilets are regularly supervised and cleaned.</li> <li>■ Cafeteria facilities are available in the Gardens offering a selection of snacks, hot food and drinks.</li> <li>■ An internal eating area "Munch Box" (open between 12 – 2 pm) is provided for school parties within the Climbers and Creepers building – by prior booking only.</li> </ul>			Low	<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
First aid and medication	<ul style="list-style-type: none"> <li>Qualified first aiders are in the Gardens at all times in the event of an emergency.</li> </ul> <p><b>Note:</b> Group leaders must accept responsibility for first aid requirements of their pupils or staff should they arise.</p>			Low	Leaders of school parties to: <ul style="list-style-type: none"> <li>Provide first aid cover for persons within their supervision.</li> <li>Carry a portable first aid kit.</li> </ul>
Security	<ul style="list-style-type: none"> <li>RBG Kew Constabulary based in the Gardens.</li> <li>RBG Kew Constabulary periodically drive / walk-through / cycle around the Gardens.</li> <li>CCTV strategically sited within the Gardens.</li> <li>CCTV monitored by RGB Kew Constabulary 24/7.</li> <li>All reasonable measures are taken to ensure RBG Kew staff who may be left alone with children or be in a position of substantial access with children have been subjected to Criminal Record Bureau checks.</li> </ul>			Low	<ul style="list-style-type: none"> <li>Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>
Emergency evacuation	<ul style="list-style-type: none"> <li>Emergency evacuation procedures are in place in all buildings.</li> <li>RBG Kew staff and RBG Kew based contractors are familiar with and regularly practice emergency evacuations.</li> <li>Emergency notices are posted within the site and in all buildings.</li> <li>Dedicated assembly points are indicated on the evacuation notices.</li> </ul>			Low	Leaders of school parties to ensure: <ul style="list-style-type: none"> <li>Persons within their supervision evacuate buildings upon hearing the alarm.</li> <li>Assemble at the dedicated assembly points.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
Slips, trips and falls	<ul style="list-style-type: none"> <li>■ Access and egress routes (footpaths and driveways) around Gardens maintained.</li> <li>■ Moss and lichen removed from walkways / paved areas as required to help prevent slips trips and falls.</li> </ul>			Low	-
Falls from height – Climbing trees	<ul style="list-style-type: none"> <li>■ Climbing trees is not permitted. (Refer to RBG Kew regulations).</li> <li>■ Active tree management programme in place.</li> </ul>			Low	<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>
Water courses – lakes, water features, ponds - Drowning Slips, trip and falls	<ul style="list-style-type: none"> <li>■ Buoyancy aids provided as required and regularly checked.</li> <li>■ Grassed/paved areas adjacent to water maintained.</li> <li>■ Areas considered unsafe, due to uneven surface, bad cracking etc. fenced off by use of temporary barriers installed until area made safe.</li> </ul>			Low	<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>
Legionella	<ul style="list-style-type: none"> <li>■ Water management system in place.</li> <li>■ Legionella testing carried out.</li> <li>■ Risk assessments completed.</li> </ul>			Low	-
Moving plant/equipment - Vehicular traffic – tractors, grass cutters, electric buggies, bicycles etc	<ul style="list-style-type: none"> <li>■ Garden speed restriction of 10 mph in force.</li> <li>■ Movement of all non-gardening related vehicles is restricted to a minimum during the Gardens opening hours.</li> <li>■ Vehicle access restricted to specific routes.</li> <li>■ Only authorised RBG Kew staff operate horticultural vehicles.</li> </ul>		Med		<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
	<ul style="list-style-type: none"> <li>■ Safe working procedures in place to monitor drivers/vehicle movement within the Gardens.</li> <li>■ In the event of an emergency, non-gardening vehicles are provided with escorts (RBG Kew Constabulary or pedestrian).</li> <li>■ All equipment maintained to comply with health and safety legislation.</li> <li>■ Keys removed from ignition switches.</li> <li>■ Work equipment removed upon completion of work.</li> <li>■ RBG Kew staff and contractors competent to undertake tasks.</li> <li>■ On-going supervision provided.</li> <li>■ RBG Kew staff identifiable by branded clothing and photo security passes.</li> <li>■ RBG Kew (on site) contractors identifiable by their company branded clothing.</li> <li>■ Specific risk assessments and method statements in place prior to work commencing.</li> </ul>				
<p>Moving plant/equipment -</p> <p>Work equipment – chain saws, strimmers, trimmers, vegetation shredders etc</p>	<ul style="list-style-type: none"> <li>■ All equipment maintained to comply with health and safety legislation.</li> <li>■ Warning signage (as appropriate) displayed prior to work commencing.</li> <li>■ Barriers installed to prohibit access to unauthorised person in the working area.</li> <li>■ No work equipment left unattended.</li> <li>■ Keys removed from ignition switches.</li> <li>■ Work equipment removed upon completion of work.</li> </ul>		Med		<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
	<ul style="list-style-type: none"> <li>■ RBG Kew staff and contractors competent to undertake tasks.</li> <li>■ On-going supervision provided.</li> <li>■ All RBG Kew staff and contractors wear high visibility clothing and personal protective equipment.</li> <li>■ Specific risk assessments and method statements in place prior to work commencing.</li> </ul>				
Hazardous substances	<ul style="list-style-type: none"> <li>■ Use of hazardous substances is only undertaken by competent persons.</li> <li>■ Hazardous substances are kept in secure environments.</li> <li>■ Appropriate signage is displayed.</li> </ul>			Low	
Tree Top Walkway -  Falls from height Falling objects	<ul style="list-style-type: none"> <li>■ Height of protective barriers on staircase and walkway built to Building Regulations specification.</li> <li>■ Exclusion zone immediately underneath walkway.</li> <li>■ Emergency telephones located at the base and top of treetop walkway stairs.</li> <li>■ Emergency telephone located within treetop walkway passenger lift.</li> <li>■ Signage displayed adjacent to emergency telephones on action to take in the event of an emergency.</li> </ul> <p><b>Note:</b> RBG Kew staff <b>do not</b> provide supervision on the Tree Top Walkway.</p>			Low	<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
Equipment/Play Equipment	<ul style="list-style-type: none"> <li>■ All equipment is regularly checked to ensure it remains “fit for purpose” and results of inspections are recorded in an equipment log.</li> <li>■ All play equipment within dedicated play areas i.e. Climbers and Creepers (for children aged 3-9 years) conforms to current British and European Standards and is subject to regular inspection.</li> <li>■ Supervision of visiting school parties provided by school leaders.</li> </ul> <p><b>Note:</b> <i>RBG Kew <b>do not</b> provide supervisory staff for school parties.</i></p>			Low	<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervision for all persons within their groups.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
Harmful/poisonous plants/fungi (mushrooms & toadstools)	<ul style="list-style-type: none"> <li>■ Group leaders of school parties must advise all persons within their supervision that they should not pick or eat any parts of any plants in the Gardens.</li> <li>■ If prepared plants are to be touched or consumed for educational reasons, the group leaders must check persons within their supervision for any known allergic reactions to plants prior to visiting the Gardens.</li> </ul>			Low	Prior to visiting the Gardens, leaders of school parties to: <ul style="list-style-type: none"> <li>■ Inform persons within their supervision they should not pick or eat any parts of any plants in the Gardens.</li> <li>■ Check persons within their supervision for any known allergic reactions to plants.</li> </ul>
Plants with sharp spines or thorns	<ul style="list-style-type: none"> <li>■ Many plants within the cactus areas of some glasshouses have sharp spines/thorns – some are placed behind protective screens and warning notices displayed “do not touch”.</li> </ul> <p><b>Note:</b> <i>Plants with sharp spines/thorns can be found throughout the Gardens.</i></p>			Low	<ul style="list-style-type: none"> <li>■ Prior to visiting the Gardens, leaders of school parties should ensure persons within their supervision are made aware of the dangers of touching plants with sharp spines/thorns.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks (provide timescales and initials of person responsible)
		High	Med	Low	
Lost / disorientated persons	<ul style="list-style-type: none"> <li>■ Signage displayed at key intersections of Gardens identifying locations of places of interest.</li> <li>■ Full-time RBG Kew Constabulary carry out periodic patrol of the Gardens.</li> <li>■ RBG Kew staff wear branded clothing/uniform and/or photo security passes.</li> <li>■ All RBG Kew Constabulary and many other staff carry communications aids.</li> <li>■ An emergency contact number is advertised in the visitor map for anyone who needs help.</li> </ul> <p><b>Note:</b> <i>Group leaders must supervise persons in their party to ensure they do not become lost or disorientated.</i></p>			Low	<ul style="list-style-type: none"> <li>■ Leaders of school parties to provide supervisory cover for persons within their groups.</li> </ul>
Access / services for persons with special needs	<ul style="list-style-type: none"> <li>■ Ramped accessed to public buildings.</li> <li>■ Paths accessible for wheelchair use.</li> <li>■ Lift access available in public buildings.</li> <li>■ Hearing loop systems in place within entrance Gate Boxes.</li> <li>■ Limited wheelchair facilities available at entrances to the Gardens (first come basis).</li> <li>■ Limited number of mobility scooters available (must be booked in advance); training provided.</li> <li>■ Ramped access to RBG Kew Explorer Bus (internal tour of Gardens only – tickets purchased at point of tour).</li> </ul>			Low	<ul style="list-style-type: none"> <li>■ Prior to visiting the Gardens, leaders of school parties should discuss with RBG Kew's Education Department any individual needs of members of their group.</li> </ul>

\* See attached sheet for definition of Risk Level

## HEALTH AND SAFETY RISK ASSESSMENT

Risk/Hazard	Existing Control Measures	Risk Level * (tick one)			Further Action needed to reduce risks <i>(provide timescales and initials of person responsible)</i>
		High	Med	Low	
	<ul style="list-style-type: none"> <li>■ Disabled access to RBG Kew Discovery Bus (internal tour of Gardens only – private hire by prior arrangement).</li> </ul>				
Insurance (Public Liability)				Low	<ul style="list-style-type: none"> <li>■ School parties should provide Public Liability insurance cover for their groups.</li> </ul>

\* See attached sheet for definition of Risk Level

# HEALTH AND SAFETY RISK ASSESSMENT

## DEFINITION OF RISK LEVEL

**Hazard Severity**

		<b>Negligible</b> Negligible injury, no absence from work	<b>Slight</b> Minor injury requiring first aid treatment	<b>Moderate</b> Injury leading to a lost time accident	<b>High</b> Involving a single death or serious injury	<b>Very High</b> Multiple deaths
<b>Likelihood of Occurrence</b>	<b>Very Unlikely</b> A freak combination of factors would be required for an incident to result	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>
	<b>Unlikely</b> A rare combination of factors would be required for an incident to result	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>
	<b>Possible</b> Could happen when additional factors are present, otherwise unlikely to occur	<b>LOW</b>	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>
	<b>Likely</b> Not certain to happen but an additional factor may result in an accident	<b>LOW</b>	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>HIGH</b>
	<b>Very Likely</b> Almost inevitable that an incident would result	<b>MEDIUM</b>	<b>MEDIUM</b>	<b>HIGH</b>	<b>HIGH</b>	<b>HIGH</b>

**Action Priority Table**

<b>Risk Level Rating</b>	<b>Action</b>	<b>Priority</b>
<b>High</b>	Significant risk	<b>Immediate Action Required</b>
<b>Medium</b>	Risk must be reduced where further actions identified	<b>Action Required</b>
<b>Low</b>	Risk is controlled but monitor the control measures	<b>Ongoing Monitoring Required</b>

<b>LOW RISK</b>	May be acceptable; review task to see if risk can be reduced further.
<b>MEDIUM RISK</b>	Task should only proceed with appropriate management authorisation after consultation with Health and Safety Team. Where possible, the task should be redefined to take account of the hazards involved or the risk should be reduced further prior to task commencement.
<b>HIGH RISK</b>	Task must not proceed. It should be redefined or further control measures put in place to reduce risk. The controls should be re-assessed for adequacy prior to task commencement.

\* See attached sheet for definition of Risk Level

## Task 4.9: Train the Trainers Courses

October 2013



Photo: Train the Trainers course at NBGB, 15 September, 2012

Asimina Vergou, BGCI

Supported by



## Table of Contents

1. List of LOtC contacts made by Partner institutions .....	3
2. INQUIRE Train the Trainer Courses.....	6
3. Overview of the professions of participants of INQUIRE Train the Trainers courses.....	7
4. List of Participants handed in by partners .....	8
4.1. INQUIRE Partner institution: University of Innsbruck (LFU) .....	8
4.2. INQUIRE Partner institution: Museo delle scienze (MUSE) .....	9
4.3. INQUIRE Partner institution: Royal Botanic Gardens Kew (KEW).....	11
4.4. INQUIRE Partner institution: Agencia Estatal Consejo Superior de INvestigaciones Cienificas (CSIC) & Universidad de Alcala (UAH).....	12
4.5. INQUIRE Partner institution: University of Bremen (UniHB) .....	15
4.6. INQUIRE Partner institution: University of Sofia (UBG) .....	16
4.7. INQUIRE Partner institution: Schulbiologisches Zentrum Hannover (SBZH) and Botanischer Garten, Rhododendron-Park botanika Bremen (BGRHB) .....	17
4.8. INQUIRE Partner institution: Jardin Botanique de la Ville de Bordeaux (BORD) .....	18
4.9. INQUIRE Partner institution: Coimbra Botanic Garden (FCTUC) .....	19
4.10. INQUIRE Partner institution: Coimbra Botanic Garden (FCTUC) .....	20
4.11. INQUIRE Partner institution: Moscow State University Botanical Garden (MSU).....	21
4.12. INQUIRE Partner institution: Natural History Museum, University of Oslo (NHM).....	22
4.13. INQUIRE Partner institution: University of Lisbon (UL) .....	23

## 1. List of LOtC contacts made by Partner institutions

Partner Institution	Meetings with other LOtC's organisations.
LFU	<ul style="list-style-type: none"> <li>• Natopia, Naturparke,</li> <li>• Participation in Science Center Network Meeting, September 19<sup>th</sup> 2011, Kapelari, Vienna,</li> </ul>
BGCI	<ul style="list-style-type: none"> <li>• Meeting with other botanic gardens educators at BGEN annual conference, Harlow Carr, Yorkshire, 23-25/11/2011</li> <li>• Meeting at the Longwood Gardens, US, 14 March, 2013 (7 members of the Education team)</li> <li>• Meeting at Phipps Conservatory, Pittsburgh US ,11 March, 2013 (10 members of the Education team)</li> <li>• 2nd International Symposium of Shanghai Chenshan Botanical Garden, Shanghai, China 16-19 May, 2013 (2 members of the Education team)</li> </ul>
KCL	N/A
MSTN	<ul style="list-style-type: none"> <li>• National network of Botanic Gardens in Parma, 16/04/2011 and to the National association of science museums in Padua in 11/11/2011</li> </ul>
KEW	<ul style="list-style-type: none"> <li>• meeting with other botanic gardens educators at BGEN annual conference, Harlow Carr, Yorkshire, 23-25/11/2011</li> <li>• in 3 BGEN committee meetings Westonbirt :Meeting 2/6/12 to Asses and discuss Inquire (4 persons)</li> <li>• 2 x LOtC meetings Environmental group (Council for LOtC)</li> <li>• July 18<sup>th</sup> 2012 and November 21<sup>st</sup> 2012 (9 persons - RSPB, Field Studies Council, Wildlife Trusts, Natural England, BGEN, Kew, Garden Organic, FACE, Woodland Trust)</li> <li>• April 18<sup>th</sup> - meeting with Edinburgh Botanic Garden education staff (4 persons)</li> <li>• Local Authority World Heritage Forum 26<sup>th</sup> April 2013 (all 26 members of the UK World Heritage Institutes are members )</li> </ul>
CSIC	<ul style="list-style-type: none"> <li>• National Center of Enviromental Education. (informal conversations)</li> </ul>

