

## **Chain reaction final report**

BYRNE, Eleanor, BOOTH, Josephine, BEVINS, Stuart and BULLOUGH, Andy

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### **Published version**

BYRNE, Eleanor, BOOTH, Josephine, BEVINS, Stuart and BULLOUGH, Andy (2017). Chain reaction final report. Project Report. SCIENTEX.

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## **FINAL REPORT**

**Grant Agreement number:** 321278

**Project acronym:** CHREACT

**Project title:** Chain Reaction

**Funding Scheme:** FP7-SCIENCE IN SOCIETY-2013-1

**Period covered:** From 01/12/2014 to 30/05/2016

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## **Publishable summary**

### **A summary description of the project context and the main objectives.**

Chain Reaction was a three-year project funded by the European Commission. Its key aim was to develop Inquiry Based Science Education (IBSE) across twelve partner countries—United Kingdom, Italy, Slovakia, Turkey, Bulgaria, France, Slovenia, Germany, Greece, Ireland, Jordan, Georgia. The key underpinning element of the project was the development and deployment of interactive and engaging professional development for science teacher educators from each participating country. The science teacher educators involved were introduced to 'tried and tested' inquiry-themed science resources and worked collaboratively with project members to gain a clear understanding of the philosophy and mechanisms involved in designing and facilitating inquiry in the science classroom. Once fully cognisant in the use of the resources the science teacher educators, from each partner, designed and delivered a dedicated professional development course for participating science teachers. The specific nature of each professional development event varied from partner to partner but was consistent in its aim to develop participating teachers' confidence and skills in using the resources with their science students. Following the professional development sessions in each country, science teachers were able to deliver a series of inquiry-based sessions.

Students in the 14-16 age groups worked in project groups to research scientific scenarios using critical thinking, reasoning and problem solving skills. This inquiry approach enhanced the students' understanding and awareness of scientific process and offered an insight into the practice of professional scientists. In an attempt to increase the impact of this element of the project we recruited 'science role models' (early year science professionals or PhD students) to support the work of the students in school and to act as conference chairs during national celebration events. Each role model was assigned a school to work with and, through negotiation with the participating science teacher, planned a programme of support that aimed to add to the student experience. Typically, a role model would support the development of student inquiries in the science classroom, deliver lectures and discussions about science and science careers, and attend national and international student celebration events.

Participating students' work was summarized in presentations and shared at national student celebration events. These annual national events took place in each partner country and celebrated science and the work completed by the students. The student presentations encouraged students to detail the inquiry processes they engaged in and share findings whilst being creative and imaginative through their presentations. A significant feature of the structure of the celebration events was that they were organised to reflect typical scientific research conferences in an attempt to provide participating students with an understanding of how professional scientists communicate their work. So, conference programmes were produced that contained abstracts for each presentation, names of presenters and an area for poster presentations was designated. Students engaged in presentations of no more than ten minutes with a further five minutes given for audience questions. During breaks, students were encouraged to discuss the work presented with their peers and to engage with the wider audience.

Three annual 'Express Yourself' Conferences were held at the end of each year of the project and were hosted by—Sheffield Hallam University (year one), Teacher Education University, Heidelberg (year two), and the University of Plovdiv (year three). The international conferences were also structured to reflect a professional science conference and engaged one group of students from each participating country (twelve presentations).

As the Chain Reaction model was cyclical we were able to recruit new teachers from different schools in an attempt to ensure a large number of teachers and students were able to participate and thus, influenced a significant number of science teachers, students and school science departments. A key legacy of the Chain Reaction project is a strong and sustainable IBSE framework for both teacher educators and science teachers. Therefore, science teachers were able to build their knowledge and skills, learning independently as well as being part of a wider teacher network which, through the project website and international Express Yourself conferences, allowed and encouraged science teachers from each participating country to communicate and share ideas and experiences.

## **Key achievements**

### **Express Yourself Conferences**

Since the beginning of the project each participating partner contributed to the professional development of 565 teachers from schools across twelve countries. Each partner designed and delivered a National Express Yourself conference involving more than 4775 students. Three International Express Yourself conferences, with over 1190 delegates, were held at Sheffield Hallam University (2014), the Teacher Education University of Heidelberg (2015), and the University of Plovdiv (2016). Each of these conferences included a high profile key note address from an eminent science professional, interactive workshops and presentations by teams of students.

### **EUPRB**

The project began with 11 existing EUPRB (European Union Pupil Research Briefs) resources. However, each participating partner country was involved in the translation and adaptation of the briefs and a number of teachers took the original template and designed and published their own EUPRB—the project website hosts 14 EUPRBs. The additional resources go beyond the Earth and Space Science context originally offered and cover a range of subject and inquiry topic matter including Obesity and Energy.

### **Project Website**

A main project website was developed with 12 partner websites working alongside this. In addition a number of the consortium partners actively engaged in social media with the creation of dedicated Chain Reaction Facebook (FB) pages. These have been particularly successful in Jordan and Turkey, with the Turkish FB page reaching 1,014 'likes'. The main project website has become a crucial legacy and dissemination tool now the project has been completed. The website has a user friendly platform and hosts all the EUPRB resources, inquiry tool kit, details of the project and partner information as well as a detailed description of the philosophy and mechanics of inquiry based science education. The website also hosts a student guide to delivering conference presentations. All of these resources are available for download free of charge. The website also offers teachers the opportunity to share ideas and experiences with other participant and non-participant teachers through a section of the site dedicated to encouraging teacher interaction.

### **Inquiry Tool Kit**

Consortium members collaborated in the design, construction and publication of an 'inquiry tool kit.' The tool kit was designed to enable classroom teachers to use the whole kit to support development of their own inquiries or to dip in to individual sections as they perceive a need. Teachers can learn about:

- using an EUPRB in their classroom setting and context
- the use of student research briefs
- inquiry as an approach to science education
- communicating science

The Chain Reaction tool kit provides a practical guide for teachers to develop and deliver effective inquiry based science education and can be supported by a range of existing inquiry briefs also hosted on the website.

### **Dissemination**

All consortium partners engaged in a range of dissemination activities including academic talks, papers, posters, and online social media.

