

Final Publishable Report



INQUIRE

**Inquiry-Based Teacher Training
for a Sustainable Future**





INQUIRE Project Final Publishable Report

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The following institutions are partners in the INQUIRE project:

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



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About the INQUIRE Project

INQUIRE was a three year project (2010 -2013), within the 'Science in Society' Programme of the European Commission, focusing on inquiry based science education and involving 17 partners in 11 European countries. The project was generously funded by the European Union under the 7th Framework Programme. Fourteen botanic gardens were involved in the project and individually developed and evaluated their own IBSE teacher training course. INQUIRE was coordinated by Innsbruck University Botanic Garden, Austria, with support from Botanic Gardens Conservation International (BGCI), King's College London, UK and the University of Bremen, Germany.

For more information about INQUIRE visit: www.inquirebotany.org



NOTE: The EU is not responsible for the contents of this publication



Summary

The EU FP7 INQUIRE Project was developed and implemented to support science literacy in Europe through teacher-training courses, focusing 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 education officers in informal education sites (botanic gardens, natural history museums etc).

Botanic gardens and similar Learning Outside the Classroom (LOtC) sites are inspirational locations that can provide training for teachers and educators on critical issues such as conservation of our natural resources and sustainability and threats to our future, in the form of 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 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 how teachers are supported to engage in alternative ways of science teaching. One current approach is the incorporation of 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 which 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 emphasise this key issue and Europe has already recognised 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 experience of IBSE.

The INQUIRE project and its 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

INQUIRE Courses

Aim: Help re-invigorate 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 a minimum of 60 hours of training, with a combination of full day sessions and self study. They promote the integration of learning in and outside the school classroom.

Achieved: 28 Pilot and final INQUIRE courses were 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 experienced IBSE in their school and in LOtC. The INQUIRE course manual has been published in 10 languages.



course over an extended period (60 hours plus) in which there was a real emphasis on reflective practice being developed by both course participants and Consortium Partners. This is in contrast to the short, sharp training sessions that are characteristic of many projects but which, although they may engage large numbers of participants, unfortunately do not engender real behavioural and attitudinal change among those participating.

INQUIRE course participants and Partners were a smaller cohort but were offered more intense and in-depth training and were also encouraged to develop an action research approach. This was evidenced in both the Quality Management Report and the External Evaluation. A good Community of Practice has also been created. All these outcomes improve the prospects for genuine sustainability of the project's future aims and objectives, as well as encouraging long-term and profitable collaborative work 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 that Botanic Gardens and natural history centres across Europe provide. The courses were piloted by Partners early in the project and, post-evaluation of the pilot course, a second course was organised. The project Partners used reflective practice and evaluation processes to analyse good practice and the impact and

effectiveness of the courses – with their course participants, through Consortium Partnership meetings and also through support sessions provided by the Quality Management team and Management Board. The courses were refined and improved iteratively through this process, resulting in enhanced courses with more polished delivery and better 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 common understanding of how IBSE can be facilitated in class as well as in botanic gardens and natural

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 4th Partner meeting in Lisbon, October 2012. The Final Quality Management Report (Deliverable D7.2) provides an analysis of participant and Partner feedback, which was very positive.



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 organised to support major developments i.e. establishing, revising and running the INQUIRE course, preparing for the INQUIRE conference and ensuring the sustainability of the courses.



Consortium Meetings

Aim: Bring Partners together to ensure work is delivered on time and to high standards and develop a Community of Practice among 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 were 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 the Consortium. 12 Management Board meetings held to plan and prepare Consortium meetings.



history museums. Sustainability was key to the project and this was achieved through the Community of Practice and by running the '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 national and international conferences, workshops, seminars and promotional events.

INQUIRE courses developed and implemented in 11 EU countries

Two sets of INQUIRE courses were delivered

across the project period. The pilot courses ran between September 2011 and July 2012 and the second phase, 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 engagement and exchange of best practice, Partners were able to refine and enhance their courses for the second phase. Overall the courses reached a total of 576 participants: 250 in the pilot courses and 326 in the second phase. Course participants included educators in LOtC sites, together with 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 drew on the 'Portfolios of Evidence' (PofE) and case studies submitted by Partners following the two sets of courses. These Partners' PofE, in turn, used the findings and reflections from participants on individual courses as well as the reflective practice of Partner course tutors and organisers. A change in both practice and attitude can be seen in these findings.

A Quality Management Plan has been implemented and supported

The Quality Management Plan was developed and agreed in the initial phase 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, wherever necessary, over the duration of the project. Regular support was provided throughout the project by both the QM team and the full Management Board, exemplified by the provision of Partner visits, support telephone calls, on-line communication 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 participant

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, on 9th-10th July 2013 and attended by 124 participants from 13 countries. The Final External Evaluation report, submitted in the final month 36 (November 2013) provided further evidence of the very positive project outcomes.

Development of a Community of Practice between Partners

The Consortium Partners quickly developed and maintained an excellent Community of Practice over the three years of the INQUIRE project. The success of this was, in part, due to effective 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 reinforced regularly through the five Partner meetings, Train the Trainers course and Final Conference held during the project. Many good friendships were established and the opportunities to share best practice face-to-face, discuss common problems and successes were very highly valued by all Partners. Partners are still communicating with each other regularly, post-project, and several 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 during the early months of the project and continued to meet and support Partners in their countries throughout the project period. While most Partners had two meetings per year; a few attended just one, often because of the unavailability of NAG members. Advice was provided on how to integrate the courses into national teacher training mechanisms and how best to promote them. Other advice focused on the structure and content of courses and where to find appropriate resources and other support. The NAGs contained experts in formal and informal science education and were influential in encouraging regional take-up and curriculum input through their contact, as well as 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's 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 INQUIRE's aims and objectives further. Participants were drawn from a range of professional backgrounds and included not only educators from botanic gardens,

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.



science centres, natural history museums, zoos and environmental NGO's but also secondary teachers, primary school teachers, teacher trainers and representatives from educational authorities. The dissemination of INQUIRE's 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 form or on-line, Partners attended and offered dissemination activities at 56 international and 135 national conferences and events. The INQUIRE co-ordinator also participated in several other IBSE-linked EU project meetings and events, as well as joining ProConet, and was therefore able to facilitate cross-project dissemination.

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 www.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 9-10th 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.

The final conference, organised by BGCI and KEW and held at Kew on 9th-10th July 2013, attracted 124 delegates from 13 countries, and provided another opportunity for widespread dissemination of best practice and project outcomes. Four other EU-funded projects (PATHWAY, Natural Europe, GreeNET and S-TEAM.) were also represented at the conference, which broadened the experience of all project Partners and opened up potential new avenues for future collaboration. INQUIRE's Train the Trainers and INQUIRE course manuals and activity booklet further support this process.





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