UniHB	<ul style="list-style-type: none"> <li>• Meetings with LOtC in North Germany</li> <li>• INQUIRE in the Zoo Course in Bremerhaven, DE 06/09/2012, 20/09/2012, 08/11/2012, 13/12/2012, 17/01/2013 (15 participants)</li> </ul>
UBG	<ul style="list-style-type: none"> <li>• TTrC: 5/06/2013</li> <li>• UBG Sofia with the NGos 'DivRoshkov' and 'Budeshte sega': May 2013</li> <li>• UBG Sofia with Ekoobshtnost: June 2013– INQUIRE Dissemination and future activities</li> </ul>
NBGB	<ul style="list-style-type: none"> <li>• Meetings with other LOtC 9-6-2011 WIN network (Association of Flemish Science Communicators)</li> <li>• 20-9-2011 VBTA (Association of Belgian Botanic Gardens and Arboreta) 26th Benelux conference on education for sustainable development: November 2012 (Koen Es)</li> <li>• STEM-dag at Technopolis Mechelen: October 2013 (Koen Es and Jutta Kleber)</li> </ul>
SBZH	<ul style="list-style-type: none"> <li>• Annual Meeting of the German speaking association of Botanical Gardens in Tharandt, Germany 26-28/09/2011</li> <li>• Meetings with the German speaking working group of the Botanical Garden educators.</li> <li>• TTC with/at botanica Bremen for Botanical Garden LoTC institutions (22.-24-06.2012)</li> </ul>
FCTUC	<ul style="list-style-type: none"> <li>• 1-EUROGARD VI: European Botanic Gardens in a Changing World-Chios, Greece, 28th May-02nd June 2012.</li> <li>• Portuguese National Inquire Forum, Lisbon and Coimbra University.: 20 and 21st November 2012.</li> <li>• 5thWorld Conference on Educational Sciences, Sapienza University of Rome, Italy05-08 February 2013</li> <li>• 5TH WORLD CONFERENCE on Educational Sciences (WCES 2013),</li> <li>• 5 - 6th International Conference of Education, Research and Innovation Seville - 18th-20th November 2013.</li> </ul>
MSU	<ul style="list-style-type: none"> <li>• meetings were held throughout the year with representatives of botanic gardens, staff of MSU's Agronomy Museum and the Federal Ecological and Biological Centre, and with park workers</li> <li>• Meeting with BG specialists (35 persons) at Main Botanical Garden Of Russian Academy of Sciences, Moscow, 25<sup>th</sup> June, 2012, Alla Andreeva</li> <li>• Personal meetings with representatives of Lots</li> </ul>

	<p>organizations during 7<sup>th</sup> National Science Festival, MSU: 12<sup>th</sup> -14<sup>th</sup> October, 2012 (Andreeva, Lazareva)</p> <ul style="list-style-type: none"> <li>• Meeting with Botanic Garden specialists (at First congress of the CIS Council of Botanic Gardens under the International Association of Academies of Science (Main Botanical Garden Of Russian Academy of Sciences, MSU): 19-20<sup>th</sup> June, 2013, Andreeva 37 persons from SNG-countries)</li> <li>• Meeting with Botanic Garden specialists and educators at 3rd International Conference Botanic Garden of Tver State University (Andreeva, Rappoport, Smirnov, Parshin);</li> <li>• Meeting with Museum educators at Moscow teacher's and educators conference, State Tretyakov Gallery: 25th Sept., 2013 () (100+ people) (Andreeva)</li> <li>• Personally meetings during 8th National Science Festival, MSU: 13 -15th October, 2013 (Andreeva, Lazareva)</li> </ul>
BGRHB	<ul style="list-style-type: none"> <li>• Meetings with the German speaking working group of Botanical garden education centres.</li> <li>• TTC at the Botanika Bremen with the SBZH for other Botanical Garden LoTC institutions (22-24 June 2012)</li> </ul>
UAH	<ul style="list-style-type: none"> <li>• Meeting at Cosmocaixa (Madrid) with the Heads of museums and outreach programmes: 22/06/2012</li> <li>• Meeting at Royal Botanic Garden Juan Carlos I during the III Jornadas Técnicas de los Jardines Botánicos. AIMJB): 6th – 8th June 2012, (Blanca Olivé &amp; Alicia Fernández</li> <li>• Cosmocaixa Madrid during the III Simposio de Museología Científica. 8th – 13th May 2013 (Juan Pedro Zaballos)</li> <li>• Jardín Botánico Atlántico (Gijón) during the XII Simposio de la AIMJB: 3rd - 4th October 2012 (Blanca Olivé)</li> <li>• Ataria Centro de Interpretación de los humedales de Salburua (Vitoria-Gastéix) During the Jornadas Técnicas de Educación Ambiental 13rd June 2013 (Blanca Olivé )</li> </ul>

## 2. INQUIRE Train the Trainer Courses

Between 18<sup>th</sup> May, 2012 and the 15<sup>th</sup> of October, 2013, 15 of the INQUIRE Partners across 11 countries ran 14 INQUIRE Train the Trainers seminars and courses. Some of these were day seminars while others were ran in a similar structure like the INQUIRE courses over a period of 3-5 months (max 72). These seminars/courses were attended by a total of 289 participants from various professional backgrounds. The most represented group was educators from botanic gardens, science centres, natural history museums, zoos and environmental NGO's - Contributing 168 of the participants - followed by, the attendance of 41 primary school teachers (including 3 head teachers) and 38 secondary school teachers (including 8 head teachers). Moreover, 23 Teacher trainers, and 5 representatives of Educational authorities participated in the courses. Other professionals attending the courses (14 participants) include scientists and technicians.

The table below provides an overview of the professions of those who attended each course. The remainder of the document consists of a comprehensive list of participants.



Photo:

Train the Trainers course at MSU

Supported by



### 3. Overview of the professions of participants of INQUIRE Train the Trainers courses.

INQUIRE course	Primary school teachers	Secondary school teachers	Educators	Teacher trainers	Education authorities representatives	other	total
LFU 17/1/2013- 24/5/2013 50 hours	1	0	8 Educators (1 head of education)	0	0	1 Scientist	10
MUSE 28- 31/8/2013 27 hours	1 (Head teacher)	8 (head teachers)	16 (6 senior managers)	5	3	2 (scientists)	35
KEW 23/10/2012 7 hours	0	0	21 (1 senior manager)	1	1	0	23
CSIC & UAH 28- 29/11/2012 10 hours	2 (1 Head teacher)	2	14	3	0	2 (1 technician, 1 scientist)	23
CSIC & UAH 29- 30/10/2013 10 hours	0	6	14	2	1	1	24
UniHB 6/9/2012 6 hours	7 (1 Head teacher)	3	3	1	0	0	14
UBG 5/6/2013 4 hours	0	1	6	5	0	1 (scientist)	13
NBGB 15/9/2012 7 hours	0	3	14	0	0	0	17
SBZH & BGRHB 22- 24/6/2012 17.5 hours	0	0	21	0	0	1 (scientist)	22
BORD 26/9/2012- 30/5/2013 28 hours	0	0	3	0	0	0	3
FCTUC 18/5/2012 7 hours	5	1	7	0	0	0	13
FCTUC 19/5/2012 7 hours	6	6	11	0	0	0	23
MSU 20/7/2013- 15/10/2013 72 hours	0	1	8	1	0	4 (scientists)	14
NHM 23/4/2013 11 hours	0	0	18	4	0	2 (scientists)	24
UL 21- 22/11/2012 12 hours	16	10	4 (1 senior manager)	1	0	0	31
<b>Total</b>	<b>38</b>	<b>41</b>	<b>168</b>	<b>23</b>	<b>5</b>	<b>14</b>	<b>289</b>

## 4. List of Participants handed in by partners

### 4.1. INQUIRE Partner institution: University of Innsbruck (LFU)

Location: Bildungshaus St. Virgil (Education Center St. Virgil)

Start date: 17<sup>th</sup> January, 2013 Finish date: 24<sup>th</sup> May, 2013

Total number of hours: 50 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Monika Otto	Teacher, Grammar School – Petting, Bavaria
2	Edith Amberger	Educator, Forscherland Salzburg
3	Ida Regl	Educator, Member of the Science Center Network Austria, retired teacher
4	Susanne Plank	Educator, KIWI Steiermark
5	Karin Hecke	Educator, KIWI Steiermark
6	Karin Garber	Educator, CEO Vienna Open Lab
7	Brigitte Gschmeidler	Educator, CEO Vienna Open Science
8	Christine Schmid-Molnar	Educator, House of Nature, Salzburg
9	Markus Prötsch	Educator, Head of the museum's educational department House of Nature, Salzburg
10	Susan Urbanus	Scientist, University of Munich

#### 4.2. INQUIRE Partner institution: Museo delle scienze (MUSE)

Title of INQUIRE TtT Course: “Formiamo i formatori - La diffusione dell’approccio IBSE nella didattica delle scienze”

Location: MUSE - Museo delle Scienze di Trento and two botanic gardens (Viote Alpine Botanic Garden on Mt. Bondone and Arco Arboretum)

Start date: 28<sup>th</sup> August, 2013 Finish date: 31<sup>st</sup> August, 2013

Total number of hours: 27 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Accossano Cristiana	Head teacher, Secondary school "Massimo Gizzio" Parco di Veio, Rome, Lazio
2	Agostinis Cristiana	Museum educator from the Friuli (NE Italy) Regional Museum Network, Comunità montana della Carnia, Udine, Friuli Venezia Giulia
3	Barbieri Giovanna	Botanic garden educator, Orto Botanico di Modena, University of Modena, Emilia Romagna
4	Barbiero Giuseppe	Researcher, University of Val d'Aosta, Education department, Aosta, Val d'Aosta
5	Bernabè Barbara	Education officer, AICS, Association for the promotion of culture and sport, Bologna, Emilia Romagna
6	Blasetti Alessandro	Education officer, Science museum, Camerino, Marche
7	Boniello Annalisa	Head teacher, Secondary school "Pitagora", Pozzuoli, Napoli, Campania
8	Calcagnini Sara	Education officer, National Museum of Science and Technology Leonardo da Vinci, Milano, Lombardia
9	Cangelosi Antonio	Head teacher, Istituto Pangea, Sabaudia, Latina, Lazio
10	Carta Gianluca	Head teacher, SISSA Medialab, Cagliari, Sardinia
11	Ceccarelli Paolina	Education officer, Association Ceas Fondazione "Villa Ghigi", Bologna, Emilia Romagna
12	Crippa Paola	Head teacher, Regional school authority, Bergamo, Lombardy
13	De Biaggi Marta	Education officer, Association for Environmental Education, SKUA Natura s.n.c., Piemonte
14	Dell'Aira Katia	Head of education, Zoo, Parco Natura Viva, Bussolengo, Verona, Veneto
15	Fassina Carlotta	Head of education, Archeology and Natural History Museum "G. Zannato", Montecchio Maggiore, Vicenza, Veneto
16	Fedon Christian	Education officer, Science Museum "Immaginario Scientifico", Grignano, Trieste, Friuli Venezia Giulia
17	Filipponi Paola	Head teacher, Secondary school "Federico II", Jesi, Ancona, Marche
18	Gallitelli Marina	Head teacher, Secondary school "Pitagora" Pozzuoli, Napoli, Campania
19	Giamperi Laura	Botanic garden curator, Botanic Garden "Scaramella", University of Urbino, Marche
20	Guida Maria	Head teacher, High school, Liceo Scientifico e Linguistico "G. Salvemini", Sorrento, Napoli, Campania
21	Manieli Martina	Development officer, Ministry of Education, MIUR, Rome, Lazio

Supported by



22	Menini Stefania	Botanic garden educator, Mediterranean Natural History Museum, Livorno, Tuscany
23	Nicolosi Paola	Head of education, Zoology Museum, University of Padova, Veneto
24	Pace Marilena	Head of education, City of Science and Natural History Museum, Naples, Campania
25	Panconesi Gianni	Head of education, Association for Education, Esplica, Verona, Veneto
26	Pelli Alfio	Teacher trainer, Institute for evaluation of education, INVALSI, Ministry of education, MIUR, Rome, Lazio
27	Ronchi Cinzia	Head teacher, Primary school "Anzio III", PhD student at University of Roma Tre, Rome, Lazio
28	Ronchi Angela	Head of education, Botanic Garden Cascina Rosa, University of Milan, Lombardy
29	Sestili Maria Luce	Head teacher, Secondary school, Ascoli Piceno, and PhD student at University of Ancona, Marche
30	Stella Luciana	Education officer, Natural History Museum, Foggia, Puglia
31	Stroppa Pierluigi	Head teacher, Secondary school and PhD student at university of Camerino, Marche
32	Tarantino Giuseppina	Head teacher, Secondary school "P. Martinetti", Caluso, Torino, Piemonte
33	Termine Rosa	Education officer, Department of Biology, University of Enna "Kore", Sicily
34	Vaccari Giorgio	Head of education and teacher trainer, Museum of Archeology and Natural History, Montebelluna, Treviso, Veneto
35	Zamboni Nadia	Teacher trainer, Secondary School, Cogoleto, Genova, Liguria

#### 4.3. INQUIRE Partner institution: Royal Botanic Gardens Kew (KEW)

Title of INQUIRE TtT Course: INQUIRE at Kew: Moving from 'Sage and Stage' to 'Engage and Discover'.

Location: Wakehurst Place, Ardingly, Sussex

Start date: 23<sup>rd</sup> October, 2012 Finish date: 23<sup>rd</sup> October, 2012

Total number of hours: 7 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Susan Allan	Education Manager, RBG Kew WP
2	Kate Castledon	Education Officer, University of Oxford Botanic Garden
3	Jane Challenor	Educator, RBG Kew
4	Sharon Critchley	Educator, RBG Kew
5	Lynn Daley	Educator, University of Oxford Harcourt Arboretum
6	Lorna Dimmock	Educator, RBG Kew
7	Helen Hicks	Educator, RBG Kew
8	Sally Jones	Educator, RBG Kew
9	Andrea Jones	Educator, Garden Organic
10	Karen Letten	Educator, The Woodland Trust
11	Daniel Marks	Student, Paignton Zoo (Student)
12	Judy Moss	Educator, RHS Garden Wisley
13	Rosalie Priday	Educator, Chester Zoo
14	Helen Rainsford	Educator, RBG Kew
15	Maria Rossini	Course co-ordinator, Science Learning Centre London
16	Patricia Senior	Educator RBG Kew
17	Mary Smith	Educator, RBG Kew
18	Amanda Walker	Educator / Ranger Oakwell Hall and Country Park
19	Jojo Way	Educator, RBG Kew
20	Fran Wedderburn	Educator, RBG Kew
21	Pam Williams	Educator, RBG Kew
22	Sarah Bell	Educator, RBG Kew WP
23	Claire Williams	Officer of OCR Examination Board

Supported by



#### 4.4. INQUIRE Partner institution: Agencia Estatal Consejo Superior de INvestigaciones Cienificas (CSIC) & Universidad de Alcalá (UAH)

Title of INQUIRE 1. TtT Course: "Inquiry as a tool to teach science"

Location: Real Jardín Botánico de Madrid (CSIC) and Real Jardín Botánico Juan Carlos I (UAH)

Start date: 28<sup>th</sup> November, 2012 Finish date: 29<sup>th</sup> November, 2012

Total number of hours: 10 hours

##### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Álvarez vergel, Reyes	Educator at Botanic Garden of Gijón
2	Ávila Jiménez, Julia	Educator at Royal Botanic Garden of Madrid (CSIC)
3	Carmona Fernández, Elda	Trainer at Regional Ministry of Environment, Comunidad de Madrid
4	Castel García, Susana	Trainer in 'Unidad de Promoción y Desarrollo (Madrid)'
5	Castilla Lattke, Felipe	Educator at Environmental Education Centre 'Arboreto Luis Ceballos (Regional Ministry of Environment, Comunidad de Madrid'
6	Del Pozo García, Teresa	Gardening trainer at Royal Palace and Moncloa Palace
7	Gil Martínez, Antonio José	Educator at Environmental Education Centre 'Valle de la Fuenfría'(Cerdilla, Madrid)
8	González Ibáñez, Andrea	Collaborator at 'Asociación Planeta Ciencias'
9	Jericó Martín, Bárbara	Educator and Gardening Trainer at Royal Botanic Garden Juan Carlos I (UAH)
10	León Muñoz, Emma	Educator at Environmental Education Centre 'Caserío del Henares'(Madrid)
11	Luna Herrero, Javier	Educator at Royal Botanic Garden of Madrid (CSIC)
12	Machado Loeches, Mónica	Educator at Environmental Education Centre 'Valle de la Fuenfría'(Cerdilla, Madrid)
13	Marín Murcia, José Pedro	PhD at Faculty of Education, University of Murcia
14	McCabe, Marikay	Director of Montessori School Madrid
15	Ochavo bravo, Silvia	Educator at Royal Botanic Garden Juan Carlos I (UAH)
16	Ognio Aranda, Nelly	Educator at Museo Thyssen-Bornemisza, Museo Nacional de Antropología, Museo Naval de Madrid, Museo Aeronáutico y Astronáutico de Madrid y el Museo del Ejército de Toledo
17	Oliveros Gómez, Carlos	Educator at Environmental Education Centre 'Valle de la Fuenfría'(Cerdilla, Madrid)
18	Serrano Caparrós, Demelza	Environmental Technician (Madrid)
19	Valera Rubio, Laura	Educator at Environmental Education Centre 'Valle de la Fuenfría'(Cerdilla, Madrid)
20	Zamora Gil, Sergio	Educator at Royal Botanic Garden Juan Carlos I (UAH)
21	Riestra Fernández, M <sup>a</sup> Paz	Secondary teacher
22	Sánchez, Ana	Primary teacher
23	Vega Bermúdez, Raquel	Secondary teacher