## Summary of key academic talks and papers

Part no. / short name	Title or conference	Journal / date of conference/location
Part. 1 / SHU	Using guided inquiry in science classrooms in England: potential versus reality (Bevins et al.	Under review
	Internal seminar at a Post-doctoral Forum	21st January 2016, Sheffield Institute of Education - Stuart Bevins
	Internal seminar	Sheffield Institute of Education on 24 <sup>th</sup> January 2016. Given by Stuart Bevins, Josephine Booth and Eleanor Byrne
	Poster presentation	European Science Education Research Association (ESERA) Conference Helsinki 28 <sup>th</sup> of August to the 2 <sup>nd</sup> of September
	Chain Reaction - a sustainable approach to Inquiry based science education	Association of Science Education conference, 06 – 09 January 2016, University of Birmingham
	Chain Reaction	Sheffield Hallam University Internal seminar at a Post-doctoral Forum, 24 <sup>th</sup> January 2016
Part. 1, 4 and 12 / SHU, TEDU, ISU	Chain Reaction Teacher Seminar	Chain Reaction Teacher Workshop, 10th May 2015, Plovdiv Bulgaria
Part. 2/ UNINA	(1)Secondary students' views about scientific inquiry (2)Science teachers' transformations while implementing inquiry-based teaching-learning sequences.	Submitted: Proceedings of GIREP-MPTL 2014.
	The Chain Reaction project -presentation	ESERA, Finland 2015
Part. 3 / UMB	Conference presentation and a paper published in the conference proceedings	Prešov, 30. 9 – 2. 10. 2015
Part. 4 / TEDU	Conference Presentation 12 <sup>th</sup> Good Practices in Education Conference	Istanbul April 11, 2015
	Conference Presentation (1 <sup>st</sup> Regional Forum on Science Education in the Arab Curricula)	Carthage, Tunisia on April 7-8, 2015
	Conference Presentation - 13 <sup>th</sup> Good Practices in Education Conference	Istanbul April 2, 2016
	Conference Presentation (Argumentation-Based Inquiry [ABI] Conference)	Washington State University College of Education in Spokane,

		Washington, United States on August 5-7, 2015
Part. 5 / PU	(1) Possibilities of the inquiry based approach to build motivation for studying sciences.  (2) Application of the ISBE in Language School "Plovdiv", Plovdiv.	Bulgarian Chemical Communications, Volume 42 (pp. 1–6) 2015  Bulgarian Chemical Communications, Volume 42 (pp. 6-11) 201
	An Attempt to Implement the Inquiry Based Science Education Approach in Physics Education in the Study of Light Sources in Secondary School", by Zhelyazka Raykova, Kostadina Katsarova ( ChReact teacher), Ganka Lavcheva (ChReact teacher)	43th National conference for Physics Education, Blagoevgrad, 2-5 April, 2015
	EU Project Chain Reaction – good practices for using IBSE	44th National Conference for Physics Education, Yambol, 7-10 April 2016
	Possibilities for using IBSE in informal education	44th National Conference for Physics Education, Yambol, 7-10 April 2016
	Chain Reaction and the NEYC for 2014 and 2015	In-service Physics Teacher training seminar, organized by Ministry of Education, The municipality centre for working with children, 16.04. 2015
	IBSE and the Chain Reaction project	In-service Physics Teacher training seminar, organized by Ministry of Education, "Compass Hall", Plovdiv University, 12.05.2016 (14.00-18.00)
Part. 8 / PHHD	(1)Chain Reaction – a sustainable approach to Inquiry Based Science Education. In: S. Bernholt (Hrsg.), Heterogenität und Diversität - Vielfalt der Voraussetzungen im naturwissenschaftlichen Unterricht. <a href="http://www.gdcp.de/images/tb2015/TB2015_384_Marme.pdf">http://www.gdcp.de/images/tb2015/TB2015_384_Marme.pdf</a> (2) First degree exam with the title "To implement inquiry-based science education in everyday teaching by selected teachers". <a href="https://sslaccount.com/cloud.chainreact.eu/index.php/s/MjwCDymDBzITxMQ">https://sslaccount.com/cloud.chainreact.eu/index.php/s/MjwCDymDBzITxMQ</a>	Gesellschaft für Didaktik der Chemie und Physik, Jahrestagung in Bremen 2014 (S. 384-386). Kiel: IPN.

Part. 9 / UOC	Approaches of Inquiry Based Science Learning in Secondary Education <u>Kallia Katsampoxaki</u> ,	1 <sup>st</sup> International Conference on: New Developments in Science and Technology Education (NDSTE 2014), 29-31 May 2014, Corfu, Greece ( <a href="http://ndste2014.weebly.com/">http://ndste2014.weebly.com/</a> )
	IBSE Case Study: Student perceptions of science and inquiry after a two year IBSE project In a Greek secondary school <u>Kallia Katsampoxaki</u> and Nikos Chaniotakis,	Scientix National Conference: Inquiry based learning and Creativity in Science Education, 9-10 October 2015, Athens, Greece ( <a href="http://www.scientix.ea.gr/">http://www.scientix.ea.gr/</a> )
	Evaluation and implementation of teaching approaches small research / exploratory learning for secondary school teachers and students, <u>Maria Fouskaki</u> ,	Conference: Mediterranean - Waterline: Posing interdisciplinary questions in teaching, 4-8 December 2015, West Crete, Greece ( <a href="http://mediterraneanmappingunkow.edu.weebly.com/">http://mediterraneanmappingunkow.edu.weebly.com/</a> )
	Interactive Learning in Science and Engineering Education <u>Nikos Chaniotakis</u> ,	International Conference: Mediterranean Sea Connects Us: Progress in Education with Local Communities, 9-13 December 2015, West Crete, Greece
	Kallia Katsampoxaki-Hodgetts, Maria Fouskaki, Katy Siakavara, Roumpini Moschochoritou, Nikos Chaniotakis (2015). Student and Teacher Perceptions of Inquiry Based Science Education in Secondary Education in Greece.	American Journal of Educational Research, 3(8), 968-976.
Part. 10 / UOL	Chain Reaction: Promoting a Sustainable Approach to the use of Scientific Inquiry in the Chemistry Classroom (in progress)	Chemistry in Action
	Poster presentation	European Science Education Research Association (ESERA) Conference Helsinki: 28 <sup>th</sup> of August to the 2 <sup>nd</sup> of September
	Presentation - Galway, March 2014 (not reported in 18 month report)	Irish Science Teachers Association (ISTA) Conference
Part. 11 / JSSR	Chain Reaction Develops Jordanian Student Inquiry Skills as Perceived by Participating Teachers: <a href="https://dub128.mail.live.com/mail/ViewOfficePreview.aspx?messageid=mqY04vaBAw5hGWididZ1xuSA2&amp;folderid=flsent&amp;attindex=0&amp;cp=-1&amp;attdepth=0&amp;n=94438187">https://dub128.mail.live.com/mail/ViewOfficePreview.aspx?messageid=mqY04vaBAw5hGWididZ1xuSA2&amp;folderid=flsent&amp;attindex=0&amp;cp=-1&amp;attdepth=0&amp;n=94438187</a>	International Journal of Education and Human Developments (IJEHD)



Part. 12 / ISU	Inquiry based science education and project chain reaction in Georgia	ESERA 2015 Conference, Helsinki, Finland, 31.08.15 – 4.09.15
	Inquiry based science education and project chain reaction in Georgia	International Conference IOSTE - International Organization for Science and Technology Education Istanbul, Turkey, 24 – 26 April, 2015
	Inquiry based science education and project chain reaction in Georgia	International Conference "Science Education and Green Chemistry for a Sustainable Future" Haifa, Israel, 2.12.15 – 3.12.15
	Inquiry based science education and project chain reaction in Georgia	LeLa Tagung Saarbrücken, Germany, 13-15 March, 2016

### Sustainability

Sustainability of the project is crucial and a range of actions have taken place through each partner country to ensure that maximum sustainability has been reached:

**Turkey** - alignment with the national curriculum was achieved during the teacher training, EUPRB development and in-school delivery. The Turkish partners were also involved in the Amgen Teach Project which allowed them to deliver a 3 day pre-training (baseline) workshop which focused on teaching, learning, inquiry and misconceptions. There was a big focus on changing the epistemological orientations of the teachers.

**Bulgaria** - Bulgarian partners involved pre-service teachers within the project and offered training workshops to pre-service teachers within Plovdiv University. The Bulgarian partners also founded a society for teachers to allow for regular meetings and discussions that will encourage reflection and sharing focused on inquiry based science education beyond the project's completion.

**Germany** - the German partners focused on facilitating pre-service teachers in developing inquiry based practices. They have also been involved in supporting a network within the project which they hope to continue and encourage teachers beyond the project to become members.

**Slovakia** – an event titled "Festival of Science" which focused on promoting science in society was hosted by the Slovakian partners. They intend to continue this event and establish the festival as a unique event in Slovakia. Additionally, they are focusing on PD in an attempt to change a culture of traditional teaching among teachers.

**Slovenia** - the Slovenian partners have focused on the use of technology in promoting the Chain Reaction project and believe that training can allow for a positive alignment between the use of technology and the act of inquiry in the science classroom.

**Greece** – A need to change science teachers' beliefs and culture regarding inquiry dominated the Greek approach to sustainability through PD events. They have also issued formal certificates to in-service and pre-service teachers to acknowledge their involvement in the Chain Reaction project and encourage further involvements.

**France** - in France the partners focused on the use of peer to peer teaching to support the professional development of in-service teachers. The main aim here was to establish reflection between teaching colleagues as a way of developing a culture of inquiry in science education.

**UK** - the UK used existing science learning centres to support the dissemination of the project. Similar to other partner countries, they have focused on initial teacher training as part of the sustainability of inquiry based practices.

**Georgia** - Georgia organised events such as the “Science Picnic” which promotes the place of science in society. They also developed a curriculum portal which contains activities related to the key features of inquiry.

**Italy** - the Italian partners also involved pre-service teachers and provided certification to participating teachers. They also developed a Chain Reaction Italy Facebook page and through this they have disseminated spam emails which contain Chain Reaction FB resources.

**Ireland** - the Irish partners focused on involving national bodies such as the NCCA and the PDST in promoting the Chain Reaction project. Ireland established a new curriculum in 2015 and included the Chain Reaction model within the new framework. Ireland also provided teacher training as part of the Amgen project. They also developed a professional development folder for teachers to keep track of their learning. This folder also provides a record to policy makers of their involvement in school self-evaluation (SSE) which is a new initiative that schools must abide by.

### **The Chain Reaction Consortium**

The Chain Reaction consortium has grown in strength over the project duration. All partners achieved their anticipated outputs but have gone beyond expectations in terms of learning and understanding of inquiry based science education and its pragmatic use by teachers in school science. The consortium developed a ‘family’ spirit which enabled a collaborative approach to problem-solving and sharing new ideas. Members have already begun discussions on how to sustain the consortium post-Chain Reaction and how we might develop the shared learning from the project.

<b>Participant No</b>	<b>Participant organisation name</b>	<b>Country</b>
<b>1 (Coordinator)</b>	Centre for Science Education, Sheffield Hallam University	United Kingdom
<b>2</b>	Physical Sciences Department, Naples University Federico II	Italy
<b>3</b>	Faculty of Natural Sciences, Matej Bel University Banska Bystrica	Slovakia
<b>4</b>	Education Department, TED Universitesi, Ankara	Turkey
<b>5</b>	Department of Physics, Plovdiv University	Bulgaria

6	Centre International de Formation Pédagogique	France
7	University Ljubljana	Slovenia
8	University of Education, Heidelberg	Germany
9	Department of Chemistry, University of Crete	Greece
10	Department of Education & Professional Studies, University of Limerick	Ireland
11	Jordan Society Of Scientific Research, Amman	Jordan
12	Ilia State University, Tbilisi	Georgia



Public website address:

[www.chreact.eu](http://www.chreact.eu)

Chain Reaction Partner websites:

Partner	website address
Partner 1 (SHU)	<a href="http://www.chreact.org.uk">www.chreact.org.uk</a>
Partner 2 (UNINA)	<a href="http://www.chreact.it">www.chreact.it</a>
Partner 3 (UMB)	<a href="http://www.chreact.umb.sk">www.chreact.umb.sk</a>
Partner 4 (TEDU)	<a href="http://www.chreact.org.tr">www.chreact.org.tr</a>