INQUIRE Partner institution: **Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC) & Universidad de Alcalá (UAH)**

Title of INQUIRE 2. TtT Course: "Inquiry as a tool to teach science"

Location: Real Jardín Botánico de Madrid (CSIC) and Real Jardín Botánico Juan Carlos I (UAH)

Start date: 29<sup>th</sup> October, 2013 Finish date: 30<sup>th</sup> October, 2013

Total number of hours: 10 hours

**List of the INQUIRE TtT Course participants**

No	Name of the participant	Job title
1	Barreira Ferrer, Empar	Educator at Real Jardín Botánico de Madrid
2	Crespo Mera, Carles	Coordinator in Museu de Ciències Naturals de Barcelona (Coordinador del servicio educativo del Museu de Ciències Naturals de Barcelona)
3	De la Fuente Pernas, Rosa	Ministry of Environment (Área de Educación Ambiental de la Consejería de Medio Ambiente y Ordenación del Territorio. Madrid.
4	Del Arco García, César	Curator at Arboretum i jardí botànic de la Universitat de Lleida (Conservador del Arboretum i jardí botànic de la Universitat de Lleida)
5	Del Carmen, Barbero, Adela	Geology and Biology teacher at Colegio N <sup>a</sup> S <sup>a</sup> del Pilar. Madrid
6	Díaz Moreno, Reinaldo	Secondary School Teacher (Profesor Adjunto en el I.E.S "Rafael Alberti" ,Coslada, Madrid).
7	Díaz Parra, Yolanda	Educator at Real Jardín Botánico de Madrid
8	Fernández Gurpequi, Ana	Educator
9	Gadea del Olmo, Margarita	Educator at Real Jardín Botánico de Madrid
10	García Álvarez, Lorena	Coordinator of Education at Alfonso XIII Botanical Garden in Madrid
11	García Boqué, Carme	Coordinator in Museu de Ciències Naturals de Barcelona (Coordinador del servicio educativo del Museu de Ciències Naturals de Barcelona)
12	González López, Raúl	Educator at Real Jardín Botánico de Madrid
13	González Pérez, Sara	Educator at her own Bussiness (Empresa propia de Educación Ambiental (SolNatur)
14	González Sousa, Tomás	ONG Educator Asociación estatal sin ánimo de lucro (SEDAL). Sensibilización y Educación para el Desarrollo Ambiental y Local. Madrid
15	Guerreo Usano, María	Secondary school Teacher. (Imparte asignaturas en l ámbito de ciencias en ESO y el ámbito científico de diversificación)
16	Guijarro Ayala, Ana	Educator at her own Bussiness (Empresa propia de Educación Ambiental (SolNatur)
17	Mardones Fuente, Elia	Director of Education Programme in Environmental Education Center (Directora de los Programas de promoción y educación ambiental de dos centros situados en la Sierra Norte: Puente del Perdón y El Cuadrón).

Supported by



18	Miralles Peirón, Eli	Coordinator in Museu de Ciències Naturals de Barcelona (Coordinador del servicio educativo del Museu de Ciències Naturals de Barcelona)
19	Morales Pacheco, Eli	(No Gubernamental Association) ONG Educator (Asociación estatal sin ánimo de lucro (SEDAL). Sensibilización y Educación para el Desarrollo Ambiental y Local. Madrid)
20	Pérez González, M <sup>a</sup> Carmen	Geology and Biology teacher at I.E.S. Calderón de la Barca. Madrid
21	Portillo Madera, Juan Mateo	Teacher in Profesional Adult School in San Fernando de Henares (Madrid) (Formador Ocupacional en Talleres de Empleo)
22	Sánchez Martínez, Pedro	Educator at Real Jardín Botánico de Alcalá
23	Tardaguila Navarro, M <sup>a</sup> de los Ángeles	Educator at Real Jardín Botánico de Madrid
24	Tchadie, Jerry	School teacher Trainer in Oficial Trainer Institution in Madrid (Formador de profesorado en ciencias experimentales en CTIF de la CAM)

#### 4.5. INQUIRE Partner institution: University of Bremen (UniHB)

Location: Zoo am Meer Bremerhaven

Start date: 6<sup>th</sup> September, 2012 Finish date: 6<sup>th</sup> September, 2012

Total number of hours: 6 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Buck Meike	Secondary school teacher; Lloyd-Gymnasium
2	Quaas Petra	Primary school head teacher; Allmerschule
3	Thoben Michael	Secondary school teacher; Karl-Marx school
4	Grunwald Cordula	Primary school teacher; Stella Maris
5	Henkes Natalie	Primary school teacher; Allmerschule
6	Köster Janette	Primary school teacher; Fester school
7	Geller Susanne	Primary school teacher; Fichte school
8	Gräwe Kirsten	Primary school teacher; Fichte school
9	Thiele Ute	Primary school teacher; Fichte school
10	Rathjen Ulrike	Pedagogical coordinator; Landesinstitut für Schule Bremerhaven (LFI)
11	Bartel Horst	Secondary school teacher; Schulzentrum Geschwister Scholl
12	Frenzel Frauke	Zoo educator; Zoo am Meer Bremerhaven
13	Schiebe Jessica	Zoo educator; Zoo am Meer Bremerhaven
14	Leshen Chawanna	Zoo educator; Zoo am Meer Bremerhaven

Supported by



#### 4.6. INQUIRE Partner institution: University of Sofia (UBG)

Title of INQUIRE TtT Course: The Global Environment Day

Location: University Botanic garden Sofia, Bulgaria

Start date: 5<sup>th</sup> June, 2013 Finish date: 5<sup>th</sup> June, 2013

Total number of hours: 4 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Elena Atanasova	Board Member - coordinator, trainer, consultant "ZAEDNO – Communication for Support and Development" Foundation <a href="http://www.zaedno.net/en">www.zaedno.net/en</a>
2	Marya Dimitrova	Chairman of the Board - coordinator, trainer, consultant "ZAEDNO – Communication for Support and Development" Foundation
3	Marija Nedelcheva	Educator Association "DivRoshkov" <a href="http://divroshkov.wordpress.com/about/">divroshkov.wordpress.com/about/</a>
4	Magdalena Chavdarova	Educator Association "DivRoshkov"
5	Kamelija Miteva	Owner, Trainer – BioGames <a href="http://www.bio-game.org">www.bio-game.org</a>
6	Janeta Petrova	Trainer - BioGames
7	Silviya Tosheva	Educator National Museum of Natural History <a href="http://www.nmnh.com">www.nmnh.com</a>
8	Desislava Sopotlieva	Scientist, <a href="http://www.iber.bas.bg/?q=bg">Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences</a> <a href="http://www.iber.bas.bg/?q=bg">www.iber.bas.bg/?q=bg</a>
9	Svetla Nikolova	Trainer, Biogradinka - Project of the Association Agrolink <a href="http://www.biogradinka.agrolink.org">www.biogradinka.agrolink.org</a>
10	Mariana Ivanova	Secondary special school for children with hearing disorders
11	Teodor Georgiev	Educator in Project "Little bees in the city"
12	Dima Gulabova	Educator Debnevo village
13	Milena Yakimova	Educator at University Botanic Gardens

#### 4.7. INQUIRE Partner institution: Schulbiologisches Zentrum Hannover (SBZH) and Botanischer Garten, Rhododendron-Park botanika Bremen (BGRHB)

Title of INQUIRE TtT Course: Inquiry based learning in Botanic Gardens

Location: Botanic Garden & Rhododendron-Park, botanika Science Centre Bremen

Start date: 22<sup>nd</sup> June, 2012 Finish date: 24<sup>th</sup> June, 2012

Total number of hours: 17,5 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Christiane Adler	Educator at the Botanic Garden of University of Tübingen
2	Ute Becker	Educator at the Botanic Garden of Mainz
3	Ditmar Breimhorst	Educator at The Palm Garden of Frankfurt
4	Annelie Dau	Educator at the Botanic Garden and botanika GmbH of Bremen
5	Kerstin Demuth	Educator at the Botanic Garden of Marburg
6	Ines Fehrmann	Educator at Witzenhausen Tropical Greenhouse
7	Marina Hethke	Educator at Witzenhausen Tropical Greenhouse and University of Kassel
8	Gesche Hohlstein	Educator at the Botanic Garden and the Botanical Museum of Berlin-Dahlem, Free University of Berlin
9	Josefine Jacksch	Educator and postgraduate at the Institute for Systematic Botany of Zurich, Switzerland
10	Sabine Kapaun	Educator at the Botanic Garden of Cologne
11	Dominik Katterfeldt	Educator at the Botanic Garden of Würzburg
12	Walter Krohn	Teacher and educator at the Botanic Garden of the University of Hamburg
13	Annemarie Neugebauer	Educator at the Botanic Garden of the University of Oldenburg
14	Dag Pfannenschmidt	Educator at the Green School of the TU Braunschweig
15	Steffen Ramm	Educator at the Botanic Garden of the University of Potsdam
16	Melanie Ranft	Educator at the Institute for Systematic Botany of Zurich, Switzerland
17	Hans Dieter Riffelmann	Educator at the Nature School of the Grugapark Essen
18	Verena Schmidt-Eichholz	Educator at the Nature School of the Grugapark Essen
19	Jutta Schmitz	Educator at the Botanic Garden of Cologne
20	Beate Senska	Educator at the Botanic Garden and the Botanical Museum of Berlin-Dahlem, Free University of Berlin
21	Franziska Wiegand	Educator and postgraduate at the University of Würzburg, Section didactics in the faculty of Biology
22	Anja Wübben	Lecturer at the University of Oldenburg, Institute of Biology and Botanic Garden



[www.inquirebotany.org](http://www.inquirebotany.org)

#### 4.8. INQUIRE Partner institution: Jardin Botanique de la Ville de Bordeaux (BORD)

Title of INQUIRE TtT Course: Inquiry based learning in Botanic Gardens

Location: Jardin Botanique de la Ville de Bordeaux, Bordeaux

Start date: 26<sup>nd</sup> September, 2012 Finish date: 30<sup>th</sup> May, 2013

Total number of hours: 28 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Baudiquez Benjamin	Educator, Jardinier botaniste, Jardin botanique de Besançon
2	Jacquot Gregory	Educator, Science Communicator, Médiateur scientifique, Jardin Botanique de Besançon
3	Sdupe Jon	Educator, Jardinier botaniste animateur, Jardin Botanique Paul Jovet (St Jean de Luz, 64)

Supported by



#### 4.9. INQUIRE Partner institution: Coimbra Botanic Garden (FCTUC)

Title of INQUIRE TtT Course: Formação de Formadores em Biodiversidade e Sustentabilidade

Location: Coimbra Botanic Garden, University of Coimbra

Start date: 18<sup>th</sup> May, 2012 Finish date: 18<sup>th</sup> May, 2012

Total number of hours: 7 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Jorge Ferreira	Educator
2	José Raul Ribeiro	Teacher Primary
3	Carolina Barreto Leite	Teacher Primary
4	Graça Maria Machado	Teacher Primary
5	Ricardo Jorge Pimentel	Educator – Serralves Museum
6	Ana Sofia Oliveira da Silva	Teacher Primary
7	Pedro Damasceno Oliveira	Teacher Primary
8	Luana Bandeira	Educator – Science Museum
9	António Fernando Ribeiro	Educator
10	Alexandra Berg	Educator
11	Janina dos Santos Garcia	Educator – Science Museum
12	Elisabete Mesquita	Educator - Ecotourism
13	Graça Dias	Teacher – Secondary level

Supported by



#### 4.10. INQUIRE Partner institution: Coimbra Botanic Garden (FCTUC)

Title of INQUIRE TtT Course: Formação de Formadores em Biodiversidade e Sustentabilidade

Location: Coimbra Botanic Garden, University of Coimbra

Start date: 19<sup>th</sup> May, 2012 Finish date: 19<sup>th</sup> May, 2012

Total number of hours: 7 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Maria de Fátima Lopes	Teacher – Secondary level
2	Joana Filipa Costa	Educator – Coimbra Botanic Garden
3	Ana Jacinta Gonçalves	Teacher Primary
4	Eva Cristina Araújo	Teacher Primary
5	João Carlos Pires	Teacher – Secondary level
6	Estefânia Gomes Lopes	Teacher Primary
7	Joana Carolina Torres	Teacher Primary
8	Pedro Miguel Ribeiro	Educator
9	João Miguel Oliveira	Teacher – Secondary level, Colégio Rainha Isabel, Coimbra
10	Garça Maria Oliveira	Teacher – Secondary level, Colégio Rainha Isabel, Coimbra
11	Ana Sofia Madeira	Educator – Lisbon Pavilhão do Conhecimento- Science Museum
12	Andreia Santos Jorge	Educator
13	Maria Madalena Ferreira	Teacher – Secondary level
14	Helena Sofia Póvoa	Educator
15	Liliana Neto Duarte	Educator
16	Raquel Alcaria	Educator – Lisbon Pavilhão do Conhecimento- Science Museum
17	Lidia Teresa Silva	Educator – Coimbra Botanic Garden
18	Ana Frias dos Santos	Educator – Mata do Bussaco
19	Paulo Coelho	Teacher Primary
20	Patricia Vieira Machado	Educator – Coimbra Botanic Garden
21	Elisabete Mesquita	Educator – Coimbra Botanic Garden
22	João Monteiro	Teacher Primary
23	Matilde Azenha	Teacher – Secondary level, Agrupamento de Escolas, Soure

#### 4.11. INQUIRE Partner institution: Moscow State University Botanical Garden (MSU)

Location: MSU Botanical Garden "Aptekarskiy ogorod" (26 str.1, Prospekt Mira, Moscow)

Start date: 20<sup>th</sup> July, 2013 Finish date: 15<sup>th</sup> October, 2013

Total number of hours: 72 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Sizykh Svetlana Vitalyevna	Deputy director of Botanical Garden of Irkutsk State University (ISU) / Secondary School Teacher (Irkutsk)
2	Yakovleva Svetlana Anatolyevna	Educator at Botanical Garden of Immanuel Kant Baltic federal university (Kaliningrad)
3	Karavaeva Natalya Vyacheslavovna	Deputy director of Botanical Garden of Udmurt State University (UdSU, Izhevsk)
4	Mazey Natalya Georgievna	Lecturer in Penza State University and Biologist of Botanical Garden of Penza State University (Penza)
5	Uskireva Margarita Igorevna	Main Specialist of Education and Tourism at Arboretum of National Park "Plescheevo ozero" (Pereslavl-Zalessky)
6	Shumihin Sergey Anatolyevich	Director of Botanical Garden of Perm State University / lecturer at the PSU (Perm)
7	Filatova Inna Olegovna	Scientist and educator of Moscow State University Botanical Garden
8	Pushay Elena Stanislavovna	Scientist and educator of Tver State University Botanical Garden/lecturer at TSU
9	Erygina Olga Germanovna	Chairman of methodical association of biologists in the Centre of Education No 109, Moscow
10	Popova Irina Victorovna	Educator at Gareev Botanic Garden of National Academy of Sciences of Kyrgyz Republik
11	Platonova Elena Anatolyevana	Deputy director of Botanical Garden of Petrozavodsk State University
12	Eglacheva Arina Vyacheslavovna	Educator and tour guide at Botanical Garden of Petrozavodsk State University
13	Stepanova Elena Vadimovna	Educator and tour guide at Arboretum of National Park "Plescheevo ozero"
14	Gosteva Tatyana Vladimirovna	Specialist Educator at Arboretum of National Park "Plescheevo ozero"