<b>Partner 5 (PU)</b>	<a href="http://chainreact.dipseil.net">http://chainreact.dipseil.net</a>
<b>Partner 6 (CIFOP)</b>	<a href="http://www.chreact.fr">www.chreact.fr</a>
<b>Partner 7 (UL)</b>	<a href="http://www.chreact.si">www.chreact.si</a>
<b>Partner 8 (HUED)</b>	<a href="http://www.chreact.de">www.chreact.de</a>
<b>Partner 9 (UOC):</b>	<a href="http://www.chreact.gr">www.chreact.gr</a>
<b>Partner 10 (UOL)</b>	<a href="http://www.ul.ie/chainreaction/">http://www.ul.ie/chainreaction/</a>
<b>Partner 11 (JSSR)</b>	<a href="http://www.chreact.io">www.chreact.io</a>
<b>Partner 12 (ISU)</b>	<a href="http://chain-reaction.iliauni.edu.ge/">http://chain-reaction.iliauni.edu.ge/</a>

## 2. Project objectives

### 2.1 Overview

This final report is structured to tell the story of the Chain Reaction project from inception, through delivery and completion. It details, with examples, the model and philosophy, achievements, difficulties and development of the project over its 3-year period.

*Chain Reaction* established and delivered an Inquiry Based Science Education (IBSE) approach through twelve partner countries over a three-year period. The project provided interactive and engaging IBSE professional development to teacher education professionals from each participating nation using tried and tested inquiry based science resources originally called Earth and Universe Pupil Research Briefs (EUPRBs). These EUPRBs presented realistic scenarios to reflect real world professional science, support inquiry based teaching and learning of science and involve engaging topics designed to appeal to both genders.

The project model briefed participating teachers through a dedicated course in each partner country. Once fully confident with the IBSE model and the resources (EUPRBs) provided, the participating teachers delivered a series of exciting and student- focussed lessons which explored the research projects offered through the EUPRBs. Using critical thinking, reasoning and problem solving skills, students in the 14-16 age groups worked together to research scientific scenarios. Their work was summarised in presentations that were shared at national student celebration events. These annual national events took place in each partner country and celebrated science and the work completed by the students. The student presentations encouraged students to detail the inquiry processes they engaged in and share findings whilst being creative and imaginative through their presentations. The national events also engaged practising scientists (early year science professionals or PhD students) who acted as role models for the students and shared their work to inform and encourage young people to consider a career in science related fields. Practising scientists were recruited from local industry and research institutions early on in the project. National conferences were followed by an international conference which a number of students from each national conference were selected to attend. Acting in assessment teams with participating teachers, the role model scientists identified students to participate in the annual International Conference.

### 2.2 Project Objectives

*Chain Reaction* had seven key objectives:

1. Adapt and disseminate a set of themed inquiry based science resources (EUPRBs), that meet each partner's cultural and curricular needs, to be used for briefing teachers and in the classroom
2. Promote the use of IBSE in secondary schools across the 12 partners via a programme of teacher development which will engage young people in science through student-led inquiry based research
3. Help bridge the existing gap between science teachers and the science education community
4. Promote a European teacher network
5. Engage in effective dissemination of resources (EUPRBs) and effective practice
6. Design and deliver effective evaluation and reporting models
7. Hold 36 national and three international celebration events for teachers and students.

### 2.3 Follow-up of previous review

A mid-project review took place in Brussels in May 2015. This was attended by the Coordinator and the Work Package Leaders as appropriate. Chain Reaction was assessed as having made "Good" progress by the expert evaluators.

However some recommendations were made:

- The evaluators were unclear about the reporting of deliverables as these were not considered to be sufficiently detailed. More information was required regarding activity across the consortium and more systematic reporting was encouraged
- Issues were outlined relating to the project websites, including missing information

### 3. Work progress and achievements

#### 3.1 Progress overview and contribution to the research field

Chain Reaction has continued to be successful. The consortium is strong and the milestones and deliverables for the project have been met.

Since the submission to the Chain Reaction 18 month report the project has:

- Used strong management procedures and structures across the consortium
- Updated the project resources to suit national contexts, and translated as necessary
- held regular project management board meetings
- Re-launched the main project website and some partner websites
- continued to brief teachers across all partners in IBSE approaches and the project resources
- supported teachers and schools in the delivery of IBSE
- delivered 24 national conferences (12 in 2015, 12 in 2016)
- held two international conferences, in Heidelberg, Germany in 2015, and Plovdiv, Bulgaria in 2016
- held pupil inquiry days after the international conferences
- produced a "toolkit" guide to IBSE as a project legacy
- held a teacher workshop in Plovdiv, Bulgaria as part of the international conference which involved teachers from all three years of the project from all partners
- involved early year scientists in both schools and the conferences
- been subject to evaluation

### 4. Work packages progress

#### 4.1 Work Package 1 - Project Management

Please see Management Section

#### 4.2 Work Package 2 - Website Development

This work package was led by the University of Crete, Greece (Partner 9).

*Predicted* start and end dates for WP2

Start Month	2	End Month	36
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*Actual* start and end dates for WP2

Start Month	2	End Month	36
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## Objectives

- Produce one main website for general information about the project
- Produce 12 partner state sites which are linked to the main website
- Maintain and update each site at regular intervals

## Progress

The main site was launched on December 10th 2013 and can be found at [www.chreact.eu](http://www.chreact.eu).

**Table 4.2.1 - Domain names for Chain Reaction Partner websites**

Partner	website address
Partner 1 (SHU)	<a href="http://www.chreact.org.uk">www.chreact.org.uk</a>
Partner 2 (UNINA)	<a href="http://www.chreact.it">www.chreact.it</a>
Partner 3 (UMB)	<a href="http://www.chreact.umb.sk">www.chreact.umb.sk</a>
Partner 4 (TEDU)	<a href="http://www.chreact.org.tr">www.chreact.org.tr</a>
Partner 5 (PU)	<a href="http://chainreact.dipseil.net">http://chainreact.dipseil.net</a>
Partner 6 (CIFOP)	<a href="http://www.chreact.fr">www.chreact.fr</a>
Partner 7 (UL)	<a href="http://www.chreact.si">www.chreact.si</a>
Partner 8 (PHHD)	<a href="http://www.chreact.de">www.chreact.de</a>
Partner 9 (UOC):	<a href="http://www.chreact.gr">www.chreact.gr</a>
Partner 10 (UOL)	<a href="http://www.ul.ie/chainreaction/">http://www.ul.ie/chainreaction/</a>
Partner 11 (JSSR)	<a href="http://www.chreact.jo">www.chreact.jo</a>
Partner 12 (ISU)	<a href="http://chain-reaction.iliauni.edu.ge/">http://chain-reaction.iliauni.edu.ge/</a>

## Significant Results

The WP leader maintained and updated a comprehensive project website alongside twelve partner sites. Partner sites include links to social media, information regarding participants (including role model biographies), picture galleries and information about the national delivery including high quality videos.