#### 4.12. INQUIRE Partner institution: Natural History Museum, University of Oslo (NHM)

Location: Natural History museum, Botanical Garden, Oslo

Start date: 23<sup>rd</sup> April, 2013 Finish date: 23<sup>rd</sup> April 2013

Total number of hours: 11 hours

##### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Anne-Cathrine Scheen	Botanist, Museum of Archaeology
2	Audun Brekke Skrindo	Educator, Oslo Wetlandcenter
3	Beate Johansen	Educator, Agder Natural History Museum and Botanical Garden
4	Brita H. Lohne	Outdoor educator, Norwegian Nature Inspectorate, Villreinsenter sør
5	Bård Knutsen	Assistant Professor, Programme for Teacher Education, Norwegian University of Science and Technology
6	Grethe Hillersøy	Outdoor educator, Norwegian Nature Inspectorate, Ytre Hvaler nasjonalparksenter
7	Heidi Ydse	Outdoor educator, Norwegian Nature Inspectorate, Villreinsenter nord
8	Hilde Friis Solås	Project Manager, Norwegian society for Conservation of Nature Oslo and Akershus
9	Ida Glemminge	Outdoor educator, Norwegian Nature Inspectorate, Flå
10	Kari Fiskvatn	Educator, Agder Natural History Museum and Botanical Garden
11	Kari Korsmo	Scout leader
12	Kari Synnes	Assistant Professor, Faculty of Education and International Studies, Oslo and Akershus University College of Applied Sciences
13	Kjersti Follesøy	Outdoor educator, Norwegian Nature Inspectorate, Eidfjord
14	Kjersti Hanssen	Outdoor educator, Norwegian Nature Inspectorate, Kunnskapssenteret for laks og vannmiljø
15	Line Gustavsen	Educator, Nordre Øyern Wetlandcenter
16	Live Danielsen	Outdoor educator, Norwegian Nature Inspectorate, Oslomarka
17	Majken Korsager	Assistant Professor, Faculty of Education and International Studies, Oslo and Akershus University College of Applied Sciences
18	Mari Bjørnsrud-Gabrielsen	Educator, Bygdø Royal Farm
19	Solbjørg Pedersen	Educator, NTNU University Museum
20	Tina Dahl	Outdoor educator, Norwegian Nature Inspectorate, Villreinsenter sør
21	Torfinn Rhode	Section Manager, Department of Outdoor educators and information, Norwegian Nature Inspectorate
22	Torkjell Morset	Outdoor educator, Norwegian Nature Inspectorate, Stabbursdalen nasjonalpark
23	Wenche Eidshaug	Educator, Ringve Botanical Gardens
24	Star Kristiansen Mborja	Educator, Aktivitetsskolen Seterbråten

Supported by



#### 4.13. INQUIRE Partner institution: University of Lisbon (UL)

Location: University of Lisbon Botanic Garden

Start date: 21<sup>st</sup> November, 2012 Finish date: 22<sup>nd</sup> November 2012

Total number of hours: 12 hours

#### List of the INQUIRE TtT Course participants

No	Name of the participant	Job title
1	Vera Novais	BG guide, MUHNAC; Zoo guide
2	João Azevedo	Teacher Primary
3	Inês Paulino	BG guide, MUHNAC
4	Vera Malhão	Educational researcher and university teacher
5	André Ferreira	Teacher Primary
6	Natércia Barbosa	Teacher Primary
7	Ana Pedro	BG guide, MUHNAC
8	Teresa Capela	Teacher Primary
9	Carla Kullberg	Teacher Primary
10	Sónia Marcelino	Teacher Primary
11	Alexandra Preto	Teacher Primary
12	Cristina Weber	Head of the Lisbon Communications Museum
13	Silvia Figueiredo	Teacher Primary
14	Ana Amaral	Teacher Secondary
15	Maria Gabriela Moreira	Teacher Secondary
16	Carla Silva	Teacher Secondary
17	Isabel Raposo	Teacher Secondary
18	Maria Pinto	Teacher Secondary
19	Susana Serra	Teacher Secondary
20	Helena Moita de Deus	Teacher Secondary
21	Maurícia Reis	Teacher Secondary
22	Maria Laura Pinto	Teacher Secondary
23	Ana Neves	Teacher Secondary
24	Isabel Raposo	Teacher Primary
25	Joaquim Santos	Teacher Primary
26	Ana Vicêncio	Teacher Primary
27	Raquel Alcaria	Teacher Primary
28	Fernanda Marques	Teacher Primary
29	Vanda Vilela	Teacher Primary
30	Ricardina almeida	Teacher Primary
31	Joana Carvalho	Teacher Primary

Supported by



## Sustainability of Inquire post project

October 2013



Gail Bromley MBE FLS,

KEW

Supported by





## SUMMARY

Prior to the close of the Inquire project, Consortium partners provided a short paper on how the Inquire project would be sustained going forward. The Consortium partners that provided these short summaries were the those that has delivered Pilot Inquire, Inquire and Train the Trainers courses i.e. not Kings College or BGCI . The co-ordinating body also did not put in a report as they will look to develop a follow up EU project.

Each partner was asked to reflect on 2 questions, so that the Management Board could collate information about sustaining the project:

1. *What are your plans for continuing the INQUIRE course in your institution following the end of the project*
2. *What other actions apart from running an INQUIRE course is your institution planning to take in order to encourage IBSE in your country's education system.*

The pages below provide an overview / reflections about the plans of each partner for maintaining and developing the principles and aims over the forthcoming months.



Supported by





## Table of Contents

INQUIRE Partner Institution: <b>University of Innsbruck (LFU)</b> .....	4
INQUIRE Partner institution: <b>Museo delle Scienze (MUSE)</b> .....	5
INQUIRE Partner institution: <b>Royal Botanic Gardens Kew (KEW)</b> .....	6
INQUIRE Partner institution: <b>Agencia Estatal Consejo Superior de Investigaciones Cientificas (CSIC) &amp;Universidad de Alcala (UAH)</b> .....	8
INQUIRE Partner institution: <b>University of Bremen (UniHB) &amp; Botanischer Garten. Rhododendron- Park, botanika Bremen (BGRHB)</b> .....	9
INQUIRE Partner institution: <b>University of Sofia (UBG)</b> .....	10
INQUIRE Partner institution: <b>National Botanic Garden of Belgium (NBGB)</b> .....	11
INQUIRE Partner institution: <b>Schulbiologisches Zentrum Hannover (SBZH)</b> .....	13
INQUIRE Partner institution: <b>Jardin Botanique de la Ville de Bordeaux (BORD)</b> .....	15
INQUIRE Partner institution: <b>Coimbra Botanic Garden (FCTUC)</b> .....	16
INQUIRE Partner institution: <b>Moscow State University Botanical Garden (MSU)</b> .....	17
INQUIRE Partner institution: <b>Natural History Museum, Botanical Garden (NHM)</b> .....	20
INQUIRE Partner institution: <b>University of Lisbon (UL)</b> .....	22

Supported by





INQUIRE Partner Institution: **University of Innsbruck (LFU)**

## **Plans and actions for sustainability of INQUIRE**

A new INQUIRE course has been planned for the academic year 2014/15 to run at the University of Innsbruck, Austria.

It will be a three module course running over the period of 7 month and will include INQUIRE cafes for participants to share their experiences. It will be aiming at teachers and educators at national level and will include an online platform to share knowledge for those who may not be able to attend INQUIRE café 's on a regular bases.

Thus we will relay on knowledge and experience gained while running the two INQUIRE courses in Innsbruck and the TTT course in St. Virgil, Salzburg.

The University department for Professional Development will support and advertise this course and we will inform people about the course via all the networks we have established so far. Thus we hope we will have enough applications to run this course. This course will not be free but will have a registration fee and this might be a constraint impacting on the number of participants.

In addition we are currently negotiating a national wide Training course for Explainers working at LOtC sites. This will be a University Course and we will run it in cooperation with the University of Klagenfurt and the Science Center Network, Austria. Thus we will be able to contribute with our knowledge and ready to go teaching materials developed in the INQUIRE project and to add the Inquiry Based Science Education to the curriculum which is currently designed.

We will publish a book about Case-Studies LOtC institutions who participated in the INQUIRE Train the Trainer course or in the two INQUIRE courses handed in. We assume that this booklet is a good way to promote Inquiry Based Science Teaching at LOtC sites in Austria and we are looking forward for explainers to sign up for the INQUIRE course 2014/15.

Supported by





www.inquirebotany.org

INQUIRE Partner institution: **Museo delle Scienze (MUSE)**

### **Plans and actions for sustainability of INQUIRE**

A new inquire course has been planned for the end of August 2014 at MUSE in Trento. It will be a 3 days residential course aimed at teachers and educators at national level using the validated format of the two previously run Inquire courses in Trento and Bergamo. The museum already has a target list of interested people compiled during the 17 congresses and meetings attended at national level in the past 3 years and an additional short list compiled from the 85 applications received for the TTC course that include people more suitable for an inquire course rather than a TTC course. This course will not be free but will have a registration fee and this might be a constraint impacting on the number of participants.

In the future the museum is considering to run a second short TTC course aimed at the participants of the first TTC course that were successful in running an INQUIRE course in their local context and new teacher trainers and head educators interested in running an inquire course also sourced through the original reserve list of the first TTC course to promote a fruitful exchange of information.

An agreement has been reached with the RWL project (Real World Learning - <http://www.rwlnetwork.org/>) funded by the EU Comenius Lifelong Learning Programme to run a national two days workshop on outdoor learning aimed at teachers, head teachers and educators in partnership with CREDA (Centro Ricerca Educazione Documentazione Ambientale onlus, Monza, Milan, Lombardy) the Italian partner of RWL project. The national workshop will be run next summer in a date to be announced between June and August 2014 and will focus one day on educational approaches highlighting IBSE among the others and one day on evaluation highlighting the different evaluation tools suitable for outdoor education.

Informal outreach will continue using the e-forum, social media and wikis to make available online a selection of lesson plans developed during past and future inquire and TTC courses (<http://inquire.italiaforum.net> and <http://inquirebotany.wikispaces.org/>)

Supported by





INQUIRE Partner institution: **Royal Botanic Gardens Kew (KEW)**

## **Plans and actions for sustainability of INQUIRE**

Following on from the evaluation of the pilot Inquire courses, RBG Kew will be running a charged for Inquiry based CPD (Continuing Professional Development) course for teachers and educators on an annual basis, starting from Autumn 2014. This will be an adapted course utilising the content and activities developed and evaluated over the 2 pilot Inquire courses.

In collaboration with Kew, the Royal Botanic Gardens, Edinburgh are also launching a similar annual Inquire CPD course for teachers in Scotland, to be launched in spring / summer 2014. Kew has already had 2 joint meetings with Edinburgh to explore how best to adapt content and activities and how to support a community of practice between participants across the 2 sites. Marketing and PR will be jointly developed and disseminated through a range of media including Kew and Edinburgh websites.

It is hoped that further LOtC sites will set up Inquire training courses or short taster sessions, similar to those delivered through Kew over the duration of the project. The overall education manager from the Wildlife and Wetland Trusts (WWT) across the UK (3 staff from 3 sites attended a Kew Inquire pilot course) have also had conversations with Kew to discuss how similar training courses could be set up through the WWT network and used to train other WWT education and ranger staff, or more widely, local schoolteachers who access their sites.

Kew will be integrating Inquiry based teaching and learning approaches into all of its current schools science education programmes; inquiry based science is a key focus for the delivery of Kew's Temperate House new schools programme which will be launched alongside the re-opening of the refurbished Temperate House building in Kew in 2018.

See extracts from bid below:

'The 12-19 audience has also been identified as a challenging leisure audience for Kew. In response Kew aims to build this audience through involvement with schools and colleges. Digital technologies will play a key role in this, opening up opportunities to step away from traditional teaching and to support innovative, inclusive and enquiry based learning with online support and post visit learning opportunities.'

### **' Rationale for New Activities**

The first four Breathing Planet themes underpin the new learning programme for

Supported by





secondary schools: a) Diversity challenge; b) Search and rescue; c) Help for habitats; d) Local plants for local people. The approach is structured in line with inquiry based learning practice. These are taken from the Pilot Inquire course (At the time of writing, Kew is a lead partner in this project which involves 17 botanic garden and pedagogical partners from eleven European countries).'

All Kew's cohort of teachers (c30) , including several new staff will have had IBSE training by January 2014, in order to further the integration of IBSE in educational programmes.

Kew will continue to work with BGEN to provide IBSE training (train the trainers courses) over the coming years. This will probably be run as 1 workshop annually to reach all members across the UK

Kew will continue to provide training on IBSE concepts and activities as part of the International Diploma in Botanic Garden Education (IDBGE) , which is offered every 2 years at Kew in association with BGCI (next 5 week course is May 2014; student number is c12 )

Kew will continue to provide training on IBSE concepts and activities as part of the 4 day training offer provided for the science PGCE students (trainee teachers) from the Institute of Education, London .(Training is provided annually in June; student number is c90)

Supported by





[www.inquirebotany.org](http://www.inquirebotany.org)

INQUIRE Partner institution: **Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC) & Universidad de Alcalá (UAH)**

## Plans and actions for sustainability of INQUIRE

We have planned to continue with the INQUIRE courses (once a year). We have applied for a Spanish project in which “inquiry based science education courses” for teachers are included. At the moment we are waiting for the resolution.

In case we will not get the project, we have planned to run the course in a “self-paid way” that means we will charge the participants a small fare, enough to run it or to ask for funding and administrative support to the Universidad de Alcalá or the Postgraduates Department of CSIC. We have also considered to run an on-line course or seminar. For running the course both gardens will work together. Besides, we will try to engage the Regional Teacher Training Institution.

The Alcalá Garden has plans to collaborate with the Universidad de Méjico (Jalapa’s Garden to run INQUIRE courses)

In the Spanish project we have applied for, there are included different *inquiry-based* workshops. By the way, it will be necessary to organize seminars aimed to educators in order to train them to deliver those activities and use our web sites to disseminate it. In this project there is a special point to run workshops during the science week.

Another point to highlight is the request from some teachers of education schools (teachers teaching future teachers) to deliver a seminar and a practical activity about IBSE in the garden of Madrid. Those teachers were participants of a previous course and they have asked for a seminar per year for their students. We will try to include that in our education programme as we think it is a very good way to spread inquiry based learning.

We have also planning to run a national conference with teachers developing IBSE activities. We have plan to encourage other Spanish gardens to use IBSE by the Spanish-Portuguese net (AIMJB)

Supported by





INQUIRE Partner institution: **University of Bremen (UniHB) & Botanischer Garten. Rhododendron- Park, botanika Bremen (BGRHB)**

After finishing the INQUIRE project the idea of IBSE will persist in the work of the Green School in the Botanical Garden Bremen. There are 7 modules which were developed during the time of the project and other new modules which contain IBSE activities and problem statements for introduction.

Instead of a long term teacher training there might be the possibility of one-day training courses. These could include a theoretical part with some impact of the IBSE methods and examples. During the second part the participants could collect ideas for the implementation in their classes and they could furthermore plan a short activity by their own in small groups. Another possibility could be the creation of a regular's table where all interested teachers, garden educators and others could come together and exchange their experiences, new ideas and plans for cooperation between the institutions.

Especially in winter time, less school classes visit the Botanical Garden. For this, it could be a good idea to announce a drawing at Christmas time for visits in the Green School. The winner classes would get 3 hours IBSE module and involved activities. Though there is no vegetation in the Botanical Garden, the "winter-modules" like "Rain forest", "Carnivorous plants" or "CO<sub>2</sub> cycle" can be realized in the greenhouses of Botanika and in the laboratory. Besides of the advertisement for the Green School this is a very good chance to spread the idea of IBSE.

Besides, IBSE and the offer of the Green School with their modules and activities in the Botanical Garden will still be presented at teacher conferences and other events where teachers and potential users are present.

One last advisory board meeting will be organized in the next months together with the SBZH. This gives a good occasion to discuss the implementation of IBSE in the curricula with the officials of the Senator of Education and Science Bremen and Ministry of Education Lower Saxony.

Supported by





[www.inquirebotany.org](http://www.inquirebotany.org)

INQUIRE Partner institution: **University of Sofia (UBG)**

### **Plans and actions for sustainability of INQUIRE**

During the last several years University Botanic gardens in Bulgaria worked on development and verification as a site for outdoor learning. We made a big step forward with INQUIRE project and now we are planning to continue with Teacher and educator course 2013/14. This course will be disseminated through our UBG and INQUIRE web-sites as well as through the Regional inspectorates of education (which are local educational structures). The course will copy the programme of this year INQUIRE course and we hope that participants will be interested in.

We still calculating the finance issues and according to the resources we could provide different IBSE activities in our three Botanic gardens, situated in three different towns.

We consider INQUIRE Courses in Bulgaria were successful. We reached a lot of teacher from primary and secondary school from two biggest towns in Bulgaria as well as some small towns and villages. But a lot of participants gave the feedback that they will need additional support. Community of practitioner is something which we started to build here and something that we will try to make sustainable.

Regarding to this we would like to organize regular meetings for 'face to face' discussions and experience exchange on topics connected to IBSE, outdoor learning as well as climate changes and biodiversity.

University Botanic gardens also wants to include regular IBSE activities in their educational program. And hopefully in the future we will be able to provide long-lasting education programs for primary and secondary school students during the summer vacations.

Supported by



## Plans and actions for sustainability of INQUIRE

We work on the course sustainability in 3 major ways :

1. We organize the course again in 2013 – 2014 and intend to do this in the coming years.
2. We had 11 teachers trainers and two teacher trainees in our course.
3. We organized meetings with the pedagogical advisors of the three main educational networks (public schools, catholic schools and municipal schools).
4. We let the methods of IBSE infiltrate in the educational offer in our Botanic Garden.

In 2013 – 2014 we organize an IBSE course that will take 4 Wednesday-afternoons. The participants will have to pay a fee of €100 for the four days. By choosing Wednesday afternoons, our target group is primary school teachers. We chose for this option, because we noticed that primary these teachers have a great need of knowledge about plants and that they are very open toward the methodology. This can be explained by the fact that they have more freedom in their time management, which makes the organization of IBSE activities easier. The main concept of the course will remain the same. We offer our participants some theoretical background and some good examples. They develop and demonstrate their own 'translation' of the methodology and the examples. In that way, they can provide us with important feedback.

For this course, we made an personalized course manual with tips and examples that correspond with the Flemish situation and curriculum. The manual has two main parts:

1. **In the first part**, the reader is taken through the circle of inquiry. He can find tips and tricks, do's and don'ts about each aspect of the circle. What are good research questions? How can children be stimulated to ask questions? How can concept cartoons help children to formulate hypotheses etc. All these tips are based on observed and tested activities.
2. **In the second part** we present some activities that were developed and tested by our course participants and observed by us. Even though the idea of Inquiry Based Science Education has infiltrated the curriculum, it doesn't mean that it is brought into practice in a sufficient way. Young teachers will need a lot of practical examples before they will effectively implement the method. The new textbooks for biology and other science subjects are adapted to the new

Supported by





curriculum, but they don't give many examples of *real* IBSE activities. Regretfully, they often just replaced the word 'Task' by 'Research question', thinking that this will make a lesson Inquiry based. Therefore, the only time when young teachers can see really good examples, will be during their training.

We can conclude that having teachers trainers and students in the courses is a very important way of ensuring the sustainability.

Pedagogical advisors have an important function in our school system. They help schools 'translate' the curriculum in a good pedagogical program. They do this in several ways:

1. By giving general advise about pedagogy to schools and teachers,
2. By giving support on demand in case schools or teachers have specific problems,
3. By advising schools who received a negative report after school inspection on how to improve their pedagogical skills.

We already had a meeting with 2 pedagogical advisors of the municipal schools. They already spread the `information on the Inquire Course in their schools, with a letter of recommendation. They consider sending some of their colleagues to our course. Finally, they will recommend the National Botanic Garden of Belgium as a place where Inquiry based activities are part of the educational offer.

In December, we will meet with 9 pedagogical advisors for Biology of the catholic school network. We will present the project and hope that this will have similar results. Through the formation of our educators and through the restatement of our educational workshops, IBSE will became part of the educational offer in the National Botanic Garden of Belgium. Again, teachers will take many examples to their classes after having intended one of our activities with their class.

We want to go one step further and offer all our visitors some research questions on different locations in our Garden. We will start this in the Glass Houses, providing cards with research questions that visitors can try to answer while visiting one certain part of the Glass House. They will be stimulated to find the answer by observing, talking to our gardeners or reading information panels. At the end of their visit, they will be invited to buy a booklet that contains more information concerning the research questions.

All this actions will be made visible by using the INQUIRE banner and the INQUIRE symbol on different locations and documents.

Supported by



## **Plans and actions for sustainability of INQUIRE**

When the project is over the School Biology Centre will continue to offer and run the three-day training course. There are already registrations for the 2013/14 INQUIRE course. The course should become a firm feature of the in-service training programme for teachers in schools and botanic gardens. The timing of the three training days (in November, March and May) will also be retained, as participants in the first two courses appreciated the fact that there was enough time between the course days to implement the methods and modules in school and to exchange experiences and views with other participants. Each subsequent course will be evaluated through plenary sessions, concept maps and questionnaires to improve the course and expand it with new IBSE modules.

The course should be included in the official in-service teacher training catalogue for the Federal State of Lower Saxony, so that participating teachers can be released from their usual duties for the days and have their time credited as working hours.

During the two INQUIRE courses five new modules were devised. They have been included in the SBZH permanent programme and can be booked at any time to be carried out with school classes.

A new plant delivery set has been compiled for an INQUIRE module. This delivery is a permanent feature of the SBZH plant delivery service and can be worked on by teachers with their classes at SBZH or be taken to school for longer-term work with the plants.

For the training course, the little-used facility for small ecology experiments was conceptionally reworked and learning modules devised for it. Now it is used for diverse purposes. The forthcoming training courses should also devise more IBSE modules.

All educational staff at SBZH were either participants in one of the INQUIRE courses or were involved in devising the modules. They use all the modules with school classes or include BSE methods in their courses whenever possible.

The development of an IBSE in-service training course for primary school teachers is planned.

A final advisory board meeting with Botanika Bremen is planned for October to integrate the IBSE methods as a permanent part of the Lower Saxony school curriculum. Further cooperation

Supported by





between the two institutions and dissemination of the methods and training courses throughout Germany via the botanic gardens network is also on the agenda.

The School Biology Centre is a regular participant in the quarterly conferences of the network of botanic gardens, where new IBSE modules are constantly presented and devised in cooperation with their participants. The plan is that more botanic gardens offer INQUIRE in-service training, and these gardens will be advised and supported by SBZH.

The INQUIRE training course at SBZH is advertised via various digital mailing lists and newsletters e.g. that of the BNE (education for sustainable development) newsletter or the school administration gazette. Hannover schools will be written to before the beginning of the new course. On the SBZH website the INQUIRE course as a separate section, with all the modules to download and an INQUIRE column is linked to the INQUIRE project website. The School Biology Centre offers many other in-service training events for teachers and childcare professionals. Here, too, the methods are further disseminated and the new courses advertised.

Supported by



### **Plans and actions for sustainability of INQUIRE**

After meeting all members from the NAG, we knew that they will not be able to help us financially and won't add our course to the traditional and national teachers training (they almost all disappeared). So, as teachers were not reimbursed and replaced in the class by the school authorities (NAG members) they won't be able to come to our IBSE training. Consequently we cannot continue the training with the shape given for the last two years.

We would like to propose challenges for teachers that will include:

- Two full days training about IBSE at the garden (theory, workshops, assessment, website introduction, resources...)
- Two or three challenging questions, depending on the children level. They will have to find an answer in an IBSE manner. They will have to give evidences of their work, their approach and results. These will be presented on INQUIRE website. Once they found out the first challenging-question they can reach the second level of questions, and so on.... Up to three questions in one challenge.
- To the classes who have reached the third level of the challenge we offer a visit to the garden.

Teachers and educators will have to register to this project; it will be schools or other environment structures that will have to pay 92 euros (equal to 2 normal visits or workshop at the garden) so they can participate to challenges receive training, have access to the website for answering to questions and a botanic garden visit.

In one hand, this new formula of the course will use the website more, not only by teachers / children but also the children's family so that they can look at the work done by the child. On the other hand it will encourage more motivation from other gardens in France, maybe more support and perhaps a new IBSE training in another garden.

We are now about to present this new training course to education authorities members to get their support. We hope that we could start in early 2014.

Also, in 2015, IBSE will be one of the main topics presented in the next French botanic garden education meeting.

Supported by



## **Plans and actions for sustainability of INQUIRE**

**Partner - FCTUC** (Faculty of Sciences and Technology of the University of Coimbra), Coimbra Botanic Garden, Portugal

1. The INQUIRE COIMBRA course should continue to be run in a regular annual format, as a trainer for the trainers individual course (teachers and educators), generating an annual pool of new IBSE projects, an alternative and motivating way for teachers, educators and pupils to study the biodiversity and climate changes curricular programs thematic. The INQUIRE COIMBRA course is credited for a period of 3 years, in order to attract more teachers for Continuous Professional Development (CPD), being formally recognised as a 60-hours workshop of 2.4 CPD credits, untitled: *"INQUIRE project - Training in Biodiversity and Sustainability"*. New candidates for a third INQUIRE COIMBRA edition course were possible to be achieved during the TT workshop (18<sup>th</sup> May 2013).

Following the last Portuguese Advisor Group meeting (21<sup>st</sup> September), as the Inquire project ends next November not financial supporting next courses, both Coimbra and Lisbon Partners are looking for the best structure with the cheapest fees for the third INQUIRE course edition to be run in a similar way, starting January 2014. Also a possibility of the University of Coimbra and Lisbon Botanic Gardens arrange a new educative national project with different educative national institutions as partners aiming to run the two Portuguese Inquire courses in the current similar formats is "on the desk".

2. Moreover, the INQUIRE COIMBRA course could be integrated with a proper design in the first curricular year of the Coimbra University, on the Biology and other connected Natural Sciences superior courses, linked to a curricular discipline of conservation, botany or science education, in this last case directly addressed to the training of future teachers. To be proposed to the Head of Department of Life Sciences, Faculty of Sciences and Technology of the University of Coimbra (FCTUC).

3. The INQUIRE COIMBRA course had two editions with good outcomes and trainee's satisfaction what motivates trainers to continue, being the course prepared to be run here at Coimbra or in another place of the world, especially in countries with Portuguese as native speaker language. I am also prepared to run the course at Coimbra, in or out of the country, by an institutional way or as a free-lancer.

Supported by





INQUIRE Partner institution: **Moscow State University Botanical Garden (MSU)**

### **Plans and actions for sustainability of INQUIRE**

The BG of MSU aims to create a sustainable system of education in botanic gardens and is willing to coordinate this work.

As the University is expanding its work with schools, it is interested in continuing the INQUIRE course on a permanent basis and in introducing innovative educational techniques. We are therefore currently working to certify a Professional Development course for teachers and educators on an annual basis, and plan to start the course in September 2014. This course will adapt and utilize the content and activities developed and evaluated over the 2 pilot Inquire courses.

We are planning to certify and run an INQUIRE training programme for staff from other botanic gardens (in Russia and other CIS countries).

The City of Moscow Department of Education gives financial support to MSU to run a project offering school activities. Thanks to the course, we have received support from the Education Department of the City of Moscow to develop a programme of Garden-based school lessons ("Lessons in the Botanic Garden") for the 2013-2014 academic year. In August 2013 we introduced a new IBSE-based education programme for students with the support of the Education Department.

We plan to continue providing information support to all course participants.

We plan to develop a "Community of Partners" with the teachers and educators through a range of Garden programmes, maintaining continuous contact and inviting them to INQUIRE lessons in the Garden. The teachers who participated in the two INQUIRE courses in Russia have expressed their willingness to continue working with MSU. MSU will organize meetings with the participants twice a year, as well as conferences and round tables to exchange views and keep in touch with teachers after the course.

We plan to continue promoting IBSE amongst teachers by taking part in webinars and conferences and by holding master classes, including events in botanic gardens. On 13<sup>th</sup> December 2013, for example, we will hold a seminar for teachers entitled "First Steps in

Supported by





Science: Research lesson in the Botanic Garden”, at which teachers who have completed the INQUIRE course will speak about their IBSE lessons in the Garden and the student response.

We plan to continue participating in MSU’s regular Science Festivals to involve many more people in IBSE activities (the next Science Festival – the 9<sup>th</sup> – is scheduled for October 2014).

Participants who attended the Train the Trainers course (from other Russian BGs) plan to start offering IBSE seminars for teachers and educators in their gardens.

We can see that IBSE is of interest to other gardens not only in Russia, but also in other CIS countries. We will therefore try to run a future course for garden educators, possibly inviting some of our foreign partners as experts.

For as long as the website exists we plan to continue using it as an educational resource for all project participants, to support garden programmes in other regions and to publish articles promoting Best Practice in INQUIRE education.

As teachers and educators have expressed an interest in visiting other sites and learning more about outdoor education, we plan to encourage project participants to get involved in programmes run by other botanic gardens and to organize visits to Russian botanic gardens implementing IBSE activities.

To help spread IBSE in Russia we propose setting up a network of botanic gardens developing their own IBSE programmes, in order to promote their resources and programmes amongst teachers and students (IBSE activities for visiting students, summer courses and camps – all of which are particularly relevant to Moscow schools). These plans were confirmed by participants in the TTC and a joint workshop for teachers and botanic garden educators on 12<sup>th</sup> September 2013.

We plan to continue promoting IBSE in Russia by taking part in webinars and conferences, and holding workshops and master-classes.

We plan to develop cooperation between Russian schools and botanic gardens and the European project participants by organizing joint training programmes.

Supported by



INQUIRE



[www.inquirebotany.org](http://www.inquirebotany.org)

Supported by





[www.inquirebotany.org](http://www.inquirebotany.org)

INQUIRE Partner institution: **Natural History Museum, Botanical Garden (NHM)**

## **Plans and actions for sustainability of INQUIRE**

The previous two INQUIRE courses have been run throughout a whole school year, which we found fruitful both to the participants maturation and to the ability to teach in all seasons. Feedback from the participants has been very positive, so we wanted to run a similar course this year, starting in September and ending in June 2014. We aimed at upper primary school teacher, as with the previous courses, due to advice from our advisory group that thought it would be best to specialise on one target group before change to another. The course was advertised in June, before school holiday, and in August when the new term started. Channels used were the INQUIRE-, the Natural History museum-, and the University of Oslo webpages, The City of Oslo Education Authority , e-mails to schools in Oslo and the surrounding municipalities. Sadly only seven participants signed up for a new course now in September 2013. Accordingly we had to cancel the course.

We are not giving up, and will try again next year. To succeed in getting enough participants the strategies for recruitment have to be improved. The same channels will be used, but the mailing list will be extended to schools in a larger geographical area. In addition, the course will be advertised on the museums Facebook profile. This year we experienced that some teachers wanted to attend the course, but were not allowed by their headmasters. A solution to this problem might be to advertise the course earlier, so the teachers got time to persuade the decision makers.

Many participants in the previous courses reported that they knew little about the Botanic garden prior to the course. Therefore we are planning to have a “get to know the museum” evening where we present what we can offer. Hopefully this will get more teachers to utilize the opportunities in our Botanic garden and recruit participants for next year’s course.

At a network meeting in September together with all botanical gardens in Norway, Kristina Bjureke informed about the INQUIRE project and IBSE. Some institutions found it intriguing. In November when the INQUIRE project ends one in the staff will be unemployed. Her contact info was distributed to the attenders at the network meeting. If they get funding’s she can visit other institution to give courses.

Supported by





We don't see the need of promoting IBSE for national authorities. Inquire based methods were incorporated in the National curriculum in 2006. One of the main subject areas for nature science is "the Budding scientist", which includes the aim that the students shall learn how to work as a scientist by make and test their own hypothesis. Even though it's a part of the curriculum, teachers lack knowledge and skills to fulfil these aims. Therefore promoting IBSE at a lower educational level is important.

In Norway we have a National Centre for Science Education. They have webpages, with contents like lesson plans and information, one for schools at all levels and one for kinder gardens. These are widely used by teachers and kinder garden employees. We have initiated collaboration with them. They will promote the Natural History Museum in Oslo and other LOtC institution, including our lesson plans. Our museum is often visited by kinder gardens. Therefore we will write an article about IBSE for the kinder garden webpage.

The TtT course was run as a seminar with educators from several LOtC institutions from all parts of our country. IBSE activities were tested and discussed, experiences and ideas were shared. A survey after the seminar stated that this was very much appreciated, and the participants wanted it to be an annual event. We want this to be an event hosted by different institutions, and are now in dialog with one of the institutions, to support and encourage them to host a seminar next spring.

We plan to promote IBSE by writing an article in "Utdanning" ("Education"), the journal of The Union of Education Norway.

Every year there is an arrangement called "Fagpedagogisk dag" (a day of pedagogy in natural science), aimed at science teachers at all levels in school. This will be a good arena for promoting IBSE.

At the 5<sup>th</sup> Global Botanic Gardens Congress in New Zealand NHM Oslo will be performing a work shop on IBSE together with colleagues in Trento, Italy, and BGCI, London.

Supported by





INQUIRE Partner institution: **University of Lisbon (UL)**

### **Plans and actions for sustainability of INQUIRE**

For the future, the BG-MUHNAC intends to continue developing these courses at the regional and national level and improve our strategies and education skills to communicate to the public about the importance of biodiversity conservation and plant diversity. This is also in the mission of the institution has a promoter and developer of continuous education and formation.