Feedback provided at the project's 18 month review meeting along with partner comments at the PMB in Month 24 lead the consortium to identify that the project website was insufficient in both its overall appearance and content. The original website template had been designed primarily to make structuring information easy for all partners, regardless of language or cultural differences. It served its purpose and helped considerably in coordinating the type of content that we felt should be available online to all stakeholders. However as the content grew we quickly identified the need to cater more efficiently to a larger, more diverse audience and moved forward with a major redesign, for increased appeal to first-time visitors and interested schools, teachers and policy makers from the education community. The new design simplified the overall structure and improved visitor interaction by consolidating similar categories. After its initial testing and deployment on the main project website, the new template was made available to all partners with detailed instructions on how to deploy it with their national websites. While most partners adopted the new design, some struggled to find the time and/or web trained staff to make the suggested changes and as such the PU, UL, PHHD, UOL and ISU sites remained in the old format. Jordan adopted an Arabic (Right-To-Left) template that was slightly different in order to more efficiently cater to its main audience.

## The main project website

The WP leader regularly updated the core components of the software infrastructure. The initial choice of platforms was vindicated by the uninterrupted service of the main site throughout the course of the project. The goal of excellent uptime and availability was achieved and the maintenance of our metrics of uptime and availability beyond project funding will continue. In addition, the physical infrastructure hosting the Chain

Reaction sites was safely maintained inside a climate controlled server room with access restricted to authorized personnel only. Every measure was taken to ensure the equipment's uninterrupted operation, including the purchase and deployment of a separate Uninterruptible Power Supply (UPS) unit solely for the Chain Reaction hardware within the Server Room.

Our dedication to usability extended to testing both the old and new templates for mobile-friendliness, making sure that all visitors had unimpeded access from all devices (i.e. desktop computers, laptop computers, tablets, and smartphones). The work that went into assuring a mobile-friendly design directly transferred to all partners who opted to use the templates, which provided a uniform experience across our network.

The most important and frequently visited section of the main Chain Reaction website was the page dedicated to Teacher Resources. These were updated and modified as necessary to bring them in line with the most current research outputs, curriculum developments and local contexts. The Research Briefs that are now permanently hosted on the website are:

- Collision course
- Cosmic website
- ET phone earth
- Feed the world
- Green heating
- Green light
- Mars-ology
- Out of sight, out of mind
- Ozone conference
- PHEPPS
- Where is Ethanol
- Plants in space
- Energized
- Obesity

A significant addition to the Teacher Resources in the final year of the Project was the 'Chain Reaction Toolkit' (see WP8 for more details). As we wish science teachers to take ownership of their own Inquiry Based Science Education approaches and create their own briefs, the website invites visitors to take a glimpse at the Chain Reaction Toolkit to find out what it takes to create, coordinate and deliver an inquiry based brief (one of ours or of their own). The Toolkit is available online as an interactive online presentation which can be downloaded freely by educators in several convenient formats. It provides step-by-step instructions on using the Project's educational resources or developing new ones and outlines useful examples of best practice.





**Figure 4.2.1:** The Chain Reaction Toolkit, an interactive presentation regarding Inquiry Based Science Education

### **Dissemination and Networking through the website**

First and foremost the project website is a dissemination platform attempting to reach all stakeholders in an appealing and efficient manner. After the site redesign, we transitioned from a platform tailored to the needs of our partners and collaborating teachers to one aimed at a wider audience of students and teachers interested in recent advancements in the field of Inquiry Based Science Education.

An important part of Chain Reaction was networking among educators, IBSE researchers and even aspiring science teachers. During the final year, the Project's website was transitioned to better facilitate this. The forum was built from the ground up to serve as a platform for teachers to interact, exchange information, pose questions and have them answered. It is also a convenient repository for information from our partner teachers aimed at their colleagues in a direct and unmediated fashion. Additional networking opportunities stem from our Project listing on the **Scientix.eu website**. Scientix is a prominent community for science education in Europe where we have outlined some key information on our work and to which we're actively linking from every page of our website, in an attempt to promote awareness of other STEM-related projects and attract collaborators alike.

Upon the Project's completion we had accumulated a range of invaluable data which touched directly on the potential impact of Chain Reaction on IBSE policies throughout the European Union. As a result, we chose to compile a paper which will be useful to policy makers, education professionals and researchers focused on IBSE. The paper is prominently displayed within the main website, since we expect it to serve as an indispensable reference to interested parties throughout the European Research Area and beyond.

### **The 12 Partner Websites**

The variable needs of each partner regarding the national websites and their intended target audience manifested during the first 18 months of the Project. Considerable effort was made to strike the perfect balance between a common uniform branding and individual customization.

An important advantage of each national website for 10 of the 12 partners was the use of the local language instead of English, which would have presented an additional barrier for non-native English speakers. The national websites directly dealt with the intricacies of each country's educational system and addressed teachers and students in a way that felt natural and familiar. Therefore, dissemination was more efficient across the board. A significant part of our outreach efforts was the use of Web 2.0 technologies, which promote visitor interaction. Several technologies were proposed, but it was agreed that each partner would be free to fine-tune

their own strategy to better suit their own needs and target audience. That led to an interesting mix of social media engagement, blogging, video sharing and other web services.

Particular examples of note are the following:

### Blogging

The web platform we chose allowed for several different ways to present information, including a blog format, which has become popular as a more direct and less formal dissemination medium. Some partners chose a blog layout for interacting with the teachers and students, reporting good user engagement and increased interest. Some offered participating schools the option of authoring their own micro-blog on the same platform.



Figure 4.2.2: A blog hosted on the German partner website, the most prominent user of the format

### Social Media

Several partners opted to complement their web presence by employing established social media such as Twitter and Facebook. The importance of social media accounts varied greatly among partner countries. It was deemed unnecessary to force this approach on partners where their impact would be negligible, but it was reported by some as a useful addition to the more formal communication through their actual website.



Figure 4.2.3: The Turkish partner Facebook profile



Figure 4.2.4: The Irish partner Twitter account

Twitter was a popular choice, with a feed embedded in some national sites. It served primarily as a means to post quick news related to the national team activities. Understandably, it wasn't deemed very useful as a medium for two-way communication.

### Video sharing

Virtually all partners created and shared video content through the national websites. The most frequently used video hosting sites were YouTube and Vimeo, but some partners also opted to store the content on their own servers. Video content provides high impact and promotes user engagement, which explains why it was employed throughout our consortium.



Figure 4.2.5: UK Partner website, with embedded video hosted on Vimeo, a popular video hosting platform

### The Future of the Website

Since the beginning of the Project it had been our implicit goal to maintain the website as an invaluable educational resource for teachers and students beyond the 36 month duration. To that end, we opted for dedicated hardware and other required infrastructure that will be able to host the information at no significant additional cost.

Furthermore, we have arranged for the main website domain name to be active until at least 2023, acting as a central repository of information for innovative educators and inquisitive students. We intend to build on the knowledge acquired during the Project's funded run, sporadically updating the content into the foreseeable future, as new information becomes available or relevant research papers are published by partners.

### Resources: WP2 (Months 1-18)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	1.9	3.03	2.14	3.53	2.1	1.96	1.1	5.26	12.29	0.75	3.01	3.74	<b>40.81</b>

### Resources: WP2 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	1.5	2.75	3.5	2.75	2.25	2.5	2.5	3.75	5	3.25	3.25	3.5	<b>36.5</b>
Actual for months 19-36	1.7	1.75	2.96	3.12	3.1	1.09	1.6	4.11	12.31	1.92	3.54	3.13	<b>40.33</b>

### Resources: WP2 (Months 1-36) TOTAL

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	3	5.5	7	5.5	4.5	5	5	7.5	10	6.5	6.5	7	<b>73</b>
Actual for months 1-36	3.6	4.78	5.1	6.65	5.2	3.05	2.7	9.37	24.6	2.67	6.55	6.87	<b>81.14</b>

### Resources: WP2 (Months 37-38) *Reporting period*

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 37-38	0.1	0	0	0	0	0	0	0	0	0	0	0	<b>0.1</b>

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP2. As is evident from the Total table (in red) WP2 required 8.14 more person months than initially predicted with partners 1, 4, 5, 8, and 9 using more time than initially thought. The majority of this extra time was required by the WP Leads (Partner 9) to update and redesign the website. This was a justified use of time based on feedback from the commission. The templates and guidance provided by Partner 9 allowed partners 2, 3, 6, 7, 10 and 12 to successfully deliver WP2 using less time than initially predicted. Partner 1 required time during the reporting period to update the national project website.

### 4.3 Work Package 3 - Technical Board (TB) Role

This is led by Sheffield Hallam University, UK (Partner 1).

*Predicted start and end dates for WP3*

Start Month	1	End Month	4
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*Actual start and end dates for WP3*

Start Month	1	End Month	36
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#### Objectives

- Deliver high quality IBSE/EUPRB briefing to all members of TB
- Ensure all members of TB feel adequately equipped to modify EUPRBs for use within own national education system
- Ensure all members of TB feel adequately equipped to design IBSE/EUPRB briefing for their own teacher briefing sessions
- Ensure TB support is provided throughout length of project from project Technical Manager

#### Significant Results

This Work Package was scheduled to come to an end in month 4, however it soon became evident that time would be required throughout the full life span of the project for updating and modifying TB support and training. Some partners chose to drip feed the EUPRBs to their TB and schools over the course of the three years and as such support for the TB was ongoing. This meant that the support given *to* and provided *by* the TB was able to improve and evolve based on feedback and national/local demands. All deliverables associated with this WP were delivered on time.

After the initial briefing sessions hosted by SHU partners took the training model and applied it in varying ways to meet their own needs and contexts. An example taken from the Greek experience demonstrates this well:

The Greek Technical Board invited participating teachers to attend an eight-hour dissemination event as part of their Chain Reaction training. During this workshop they attended lectures regarding the project's requirements and IBSE practices around the world. They were given the chance to explore the materials required for the experiments suggested in the student worksheets and devise an initial plan of action regarding one case-scenario after discussion and elaboration with peers. During the project, they were given guidelines and supporting material regarding IBSE practices and they were free to collaborate or ask for support from an appointed project science teacher whose main role was to provide peer mentoring. Peer mentors' tasks did not include evaluation of the practices reported. Peer mentors were acting as facilitators developing ideas for more experiments and school field trips.

Reaction to the training was highly positive (78% of teachers described the training as excellent). However, a lack of time put great pressure on all participants, and what teachers did not like as much with regards to the Greek training programme was the fact that there was no set time-schedule including itemised tasks and objectives. They wanted something more concrete than mere scenarios. They also asked for an extended list of suggested experiments for each theme (EUPRB) and specific instructions as to how to facilitate experimentation in compliance with IBSE. Another recurring issue was that of students' knowledge gap and students' initial hesitation to conduct research on their own (with minimal teacher intervention). The Greek Technical Board was able to identify some specific issues relating to Student engagement with the project:

- Students (just like their teachers) did not know exactly what to do in the beginning.
- Students had not realised how complex research can be.
- Students had difficulty finding and evaluating reliable open-access sources.

- Students could not understand University level papers provided. Students initially struggled to make working associations between theory and experiment
- Students initially struggled to apply the inquiry method in a reliable way.

Despite the challenges however, when asked whether they would participate in this project again, the vast majority of teachers (78%) and (teacher) peer mentors (100%) responded in a positive way and were eager to take in the same project again in the future.