The next IBSE courses will happen in the following years and are intended to be paid, as the funds for the free courses end with the end of the project. The program for the courses won't suffer many changes but it will always be open to adapt if this is necessary, for example, in case changes are made to the national scholar *curricula*. To make this happen, the BG-MUHNAC intends to continue disseminating the course and IBSE activities. There are already teachers who have showed interest in participating in the next courses.

The online website page will continue to support all course participants with course materials and it will continue to be frequently updated with new information and news on subjects as; biodiversity, climate change, IBSE, educational programs, IBSE lesson plans, and others.

The INQUIRE courses are already part of the annual program of the institution and together with this, a formal event, consisting of an open Forum, which the first already took place during the Science Week (November 21 and 22, 2012), will continue to happen.

The BG-MUHNAC offers a wide range of activities and formation courses where the INQUIRE course will be included as an annual activity to be developed.

Besides all this, the BG-MUHNAC has been already contacted by regional school coordinators in order for them to have INQUIRE courses and on IBSE methodology.

The BG-MUHNAC intends to continue the work that has been done until now in order to promote the IBSE dissemination at both national and regional level. The INQUIRE courses are already part of the annual program of the institution and together with this, a formal event, consisting of an open Forum, which the first already took place during the Science Week (November 21 and 22, 2012), will continue to happen.

To disseminate both the course and the Forum, different invitation letters to School Administration Offices as well as for the Education Ministry, press releases and Facebook posts,

Supported by





as well as, INQUIRE leaflets will be sent to schools that are in BG-MUHNAC database in order to spread the information by word of mouth. The number of requests on the second year was greater than on the first one, showing the snowball effect of the course's dissemination. For the next years we intend to continue developing this work.

Although the dissemination effort is mainly focused in schools from Lisbon region, and as already happened on the previous courses, teachers from other schools out of Lisbon will continue to show interest in attending the course as well as teachers from the Azores and Madeira Islands.

To spread and extend our knowledge at national level we have organized in Lisbon on the 30<sup>th</sup> November, a full day seminar to discuss: i) the advantages of IBSE on science teaching at schools; ii) different study cases developed by teachers to motivate students; iii) the LOtC institutions as special places for informal education; iv) the challenges for the school community to better promote science education at schools. The seminar was open to teachers, school directors, educators, parent's organization, scientific societies, government bodies. The Coimbra Botanic Garden has also been present and the event has been organized as a National event aiming the production of a document to be present and discussed within the National bodies of Government.

Supported by



## INQUIRE Project participating in EU Networking and Key Events (2010-2013)



Photo: Train the Trainers course at NBGB, 15 September, 2012

Suzanne Kapelari

Supported by



## Table of Contents

1) INQUIRE Networking Activities: .....	3
1.1. First European Fibonacci Conference: .....	3
1.2. SCIENTIX Conference .....	4
1.3. ESTABLISH Teacher Conference .....	5
1.4. BGCI's 8th International Congress on Education in Botanic Gardens.....	5
1.5. INSTEM Conference, .....	6
1.6. SECURE Conference .....	7
1.7. 5 <sup>th</sup> Global Botanic Garden Congress .....	7
1.8. The ProCoNet Network.....	8
2) INQUIRE at International Education Research Conferences .....	9
2.1. ECSITE Annual Conference.....	10
2.2. FIBONACCI Conference, Leicester.....	10
2.3. New Perspectives in Science Education.....	11
2.4. ESERA Conference.....	12
2.5. ECER Conference.....	12
3) INQUIRE at European Commission Public relation Events: .....	13
3.1. Science it is a Girls Thing: Opening Event .....	13
3.2. INQUIRE European Commission Open Day.....	14
4) Minutes From ProCoNet Meetings (Peter Gray) .....	16
2 <sup>nd</sup> ProCoNet workshop: A vision for STEM education 2014-2020.....	16
3 <sup>rd</sup> ProCoNet workshop: Revisiting STEM education in Horizon 2020.....	22
4 <sup>th</sup> ProCoNet meeting: Repositories in STEM education, Responsible Research .....	26
& Innovation and Horizon 2020.....	26



## 1) INQUIRE Networking Activities:

A large amount of people working in various areas of the educational system – formal and non-formal, research and practice – are continuously creating a huge amount of 'know how', 'know when' and 'know why'. The INQUIRE MB regarded it as essential that projects funded by the European Commission should endeavour to draw on already existing knowledge, learning from other projects and experts whilst fulfilling their own agenda.

In support of this principle, the INQUIRE coordinator and MB members did their best to contact other EU project coordinators and project partner organisations, as well as attending various EC project based events and conferences throughout the project timescale. These events and conferences bring together a wide range of key players in the field and provide valuable opportunities to learn from each other, as well as to critically reflect on one's own work.

This issue was already addressed in the Annex I of the Grant Agreement, p. 90:

Travel to European Project Conferences. It was envisaged that personnel from the INQUIRE project would participate in a minimum of 5 European Project related conferences.

### 1.1. First European Fibonacci Conference:

Raising Awareness about Inquiry Based Science and Mathematics Education in Europe

21 - 22 September 2010, Bayreuth, Germany: <http://fibonacci.uni-bayreuth.de/conference/>

While negotiating the INQUIRE grant agreement, the Inquire Co-ordinator, Suzanne Kapelari, attended this conference to learn about the Fibonacci Project idea, goals and achievements to date. The conference was organized by the University of Bayreuth in cooperation with La Main à la Pâte (French Academy of Sciences, INRP, ENS Paris).

The International Conference Bayreuth 2010 was the first key conference for the Fibonacci Project. It was both interesting and helpful for the Inquire coordinator to learn about what the Fibonacci team was planning and their expectations of the project outcomes.

Fibonacci's objectives for this conference were:

Supported by



- Raising awareness around the project objectives, in particular through involving the scientific community
- Arousing interest among those seeking to gain experience into inquiry-based mathematics and science education (IBMSE),
- Emphasizing the role of learning environments,
- Bridging the gap between IBSME theory and practice,
- Organizing networks of co-operation for IBMSE

Due to the fact that the Inquire project was still in its initial stage, the main goal for participating in this conference was to meet and talk to key players and to see whether further networking activities could be established. Participation in this meeting led to an invitation to present the INQUIRE project at the Fibonacci Conference in Leicester 2012

## 1.2. SCIENTIX Conference

‘Towards a community for science education in Europe’

6-8 May 2011, Brussels, Belgium: <http://www.scientix.eu/web/guest/conference>

The Scientix European Conference aimed to break down barriers of nationality and lay the ground for a European community for science education. More than 400 teachers, researchers, policy-makers and other stakeholders from over 40 countries gathered in Brussels, Belgium, to discuss the current challenges for science education.

Keynote speeches and the parallel sessions discussed a variety of topics and issues, from pedagogy, educational technologies and learning resources to interactions between policy, science and society. Several common themes emerged from the talks, complementing those brought up during the opening and plenary sessions.

Together they formed a set of recommendations to the Scientix stakeholders for the months to come:

- Participation in public dialogue
- Engaging in scientific endeavour
- Teacher training
- Collaboration and community building

Scientix has taken the first step to develop a European science education community. The INQUIRE project was represented at the conference by Julia Willison and Suzanne Kapelari. As the Inquire project was at an early stage, presentations included a 5 minute oral

Supported by





introduction into INQUIRE for the plenary session alongside the management of an INQUIRE stand which presented an INQUIRE poster and other posters to inform participants about the STEM education projects that INQUIRE partners had been involved in to date. A short 'inquiry based activity' was used to attract visitors and to start a conversation about INQUIRE goals and content. The Conference was well organised and the INQUIRE stand experienced a continuous flow of visitors. Coffee breaks were used to contact representatives from other EU FP7- and Comenius-Projects.

The Scientix conference was particularly helpful for INQUIRE personnel, as much was learnt about lessons learnt by other projects, outcomes projects produced and goals that were being aimed at. Links to the two other projects, PROFILE and PATHWAY, which were running in the same time frame as INQUIRE, were established and were sustained through the project timespan.

### **1. 3. ESTABLISH Teacher Conference**

Teaching at the heart of learning

7-9 June 2012, Dublin, Ireland

<http://www.establish-fp7.eu/establish-teacher-conference-2012-en>

The 5th biennial Science and Mathematics Education Conference (SMEC 2012) took place in Dublin City University, Dublin, Ireland. With the chosen theme of 'Teaching at the heart of learning' this was a joint conference of the Science and Mathematics Education Conference (SMEC) series and the FP7-funded project ESTABLISH.

This conference provided the 240 delegates with a variety of opportunities to address issues pertaining to the teaching and learning of science and mathematics at, and across, all educational levels, in particular; Classroom Practice; Evaluation & Assessment; Teacher Education and Reflective practitioners. As part of the ESTABLISH project, all of the eleven partnering countries brought up to 20 secondary level science teachers to share, discuss and exchange ideas about how to teach and assess using inquiry in the science classroom.

Partners Alla Andreeva (MSU) and Doris Elster (UniHB) ran a workshop on: *The INQUIRE Project and Some Ideas for Activities Related to Biodiversity and Climate Change*.

### **1.4. BGCI's 8th International Congress on Education in Botanic Gardens**

12-16 November 2012, Mexico City, Mexico

<http://www.bgci.org/education/bgcieducationcongress/>

Supported by





Several Inquire Partners attended this key educational conference for education in Botanic Gardens, held every 3 years. This conference, from 12-16 November 2012, was held in Mexico City and hosted by the Institute of Biology Botanic Garden at UNAM, a world renowned organisation of excellence in plant conservation, education and botany. 150 delegates from 31 countries attended. The theme of the Congress was Education and the Global Strategy for Plant Conservation. During a stimulating week of key note speeches, presentations, workshops and posters, delegates examined how their education work can support the implementation of all 16 targets of the GSPC.

Several Inquire partners attended the conference from BGCI, KEW, NBGB, UAH and CISC, NHM, BORDEAUX and MSU to showcase the INQUIRE project and the collaborative training initiatives that are at the heart of the project. This was an opportunity for partners to experience educational delivery and research on plant conservation and biodiversity management in the global context. For the other participants in the conference the Inquire workshops provided an excellent stimulus to broaden interest in IBSE pedagogy and an opportunity to try out, at first hand, IBSE activities that they could adapt in their own Gardens worldwide.

### **1.5. INSTEM Conference,**

19-20 March 2013, Amsterdam, Netherlands

<http://instem.tibs.at/>

INSTEM is a Comenius network (2012 – 2015), which brings together the experience and learning of a wide range of projects in European Science and Mathematics education. INSTEM links research, practice and policy in a unique way. Its main goal is to promote inquiry based teaching, to gather innovative teaching methods and to raise students' interest in science as well as offering them careers information in STEM subjects, in order to respond to global challenges in teaching and gender imbalances in STEM education.

The INSTEM project was developed from the idea that projects in STEM education should talk to each other and share their ideas. It grew out of the informal group ProCoNet (Project Coordinators' Network), which was formed in 2011. INSTEM and ProCoNet work closely together and provide a single channel to communicate with European Union directorates and other policymaking organisations. INSTEM also acts as an integrated provider of STEM education materials and techniques, based on the work of previous projects. It works with

Supported by





national teams on the implementation of good science and mathematics teaching, using inquiry as a starting point whilst being open to all innovative and effective approaches.

INSTEM will initially develop accessible synthesis reports and briefings, and will also provide regular updates on progress in STEM education, based on state of the art information from researchers, practitioners and policymakers in the field. It goes beyond previous 'clearing-house' activities by taking a critical, reflective and inclusive approach to the various strands of practice and development work carried out in projects across Europe.

The co-ordinator of the Inquire project is a partner in INSTEM.

### **1.6. SECURE Conference**

24 -25 October, Mechelen Belgium

<http://www.secure-project.eu/>

The SECURE project focused on a comparative study of MST curricula for 5, 8, 11 and 13 year old students in 10 European countries. The conference provided an insight into a selection of project related findings, as well as an opportunity to learn about other EU projects in the field of MST education. Suzanne Kapelari made a 30 minute presentation on the INQUIRE project.

The SECURE project focused on a comparative study of MST curricula for 5, 8, 11 and 13 year old students in 10 European countries. The conference provided an insight into a selection of project related findings, as well as an opportunity to learn about other EU projects in the field of MST education. Suzanne Kapelari made a 30 minute presentation on the INQUIRE project.

### **1.7. 5<sup>th</sup> Global Botanic Garden Congress**

20-25 October 2013, Duedin, New Zealand

<http://www.5gbgc.com/>

Over 300 delegates from 43 countries attended the 5th Global Botanic Gardens Congress (5GBGC) in Dunedin, New Zealand. The congress was held in partnership with the 6th Biennial Botanic Gardens of Australia and New Zealand (BGANZ) Congress. The Congress included 17 plenary talks, 12 organised symposia and over 80 contributed papers.

All **plenary sessions** were recorded and videos are being made available on the 5GBGC YouTube channel. [Click here](#) to view the plenary talks.

Supported by





The wide range of issues affecting botanic gardens were discussed through a series of excellent presentations and workshops and the future of botanic gardens was the topic of an open forum. A number of Congress 'talking points' provided a focus for the Congress sessions and corridor chats. New initiatives launched at the Congress included the [International Plant Sentinel Network](#) and the [new website for the Ecological Restoration Alliance of Botanic Gardens](#).

Three Inquire partner personnel attended the Congress; Costa Bonami (MTSN), Asimina Vergou (BGCI) and Kristina Buerke (NHM), who ran an 'Inquire' stand demonstrating a number of experiments. It was a valuable experience, reaching not only botanic garden educators but many Botanic Garden Directors and senior management from Botanic Gardens. This meant that Inquire personnel could showcase innovative educational pedagogy and activities that could be employed in Botanic Gardens world-wide.

### **1.8. The ProCoNet Network**

The European Union framework Program 'Science and Society' has been running for 7 years. It is essential that projects that are funded from this funding stream draw on the wealth of expertise and knowledge available from others previously and / or currently funded. The PROCONET network was founded to perform this function. PROCONET was also established to ensure that funded projects refrain from being competitive and collaborate fully with one another, pooling resources where appropriate and acting as a community of practice sharing expertise and knowledge.

For the INQUIRE project these meetings were extremely valuable as they provided a framework for collaboration, offering both time and space for sharing experiences in excess of any that national, international or project specific conferences could offer.

One important outcome of PROCONET activities was that the INQUIRE coordinating Institution (LFU) is now partner in the INSTEM project which will support INQUIRE implementation activities post project (from November 2013).

Recognising the value of this network, the collaborative group are trying to get funding for maintaining this network going forward. So far the PROCONET network has relied on enthusiastic supporters and coordinators who are currently running projects. Those with the most expertise, who have finished projects already, can unfortunately not often attend meetings as there is no funding for their travel. However, precisely these people prove to be the most valuable for the network, as their experience and knowledge is of

Supported by





immeasurable value for those who are in the early stages of running a project. Providing visibility for final outcomes and lessons learned from projects, prevents new project coordinators from reinventing the wheel and making costly and /or time wasting mistakes.

It should be in the European Commission's interest to get the most out of all funded projects. The PROCONET network is a very valuable asset and it is strongly recommended that the EU commission provides a mechanism to maintain PROCONET and fund selected past project coordinators who can offer expertise and advice to new projects.

The INQUIRE coordinator took part in the following PROCONET meetings:

1. Kick off meeting Brussels: March 2011
2. Meeting in Brussels: June 2013
3. Meeting in Brussels: September 2013
3. Meeting in Brussels October 2013

See minutes attached to this file below.

## **2) INQUIRE at International Education Research Conferences**

To support educational reform, it is important that it is not only the EU project community that is informed about what is going on in practice based educational projects. The international education community as a whole and the science education research community in particular, need to be equally exposed to INQUIRE dissemination activities.

Education research conferences not only bring researchers together, but often important key players / stakeholders in the field, as well as teachers. These events provide a most valuable forum for the INQUIRE MB to present outcomes and findings of the INQUIRE projects from an overall project perspective. INQUIRE partners were asked to present INQUIRE findings and outcomes from their organisational as well as national perspective. Travelling to these events was discussed in Annexe I of the Grant Agreement, ps. 50 and 90.

Supported by





www.inquirebotany.org

The Inquire MB regards science education researchers to be a particularly valuable target group for INQUIRE related issues, in order to fulfil INQUIRE objectives (Annexe 1 of the Grant Agreement p.4). It is particularly important that MB and INQUIRE partners maintain dissemination about INQUIRE at these meetings /conferences post completion of the project, as many INQUIRE outcomes will become more visible at a later date and will need to be further discussed and promoted.