Elements of the programme that changed	Year 1	Years 2 and 3
Source of training input	input given to teachers by two Peer mentors assigned by Technical Board Leaders over the phone, monthly visits and by email.	input given to teachers through an asynchronous, accessible to all forum in which peer mentors included colleagues that implemented the project the previous year and the TB
Training Transparency of feedback and communication	No significant feedback produced	Identification of congruent perceptions of the Nature of science among teachers of different disciplines, knowledge gaps and misconceptions are already apparent using the Forum.
Timetable: guidelines and deadlines	1 Role Model Visit and National Conference	Teachers had to discuss every week reported difficult issues well before these actually happened: <ul style="list-style-type: none"> <li>• Organising group work, group dynamics and students norms for civil discussions</li> <li>• Critical thinking skills and six thinking hats</li> <li>• Identifying Students' knowledge gap and what to do next</li> <li>• How to design lessons so as to enable students to identify reliable resources</li> <li>• Experimental method: In what ways can teacher's help students understand the method, variables and control and held them apply it in their context?</li> <li>• Field trips: supporting teachers plan and organise them.</li> </ul>
Support More experiments to supplement the existing ones given in EUPRBS	None or one in each EUPRB	Next to each EUPRB link (on our Website), there is a list of related experiments and instructions
Teacher's knowledge, skills gap	Little reflection from teachers encouraged	Through the Forum, teachers ask or give substantive feedback to their colleagues.
Role Models Visit	Later in the project	Earlier in the project
Action Research	Optional and teacher initiated	Teachers are invited and provided with guidelines as to how they can research issues relevant to IBSE.

### Resources: WP3 (Months 1-18) TAKEN FROM INTERIM REPORT

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	1.2	3.31	3.09	4.85	2.5	2.29	3.5	3.84	5.6	2.92	2.46	3.98	<b>39.54</b>

### Resources: WP3 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	<b>31.5</b>
Actual for months 19-36	0.3	0.429	1.73	0.6	4	0.33	2.1	1.87	2.4	3.26	2.57	0.96	<b>20.549</b>

### Resources: WP3 (Months 1-36) TOTAL

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	8	5	5	5	5	5	5	5	5	5	5	5	<b>63</b>
Actual for months 1-36	1.5	3.739	4.82	5.45	6.5	2.62	5.6	5.71	8	6.18	5.03	4.94	<b>60.089</b>

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP3. As is evident from the Total table (in red) WP3 required 2.911 fewer person months than initially predicted. This was in large part due to the under spend of time from partner 1. The support requirements placed on the Technical Manager (located within Partner 1's PMB) were much smaller than initially predicted as once the partners were familiarised with the briefing materials they felt confident in delivering all of the support required to their national TB. As such, the Technical Manager's role was much smaller than had been initially designed.

#### 4.4 Work Package 4 - National EUPRB Development and annual revision

This work package is led by University Ljubljana, Slovenia (Partner 7).

*Predicted* start and end dates for WP4

Start Month	1	End Month	5
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*Actual* start and end dates for WP4

Start Month	1	End Month	36
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Objectives:

- Adaptation of EUPRBs to the national context as appropriate

## Significant Results

All partners were provided with eleven EUPRBs at the beginning of the project. Some partners chose to adapt and translate all of the resources immediately whereas others decided to adapt and translate them gradually over the course of the three years allowing their TB to introduce new ones year on year.

Table 4.4.1a, 4.4.1b and 4.4.1c illustrate the EUPRBs used with schools in years 1, 2 and 3. As can be seen, Plants in Space and Green Light were the most commonly used resource across the consortium with most partners using them year on year. During the second half of the project (months 19-36) more partners began to design and implement their own EUPRBs. Table 4.4.2 demonstrates the work undertaken by UOL, PHHD and UL in producing new resources whereas table 4.4.3 lists the adaptations made by UMB, UOL, CIFOP, PU, PHHD, UOC and UL to the original EUPRBs.

This Work Package was scheduled to come to an end in month 5, however, it was decided that the EUPRB revisions would be required annually to allow for new resources to be developed and existing resources to evolve based on feedback.

**Table 4.4.1a - EUPRBs used by partner in Year 1**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Collision Course		X	X	X	X	X		X		X			8
Cosmic Web Site			X					X					2
ET Phone Earth		X			X	X							3
Green Heating		X		X			X	X					4
Green Light		X	X		X			X	X	X	X	X	8
Mars-ology	X	X			X	X							4
Out of Site, Out of Mind		X						X	X		X		4
PHEPPS	X		X					X					3
Plants in Space	X	X		X	X		X	X	X		X	X	9
Feed the World			X		X				X		X		4
Ozone Conference				X	X	X					X		4

**Table 4.4.1b - EUPRBs used by partner in Year 2**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Collision Course	X	X	X	X		X							5
Cosmic Web Site			X	X	X						X		4
ET Phone Earth		X		X	X	X							4



Green Heating	X	X		X			X		X		X	X	7
Green Light			X	X	X					X		X	5
Mars-ology	X	X		X		X					X		5
Out of Site, Out of Mind	X	X							X			X	4
PHEPPS	X		X	X	X						X	X	6
Plants in Space	X	X	X	X	X	X	X		X	X		X	10
Feed the World	X		X		X				X			X	5
Ozone Conference			X	X	X	X							4

**Table 4.4.1c - EUPRBs used by partner in Year 3**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Collision Course		X	X	X	X	X					X		6
Cosmic Web Site		X	X	X	X								4
ET Phone Earth	X	X		X	X	X					X		6
Green Heating	X	X	X	X	X		X		X		X	X	9
Green Light		X	X	X	X					X	X	X	7
Mars-ology		X			X								2
Out of Site, Out of Mind		X		X	X				X			X	5
PHEPPS	X		X	X					X			X	5
Plants in Space	X	X	X	X		X	X		X	X			8
Feed the World	X		X		X						X	X	5
Ozone Conference			X		X	X							3

**Table 4.4.2 - new EUPRBs developed**

Partner	New EUPRB developed
UOL	Badger Conservation
UOL	Induction Hobs
UOL	The physics of parachutes
UOL	The effect of drugs on living things
PHHD	Das Sinnesprojekt (The Sense Project)
PHHD	Physikalische und funktionelle Auswertung eines Aufwindkraftmodells (Physical and functional analysis of a model of a solar updraft power plant)