### **2.1. ECSITE Annual Conference**

26- 28 May, 2011, Warsaw, Poland

[http://www.ecsite.eu/activities\\_and\\_resources/annual\\_conferences/ecsite-annual-conference-2011](http://www.ecsite.eu/activities_and_resources/annual_conferences/ecsite-annual-conference-2011)

The 2011 Ecsite Annual Conference took place Copernicus Science Centre, Warsaw with 850 participants. M. Camanino, Citta della Scienza, Naples Italy and Suzanne Kapelari jointly ran a workshop called: "Planning together: The Best Teacher Training in Science Centres" on the 28<sup>th</sup> of May (see Programme:

[http://www.ecsite.eu/sites/default/files/final\\_programme\\_2011\\_0.pdf](http://www.ecsite.eu/sites/default/files/final_programme_2011_0.pdf) p.53)

### **2.2. FIBONACCI Conference, Leicester**

Bridging the gap between education research and practice

26 - 27 April, 2012 University of Leicester, UK

<http://fibonacci.uni-bayreuth.de/resources/events/leicester-conference-2012.html>

The Fibonacci Project European Conference was held at the University of Leicester in April 2012. Delegates came from 28 countries in Europe and there were also several delegates from outside the EU. The conference was organised by the School of Education, University of Leicester in collaboration with the Fibonacci European coordination team (La Main à la Pâte - French Academy of Sciences, École Normale Supérieure Lyon, École Normale Supérieure Paris). It explored strategies for improving inquiry-based science and mathematics through research and evaluation of innovative practice.

The main goals of the conference were to:

- Review the meaning of inquiry in mathematics and science education (IBMSE),
- Present research and practice of IBSME,
- Explore the relationship between IBSME theory, research and practice,
- Consider strategies for integrating inquiry across curricula,

Supported by





- Consider how the external environment of the school could be used to promote IBSME,
- Explore methods for carrying out evaluation and research in schools and classrooms in IBSME, and
- Promoted networks of cooperation for IBSE.

The INQUIRE project was represented by three people: Asimina Vergou (BGCI), Elaine Regan (KCL) and Suzanne Kapelari (LFU): a 20 minute oral presentation was given on the preliminary results of the INQUIRE project by Regan and Kapelari. About 50 people attended this presentation and the presentation received very good feedback. A scientific paper on the topic was published on the Conference website:

Paper [Download 9. Initiating IBSE science education in outdoor learningINQUIRE Kapelari.pdf](#)

The conference offered an opportunity to not only inform others about INQUIRE, but to get a good insight into recent project development and delivery experiences of the Fibonacci partners. This knowledge was helpful to the INQUIRE MB as 3 Inquire partner personnel were able to gain experience and reflect jointly on their experiences.

### **2.3. New Perspectives in Science Education**

14 - 15 March 2013, Florence, Italy

<http://conference.pixel-online.net/npse2013/>

The second edition of the international conference 'New Perspectives in Science Education' had the overall aims of promoting transnational cooperation and sharing good practice in the field of innovation for Science Education. The conference also offered an excellent opportunity for the presentation of previous and current projects in the science field.

Suzanne Kapelari (LFU) gave a presentation on the overall perspective of the INQUIRE project: *Inquiry-Based Teacher Training for a Sustainable Future*.

Doris Elster (UniHB) gave a presentation on: *Inquire for Students - How to Promote Inquiry Based Learning?*

<http://conference.pixel-online.net/npse2013/acceptedabstracts.php>

Supported by





#### **2.4. ESERA Conference**

'Science Education Research for Evidence-based Teaching and Coherence in Learning'

2-7 September 2013, Nicosia, Cyprus

<http://www.esera2013.org.cy/>

The theme of the conference underlines particular aspects of great relevance in contemporary science education research, i.e. the need to reflect on different approaches to enhancing our knowledge of learning processes and the role of context, designed or circumstantial, formal or non-formal, in learning and instruction.

The conference reached 1200 participants, from all over the world. INQUIRE did not organise a project related session, as experience has shown that these sessions are mainly attended by project partners. Instead Inquire went for three presentations in three different sessions, where presenters could directly reach c60 people. The presentations received very positive and valuable feedback. Due to health issues, the first author was unable to attend, and Suzanne Kapelari (co-author) presented the work.

Elaine Regan (KCL), Suzanne Kapelari (LFU), Justin Dillon (KCL), Asimina Vergou (BGCI); Julia Willison (BGCI) Gail Bromley (KEW), Costantino Bonomi (MTSN): Botanic garden and natural history museum educators understanding of inquiry-based science education .

Jakob Egg (LFU), Suzanne Kapelari (LFU), Justin Dillon (KCL): Professional learning communities/communities of practice implementing inquiry based science education (IBSE) in- and outside the classroom.

Doris Elster (UniHB): Inquiry in pre-service science teacher education

See:[https://dl.dropboxusercontent.com/u/3116624/ESERA\\_2013\\_Programme\\_Book\\_Printed\\_21Aug2013.pdf](https://dl.dropboxusercontent.com/u/3116624/ESERA_2013_Programme_Book_Printed_21Aug2013.pdf)

#### **2.5. ECER Conference**

Creativity and Innovation in Educational Research

10-13 September 2013, Istanbul, Turkey

<http://www.eera-ecer.de/ecer2013/>

Supported by





The European Conference on Education Research (ECER) is the main annual Education Research Conference in Europe and has c2000 participants. The private Bahçeşehir University in Istanbul hosted the event this year.

Suzanne Kapelari (LFU), Gail Bromley (KEW), Julia Willison (BGCI), Asimina Vergou (BGCI), Justin Dillon (KCL), Elaine Regan(KCL):

Professional Learning of Teacher Educators in the Development of Inquiry-based Teacher training courses

Network 01. Continuing Professional Development: Learning for Individuals, Leaders, and Organisations.

See: <http://www.eera-ecer.de/ecer-programmes/conference/8/contribution/21783/>

### 3) INQUIRE at European Commission Public relation Events:

#### 3.1. Science it is a Girls Thing: Opening Event

21 June, 2012, Brussels, Belgium

At this launch event in the European Parliament, young people had the opportunity to pose questions about careers in science and research to European Commissioner Máire Geoghegan-Quinn, Members of European Parliament and several women who are considered role models in science. Outside the Parliament, hands-on science activities were demonstrated to stimulate an appetite for science in young visitors. INQUIRE project personnel took part in the activity session, presenting project related hands on activities at their exhibition stand. These proved to be very successful with a wide range of participants.

The event was well organised and the INQUIRE stand was continuously populated with people from different age groups and from a range of European countries. The activities presented, aimed at engaging participants in posing questions and finding evidence to justify their beliefs. Charlotte Guggenheim, the event organiser, informed us that the activities and demonstrations were exceptionally well received and that the stand demonstrated well the value of the INQUIRE project.

Brussels Botanic Garden (NBGB) and University Innsbruck Botanic Garden (LFU) participated in this event. We consider our participation in this particular event very valuable for the project, as many people who may not have heard about the INQUIRE

Supported by





project were exposed to its outcomes and additionally gained an insight into the exciting work done by Botanic Gardens.

Learning about plants is not always very popular amongst young people however we know from research findings that girls in particular are most interested in health and social issues when learning about science. Therefore activities on the Inquire stand included the topics of medicinal plants and the role plants play in climate change as motivational concepts to encourage girls to learn more about science; many girls visited the stand and became engaged in the activities.

### **3.2. INQUIRE European Commission Open Day**

4 May 2013, Brussels, Belgium

Under the theme of the European Year of Citizens, the Europe Day 2013 offered all citizens the opportunity to find out about the actions of the European Commission. This event took place in the Berlaymont Building and at the Schuman roundabout. The European Council, Parliament and Commission organized the Festival of Europe. Visitors could visit European institutions, attend discussions with high-level speakers or gather information about the EU, as well as contact people working for the Commission or in European Commission funded projects. The event was well organised and well marketed to the public. Thousands of interested EU citizens visited the main EU institutions in Brussels.

On Saturday 4 May 2013, the JRC site in Ispra opened its doors to the public once more. The theme of 'Science for You' is in line with the European Year of Citizens 2013. The programme not only gave an insight into the work and role of science laboratories but provided interactive experiments and activities to demonstrate what takes place at the European Commission science research organisation. INQUIRE was one of the projects that had a stand, demonstrating interactive experiments on the Topic of 'How do plants grow'. It was an exciting experience for the four partners who manned the stand: National Botanic Garden Belgium (NGBG; Koen Es), Botanical Gardens Bordeaux (BORDEAUX, Rejane Limet), Royal Botanic Garden, Kew (KEW, Gail Bromley) and University Botanic Gardens Innsbruck (LFU, Suzanne Kapelari). It was a great opportunity to inform many people about the INQUIRE goals and objectives and to provide them with first-hand experience in how inquiry based learning is provided at European Botanic Gardens.

Visitors enjoyed engaging in the activities and the stand was continuously populated with people asking questions, observing the mystery of CO<sub>2</sub> gas and learning about

Supported by





[www.inquirebotany.org](http://www.inquirebotany.org)

photosynthesis in an 'exciting' way. Our thanks go to Maria Korda, who was present for the whole day and supported the Inquire team's work most efficiently.

Supported by





#### **4) Minutes From ProCoNet Meetings (Peter Gray)**

**2<sup>nd</sup> ProCoNet workshop: A vision for STEM education 2014-2020**

**11/06/2013 10.00 am – 16.00 pm**

**Mid-Norway Office, Avenue Palmerston 3, Brussels**

#### **Discussion document: Systemic learning and STEM education**

##### ***The Context***

We are now standing on a bridge between the successful projects and partnerships initiated under FP7/LLP, and the new territory defined by Horizon 2020, Erasmus for All (EFA, or YES Europe) and the Responsible Research and Innovation (RRI) agenda. There will be various suggestions as to how EU actions should proceed in STEM education, ranging from the zero option, through business as usual, to more radical options. This document presents an argument for a more radical approach, based on the learning from the many FP7/LLP projects associated with ProCoNet and the INSTEM project. We will present a preliminary report on this learning at the workshop – this vision statement is based on the experience of many projects and extensive discussions with project members.

We recognise that STEM education has not yet found a definitive place within either Horizon 2020 or EFA. It is necessary, however, to set out a vision in advance of definitive work programmes, calls and proposals, in order to provide a basis for discussion, either to inform work programme development, or to build projects and consortia within future parameters. This is, of course, a highly speculative document and all comments, criticisms, counter arguments and positive suggestions are welcome!

Our vision includes elements of:

- Continuity
- Expansion
- Efficiency
- Sustainability
- Diversity

We explain these, and the structure of a possible project, below.

**Supported by**





### ***Continuity***

We recognise that many useful materials and resources have been created under FP7/LLP, and it is sensible to reuse and renew these over the next decade. We also recognise that projects funded under FP7/LLP will gradually come to the end of their funding, or have already done so. There needs to be a continuing support and dissemination structure for these materials and resources. A number of existing projects have created repositories, and it would be useful to map these and to lay out a plan for continuing to host these and to further increase their usefulness.

### ***Expansion***

The success of existing projects should be seen against the size of the problem. Europe has approximately 75 million students across all school levels. Projects have done well in reaching a significant proportion of these, and it here, would be useful to establish a baseline figure. Nevertheless, expansive action is required to further combat disengagement, under-achievement and education disadvantage across the whole student population, including those currently excluded from education due to socio-economic crises and discrimination.

### ***Efficiency***

The funding applied to STEM education under FP7/LLP has been relatively generous in relation to the limited role of the EU relative to national education systems. In addition to the continuity issue identified above, considerations of financial efficiency dictate that maximum value should be obtained from the work of current or completed projects. This involves more than just continued availability of their outputs on the web. The philosophy and theory of inquiry based STEM education has been thoroughly tested and further developed by projects, but integration into national systems has often been problematic, despite widespread acceptance of inquiry. Efficiency in obtaining value from this work demands that integration between European aspirations and national systems should be a strong focus in future projects.

Supported by





### ***Sustainability***

All FP7/LLP projects have planned for sustainability in their work, but it is inevitable that the scope of sustained action is limited in the absence of ongoing funding. There are several alternatives to the existing funding model. It is important to emphasise that education projects, especially CSAs or MMLAPs, are not comparable to scientific or technological projects where a defined problem is solved by an innovation or discovery. Education systems are dynamic entities with recurring challenges. Furthermore, success in education projects depends on relationships built up over time and sustained by continuing exchanges. The current system makes these relationships difficult to sustain. We are therefore proposing alternative models in our vision.

### ***Diversity***

In order to maintain progress in STEM education, it is necessary to move away from a single approach based on inquiry, to an approach incorporating all available education enhancements together with a much more positive engagement of students themselves in the process. Expert opinion, and a considerable evidence base, points to teaching quality as a unifying concept, both in STEM and in all other education topics. We also recognise that teaching as a profession is often challenged by circumstances, and other avenues should be explored in order to complement enhanced teacher quality with positive student engagement. In turn, this requires that we take the views of students seriously and take action to empower them within education systems. We can no longer regard education as a means of social control, but must develop it as a means of societal survival.

### ***Challenge***

Challenging the education systems of Europe to produce more STEM graduates is important, but should not be the ultimate aim of education systems. We see an opportunity in the societal challenges of Horizon 2020 to refocus education systems on addressing these challenges now, increasing scientific literacy but in a wider and more democratic way than in the past. The concept of RRI, and increasing interest in social innovation, create an environment in which radical action is encouraged. On the other hand, education systems have considerable inertia and it is not possible to act effectively without the cooperation of national systems, authorities and actors. Using STEM education to address societal challenges can connect national systems to a wider European agenda without exacerbating political differences.

Supported by





### ***The vision***

We propose a Knowledge Alliance on STEM education (KASE), involving a wide range of stakeholders, upstream in the formation of the project rather than downstream. This would involve some seed funding and effort, but would eliminate the paradox whereby stakeholder (and especially public) engagement is valued, but can only be solicited after the fact, in other words, once an academic or institutional consortium has been formed and has obtained funds to support such solicitation.

The aim of KASE would be to engage young people in science through a three track approach:

**Track one: standards** couples existing resources to a permanent institution to coordinate STEM education research and support. This could be the European Academy for Science Education as proposed by the PATHWAY project, which is currently working on the idea<sup>1</sup>. A specific focus of EASE would be teacher professional development, implementing a European framework for quality teaching and learning standards in STEM education.

**Track two: continuation** would be to utilise existing knowledge and resources about quality teaching in STEM subjects across a wide network of partners with a dual function – spreading innovative teaching and learning **and** participating in WESEARCH –

**Track three: wesearch** is a completely new initiative within KASE designed to involve young people, in partnership with other stakeholders, in addressing H2020 challenges. The knowledge alliance partners, including industrial, civil society and public sector organisations as well as academic institutions, would support a range of challenge based initiatives, taking account of scientific practicalities and the needs of national STEM curricula.

### ***Mobility***

The emphasis on mobility in EFA would be realised through school-university and school-industry exchanges. For example, teachers would be enabled to update their science content knowledge in cutting-edge university departments, whilst university students would hone their teaching and communication skills through work on school-based projects.

---

<sup>1</sup> A workshop to discuss the EASE will take place in Crete 30 June-3<sup>rd</sup> July 2013.

Supported by





It should be emphasised that the individual components of this initiative are all well-proven ideas, for example the involvement of engineering and science students in La main à la pâte, and the involvement of industry in ESTABLISH, SAILS and InGenious.

### ***Building the project***

This project will start in a different way, by first creating a working group. This group will agree a workplan, timeline, milestones and set up the project website and sharing tool. Participants will have their own pages, which will outline their contributions, resources and tasks. There will be no work packages as such. The website will be used to develop the various elements of the project in a process of co-creation, against set milestones and within an overall EU contribution fixed in advance.

A separate scientific working group with stakeholder representation will develop an initial suite of socio-scientific research themes, based on H2020 challenges and designed to promote interdisciplinary learning. The project will encourage further themes to be developed from work carried out by participants.

Because education is essentially a local activity with national implications, the main work of the project will be carried out in place-based clusters, adapted to available needs, resources and knowledge. Clusters will involve schools, other education providers, universities, civil society, public sector organisations and industry as appropriate. We anticipate over 200 participants on the basis of previous project experience together with new partners added for specific purposes or on the basis of their potential contributions. Our initial target will be to involve a minimum of 1000 schools and one million students, with the eventual involvement of at least 50% of schools in the MS and other participating countries.

There will be no deliverables. The emphasis will be on progress towards targets. Progress reports from participants will be delivered at specified intervals and will be publicly available on the website, as will all project documents. Indicators of progress, and suitable instruments where necessary, will be put forward by the working group, and agreed by the initial group of participants.

A parallel scientific research project will set up a large-scale longitudinal study to measure the impact of the project on a continuing basis. This will involve an external consortium gathering institutions with appropriate experience and skills, and using state of the art data collection and analysis techniques.

Supported by





All research material will be published on the project website and in the project's own e-journal. We will encourage the use of video in describing results and a section of the website will host video reports from participants. The project will be entirely open access other than sensitive financial and management information.

### **Students in the project**

Students will be encouraged to form their own work groups and these will have partner status. E-portfolios of project work will enable assessment and recording of contributions. The project e-journal will also publish articles created by students in the course of individual research projects.

### **Public engagement**

Public engagement will be facilitated by the school-based nature of the project, since parents and careers can be drawn in through students. An additional feature will be that only one project will be set up and funded, avoiding the confusion and initiative fatigue created by having multiple projects working on the same theme. At the same time, the devolved nature of the activities actually carried out will stimulate local interest and the formation of learning communities around the project.

### **Case study - bees**

Bees provide a useful example of a scientific theme following recent EU debates on pesticides and the decline of the bee population. Expert consultation reveals that little is known about bee ecology, yet the role of bees in pollination is crucial to food security and sustainable agriculture. Although there are technical problems to overcome, work on bee ecology is eminently suitable for a large scale, school based research programme covering the whole of Europe and extending in time for at least the duration of H2020.

### **Management structure**

The project will have national management boards and an international board. The local clusters will have their own working groups and these will have a high degree of autonomy. Each scientific theme will have a sub-group responsible for monitoring progress and problem solving. The scientific working group will report on progress against H2020 challenges, with appropriate use of target setting and indicators.

Supported by





### ***Financial issues***

Many of the project activities will be self-funding through being part of everyday school activities. However, funding will be necessary for mobility actions within the project, overall administration, some dissemination activities including conferences etc, and for teacher professional development.

We anticipate a total budget of EUR 400m over the six years 2014-2020. Seed funding would be made available through savings made on current projects which have been completed inside their requested EU contribution, such as S-TEAM.

### **3<sup>rd</sup> ProCoNet workshop: Revisiting STEM education in Horizon 2020 25/09/2013 10.00 am – 16.00 pm**

**Mid-Norway Office, Avenue Palmerston 3, Brussels**

#### ***Agenda:***

10.00-10.30 welcome and introductions, current developments

1030-1115 The SECURE project: Brief presentation of findings and discussion (Wim Peeters & Job de Meyere)

1115-1130 Coffee break

1130-1230 The future of STEM education in H2020 – discussion of current draft programmes and presentation of EERA<sup>2</sup> position paper (Peter Gray) – we also have time for EC presentations during this session

1230-1330 Lunch

1330-1430 Commercialisation, RRI, and H2020: STEM education as a special case (Peter Gray)

1430-1440 Short break

---

<sup>2</sup> European Educational Research Association

**Supported by**





1440-1600: The way forward for STEM: Changing the science-society relationship? The SiSCatalyst strategy (Tricia Jenkins)

### Participants

Alexa Joyce (Ingenious, EUNSchoonet)  
Peter Gray (ProCoNet, INSTEM) - chair  
Michela Insenga (INSTEM, SiSCatalyst)  
Martin Lindner (INSTEM, SAILS, SciCamp)  
Suzanne Kapelari (INSTEM/INQUIRE)  
Maria Karamitrou (DG Research)  
Tricia Jenkins (SiS-Catalyst)  
Wim Peeters (SECURE)  
Job De Meyere (SECURE)  
Valdimir Garkov (DG EAC)  
Francesco Cuomo (Biodidaktik, Halle, & TRACES)  
Stefan Schaaf (KMK, Bonn)

### Background

This workshop will continue from our previous meeting on 11<sup>th</sup> June and will revisit the issue of STEM education within Horizon 2020 and in other forthcoming programmes. It will be informed by a number of events subsequent to that meeting, including:

- Meeting of European Educational Research Association network conveners in Berlin to discuss Horizon 2020 (13<sup>th</sup> June 2013): this produced a draft position paper, which will be revised following the EERA conference in Istanbul (9-13 Sept. 2013);
- Meeting of UK science institutions and funding bodies concerning access to STEM subjects at university level (17/06/13): this provides a possible model for cross-sectoral collaboration in other member states, and is being followed up with another meeting on 1<sup>st</sup> October to discuss possible UK policy recommendations;
- Meeting of the Pathway project and the European Physical Society to discuss formation of a European Science Education Academy with an expert panel in Crete (1-3 July, 2013);
- Participants' own reactions to various Horizon 2020 documents, which have appeared in the intervening period, including draft work programmes;
- The revised INSTEM synthesis and state of the art reports;
- The STIMULA conference in Zaragoza (18 Sept. 2013);
- Progress on the WESEARCH project

Supported by



### ***Purpose of meeting***

At this stage, the shape of the first wave of Horizon 2020 calls is beginning to emerge. A number of opportunities for STEM education appear to exist, both as specific draft calls, e.g. within 'Inclusive, Innovative and Reflective Societies' and also within more specialised Scientific and Technological topics. The meeting provides an opportunity to apply the learning from current and completed projects within FP7 and elsewhere to future activities in STEM education. It will also enable participants to discuss how this learning can best be disseminated, including a discussion of forthcoming events and how these could take forward an open and collaborative approach to the long-term future of STEM education and research. These include:

- Follow-up meeting of UK science institutions on access to STEM: London, 1<sup>st</sup> October.
- Proposed Gender Brainstorming event, Brussels, 18<sup>th</sup> October
- SiSCatalyst conference on controversies and dilemmas in science communication: Lodz, 23-26 October
- SECURE Conference, 24-25<sup>th</sup> October, Mechelen
- IOSTE conference and brokerage event: Antalya, 30<sup>th</sup> October – 1<sup>st</sup> November
- EC Public Engagement event for project coordinators, Brussels, 6-7 November
- ProCoNet project week, Brussels 25-29<sup>th</sup> November
- PRIMAS conference, Brussels, 28<sup>th</sup> November

A further meeting in this series is provisionally planned for 27<sup>th</sup> November as part of the ProCoNet project week.

(Appendix: Pre-meeting document)

The Context of STEM education in H2020 – Inclusive and innovative societies

If Horizon 2020 = innovation = research applied to business, how can education be mainstreamed within the programme, since education is the last state industry within Europe? The digital learning agenda is mentioned on pp.131-132 of the current draft call, and it is reassuring that "...the longer term perspective remains the empowerment of young people with the full set of critical 21st century skills" (p.132).

Supported by





Of course, there is the precedent of MOOCs, Coursera, Lectica<sup>3</sup> and other online offerings emanating from prestigious US universities. Is this the way forward? Can this be combined with the development of adult education, as proposed in the draft WP (p.153)?

Within the Inclusive Societies work programme, the topic of ‘innovative pedagogies’ has replaced the focus on inquiry-based learning within FP7. However, the underlying theme remains the same, namely, that encouraging interest in science depends on improving pedagogical methods. The evidence for this assertion is not strong, since the kind of long-term research necessary to establish the link between pedagogy and career development has not been possible within the regime of short-term research projects characteristic of national systems in the member states.

This is an opportunity for EU leadership, since improving synergy between schools, tertiary education and economic activity can only enhance prospects for economic growth. A number of issues are in play here:

- Teaching quality
- Young people’s rights for self-determination
- The rigidity of current school systems, in terms of subject choices
- The relationship between curriculum, assessment and pedagogy

With these factors in mind it is timely that there should be a call on “Boosting the attractiveness of scientific and technological careers” (pp.147-148) which takes into account a wide range of factors

---

<sup>3</sup> <https://www.lectica.org/visitors/about.php>

Supported by





www.inquirebotany.org

## **4<sup>th</sup> ProCoNet meeting: Repositories in STEM education, Responsible Research & Innovation and Horizon 2020**

**27/11/2013 10.00 am – 16.00 pm**

**Wien-Haus, Avenue Tervueren 58, Brussels  
Meeting report**

### ***Participants***

Emilio Balzano (TRACES, INSTEM)  
Louise Bindel (SAILS)  
Franz Bogner (Pathway)  
Christian Gary (Kinderbüro, Wien & SiSCatalyst)  
Agueda Gras-Velasquez (Scientix 2, EUNSchoonet)  
Peter Gray (ProCoNet, INSTEM) - chair  
Karoline Iber (Executive director, Kinderbüro, Wien)  
Michela Insenga (INSTEM, SiSCatalyst)  
Martin Lindner (INSTEM, SAILS, SciCamp)  
Maria Korda (DG Research)  
Maria Karamitrou (DG Research)  
Sofoklis Sotiriou (Pathway)

### ***Introduction***

The purpose of the meeting was to discuss the role of repositories or other web-based systems in sustaining and disseminating the products of EU-funded projects in STEM education. The role of repositories is affected by four main issues:

- 1) Interaction between potential providers of repository services and the individual projects responsible for creating innovative resources
- 2) Interaction between European meta-level repositories (Scientix, Pathway/European Science Education Academy and those established at national level (e.g. National Aggregator in Greece, [www.schoolscience.co.uk](http://www.schoolscience.co.uk), Times Educational Supplement)

**Supported by**





3) Language and translation

4) Teachers' needs and level of demand

Repositories provide opportunities to maximise use of previous project findings and best practices. The meeting heard from Prof. Franz Bogner and Dr Sofoklis Sotiriou regarding the proposed European Science Education Academy (ESEA). This is effectively a repository building on work done in the Pathway project, using Pathway criteria for best practice in IBSE resources and the related teacher professional development (TPD) and dissemination activities.

The ESEA documents the innovation process in education and progress in the delivery of continuous professional development with teachers and ensures that implementation has common approaches among projects. It aims to become the main repository for distributing STEM education resources and materials in Europe. Following the end of the Pathway project in December 2013, there are two follow-up projects (European Physical Society will provide financial support for the next 2 years). Also, co-funding will be possible in the frame of H2020. The most important contribution of the academy will be the creation of a community, a network of practitioners to share visions and best practices. A sustainable model would be possible but requires the involvement and willingness of this community. The meeting discussed the possible overlaps between this initiative and Scientix 2, but both project leaders emphasised that there was no problem, since the roles of the two platforms were identifiably different. Possible cooperation between the two organisations was discussed, and it was pointed out that the Academy has a large science expertise based knowledge that is missing in Scientix 2. The academy is more based on national content, whilst Scientix 2 includes only content from international projects, which are partially (or completely) publicly funded

Dr Agueda Gras-Velasquez then reported on the Scientix 2 project, building on Scientix 1 but with an increased focus on liaison between national and EU levels of STEM project activity. Within Scientix, teachers have a certain degree of freedom to upload their materials and share tools. There are some problems regarding the "certification" of the materials and quality marks, but the Scientix brand is well established and provides confidence for teachers.

Supported by





There are three very clear components within Scientix 2:

- a large teacher panel (c. 90 teachers)
- national contact points/persons, liaising with organisations that run STEM programs
- facilitators for further interaction between projects, teachers and other stakeholders

One of the main aims of Scientix has always been helping teachers to find materials and to access resources. The next Scientix conference will take place in Brussels on 24<sup>th</sup>-26<sup>th</sup> October 2014. It was agreed that the previous Scientix conference had been very useful and that this forthcoming event would be highly significant. There was some discussion of how it could be aligned with the forthcoming conference under the auspices of the Italian Presidency, which is intended to sum up the achievements of Science in Society. There is at present no information about dates for this event but ProCoNet members are pursuing further information with a view to actively participating.

### ***Other discussion***

One aspect emphasised within the meeting was the integration or alignment of the administrative side of EU STEM projects with a potential movement towards the use of inquiry and other innovative methods. It was felt that EU work in this area was valuable because it provided leverage for those in the 'movement' (primarily teachers, teacher educators and researchers) to initiate change at national level. Examples of this were provided, e.g from the SUN TPD project in Norway, the new national curriculum in France and changes to policy in Cyprus and Turkey. Whilst these changes might not be causally linked to EU projects, the presence of such projects in the policy space undoubtedly made a significant contribution.

There remains, therefore, a need to identify policy channels through which reforming movements, such as IBSE and the *young people as social actors* movement initiated by SiS-Catalyst, could focus their efforts. Teacher Professional Development provides such a channel, but we also need to involve organisations and stakeholders such as trade unions, parents and of course students themselves. However, results from INSTEM workshops indicate that students in particular do not take a strategic view and are, unsurprisingly, either focused on success in examinations or are, in some cases, disengaged from education generally. IBSE therefore needs to be promoted within a wider context of taking student opinion seriously whilst involving them in debates about teaching and learning methods.

Supported by



INSTEM findings indicate that, with the exception of SECURE and Primas, few projects have been able to gather significant amounts of data on student opinion regarding inquiry, nor, as Coordination and Support actions, do have they gathered substantial account of direct evidence about the effectiveness of IBSE. It is encouraging that ASSIST-ME, SAILS and FasMed, especially, are building evidence about the assessment of IBSE.

The meeting further discussed the role of the informal sector in providing feedback and in helping to promote this movement for cultural change in education. It was noted that H2020 has several call topics investigating the role of, and provision for, young people within the science-learning ecosystem. Future developments in this area might include the strengthening of university outreach and children's university programmes, and again this is something where Scientix 2 could have a coordinating role.

The central question remains: how to motivate teachers to change in the face of contradictory pressures. The role of EU funded projects as a counterbalance to other forces within the pedagogical field is significant, but they must align their messages to avoid confusion.

### **Budgets**

There was some discussion of funding for science education within H2020. MK indicated that from the EC perspective, this funding was at a comparable level to FP7. A figure of 0.5% of overall budget allocated to Responsible Research and Innovation (RRI) for H2020 projects as a whole had been mentioned at the Public Engagement Workshop in November 2013, and this could result in increased funding for science education if aggregated across projects. However, this was only a part of the RRI agenda, and projects would have to give careful consideration as to how all the dimensions of RRI could be addressed within proposals.

### What is meant by Open access?

At the moment, this mainly involves making peer reviewed journal articles and publications as widely accessible as possible, e.g. through payments to publishers, because the underlying research is publicly funded. The implications of open access are, however, somewhat wider since public engagement, for example, requires that the processes of research, and not just the outcomes, are made open and transparent. This is currently an emerging trend in 'open science' involving blogs and other e-media as a means of putting research processes into the public domain. ProCoNet is in favour of this trend despite the continuing insistence on rating academic quality through publications and citation indices,

Supported by



as seen e.g. in the UK funding regime. Even there, however, there is an increasing emphasis on 'impact', linked to public engagement<sup>4</sup>.

Teachers often do not have the inclination or the access channels to read peer reviewed articles, and therefore projects need to find the *right channels* to communicate with them within the open access frame. For example, the format of a "one package" findings document gathering data from many projects to be shared with teachers will work – as it provides the benefit of pulling out commonalities between project findings so to be consistent and not "throw" too much material at teachers. This, of course, assumes that projects have findings as such – often they have products rather than findings and it is still necessary to adapt these to local needs.

A big group of partners within a project will always come up with what they believe is best practice; there is a need to pull out the most important elements and reach agreement on what best practice is within that context, to avoid duplication and production of too much material – leading to information overload, especially for teachers/practitioners. There will be a need for better National policy involvement within EU funded project proposals in H2020, which Scientix is well placed to meet. There is equally a need to identify and involve *Policy Channels* – meaning, for instance, people who are designing and delivering continuous professional development programmes to teachers, or expert groups involved in curriculum design. This has been happening in Ireland, through EU funded projects holding conferences and meetings involving administration and governmental representatives (Ministry of Education).

There was discussion about getting a clearer picture of what is happening at National level, some of this is being done by INSTEM and Scientix 2 now has a clearer role in liaising between local, national and European levels.

Actions from the meeting

Next ProCoNet meeting: May 13<sup>th</sup> in Brussels

(Note an interim internal meeting was held on 14<sup>th</sup> January in Napoli as part of the INSTEM management board meeting)

Following from the Scientix workshop on 29<sup>th</sup> November, it was agreed that ProCoNet would help to distribute the dissemination toolkit and other outputs from the DESIRE and Web2LLP projects.

---

<sup>4</sup> See the recent presentation by Charles Forsdick (22/01/14) available on the SIS-Catalyst website



It was also agreed that ProCoNet would work (in collaboration with Scientix) on a calendar of events in STEM projects across Europe, including conferences of existing and newly-launched projects.

### **Acknowledgements**

Thanks to Chris Gary and the Wien-Haus staff in Brussels (inc. Michela Kauer, Andrea König) for arranging the venue. Michela Insenga enabled this report by writing comprehensive notes – thanks. And special thanks to our colleagues from DG research, Maria Korda and Maria Karamitrou for making valuable time to come to our meetings!

**Supported by**