PHHD	Modell eines Aufwindkraftwerkes (Model of a solar updraft power plant)
PHHD	Aufwindkraftwerke – eine alternative regenerative Energiequelle? (Solar updraft power plants – an alternative regenerative energy source?)
PHHD	Bau eines MultiChAcc (Construction of a multi chargable accumulator)
PHHD	Messung der Hautfeuchtigkeit über den elektrischen Widerstand (Measurement of skin moisture via electrical resistance)
PHHD	Messung der Hautfeuchtigkeit über den elektrischen Widerstand (Measurement of skin moisture via electrical resistance)
PHHD	Handy-Tankstelle – Netzunabhängige Stromquelle für Kleinelektronik (Mobile fuelling station – network-independent power source for small electrical devices)
PHHD	Obsttreibstoff – die Alternative für den Treibstoff der Welt (fruit fuel – the alternative fuel for the world)
PHHD	Myoelektrische Handprothesen (myoelectrical hand prosthesis)
PHHD	Modell zur Nutzung des Aufwindes (Model for usage of updraft power)
PHHD	Düngereffizienz (Fertilizer efficiency)
PHHD	Solar works © (solar works © – Construction of a low-budget solar panel)
PHHD	Green Gym (Green Gym – Usage of exercise machines for power generating)
PHHD	Der beste Schutz vor dem Austrocknen (The best defence against skin dehydration)
PHHD	Energiegewinnung aus Ton (Energy production from sound)
PHHD	Green Lantern (Green Lantern – Light energy analysis of a school)
UL	Smart electric car
UL	Efficiency of water turbines
UL	Effectiveness of wind turbines
PHHD	“Im Aufwind” (Solar chimney power plant)
PHHD	Marmetics (cosmetics)
UL	Smart e-cars
UL	Efficiency of water turbines
UOL	Obesity
UOL	MND
UOL	Ebola
UOL	Forces
UOL	Badger Culling
UOL	Functions and Expressions in Physics
UOL	Induction Hob

The process of EUPRB development for specific national contexts was undertaken in different ways across the consortium:

**Table 4.4.3 - original EUPRBs adapted**

Partner	EUPRB adapted	Adaptation
UMB	Ozone conference	We improved some parts of the text. For example we reformulated the text on page 9 concerning emissions of oxides of nitrogen from fuel machines. We changed some terms, for example “kyslé depozície” to “kyslé dažde”, so as to ensure the right translation of the science terms as well as their understanding to students. We tried to use terms that are not too difficult, but correct. There was a suggestion to add some empirical investigation to the brief. So we have developed an experiment that was incorporated into the student instructions at page 10. We also improved the text concerning the ozone hole (ozone depletion) at page 17.
UMB	Green light	We made the major adaptation in the first project period. Now we only formulated more precisely the requirements concerning the poster that students need to produce (page 3). Other comments were given to teachers orally. The brief should not be seen as

		an advertisement of one light source but treated more openly to enable open-ended investigations to be performed and a comparison of the light sources from various perspectives. Disadvantages of the “green” light sources should be taken into the consideration as well.
UMB	Green heating	It is a newly translated and adopted brief introduced to teachers in Year 3. Besides the adopting they used terminology to enable a suitable fit with the Slovak science curricula we added information on photovoltaic panels (student instructions, p. 8) so that students understand they are different from solar panels. We divided the proof of the hypothesis (p. 11) into two parts.
UOL	Green Light	Focus on using the Jigsaw method to deliver the lesson. Changed some of the costings to reflect the standard price in Ireland. Included focus on LED lights.
UL	Plants in Space	We changed the plant (from pondweed to chicory), the new activities include the construction of a small greenhouse. They also included a light system with LED diodes. Students were changing parameters of the greenhouse in dependence of their research, observing and measuring the growth of the plants.
CIFOP	Collision Course	An invitation to a comparison to numerical simulations has been added in.
CIFOP	Ozone Conference	An experiment using tobacco plants to measure ozone concentration has been added
PU	Plants in Space	Introduced the use of worms to the experiments
PU	Green Light (2014, 2015, 2016)	In addition, there were some LED light sources being analyzed. Some of the light characteristics of the light sources that were examined had to be additionally taught to the students. (2014 and 2015)
PU	Green Heating (2016)	They assembled a model of the school in an appropriate scale and the roof was made by photo panels. This was in line with the student’s profile of education- construction engineering. (2016)
PU	Out of Site, Out of Mind (2016)	The team of LS “Bertold Brecht”, Pzardjik chose the topic “Out of Site, Out of Mind”, because it offered a solution for a pressing problem for the community. For quite some time the residents of Pazarjik town and the nearby villages have suffered from a smog that resulted from exhaust fumes coming from the local landfill. The students were a small group of researchers. They learned the rules for taking and analysing soil samples, and various types of soils. For the migration of heavy elements from the soil to the plants and for the requirements set by the EU for the landfills. They also Explored and offered opportunities to profit from selling lavender oil. These means would allow maintaining the monitoring of the landfill.
PHHD	PHEPPS	Content modifications and addition of new turbine experiments
UOC	Green Heating	Explicit design models of solar panels added (see the link below <a href="http://www.chreact.gr/?q=node/53">http://www.chreact.gr/?q=node/53</a> ). Teachers provided with a list of suggested experiments on this topic.
UOC	Ozone Conference	Researchers in Chemistry Departments that worked in the field were contacted for support. They contributed by providing papers in Greek for the EUPRBs. Thus, regarding the first strand of the EUPRB, that is, tropospheric ozone, summaries of papers, tables and graphs of recently measured man induced sources of Ozone emissions in a major Greek city, Patras, according to the 2nd Newsletter of INTERREG “European Ground Cooperation between Greece and Italy, June 2013) were added. Other major modifications entailed the provision of the latest measurements of the two monitoring venues in Greece, Finokalia (Crete) and Aliartos (Evia) so that students can make comparative tables of current ozone values on the same day and time. As well as providing students with feedback regarding latest ozone values, the EMEP link ( <a href="http://www.nilu.no/projects/ccc/emepdata.html">http://www.nilu.no/projects/ccc/emepdata.html</a> ) was provided which offers a direct link to ozone and pollution emission and measurement data in Europe.
UOL	Green Light	Jigsaw activity was introduced as the primary methodological approach

### Resources: WP4 (Months 1-18)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	0.1	3.17	3.68	4.08	0	1.67	4.2	4.01	1.64	1.28	2.1	5	30.93

### Resources: WP4 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	0.5	2	2	2	2	1.5	2.5	2	1.5	2	2	2	22
Actual for months 19-36	0	0.286	2.13	0.6	5	0.08	5.69	0.79	0	4.01	1.79	0.83	21.206

### Resources: WP4 (Months 1-36) TOTAL

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	1	4	4	4	4	3	5	4	3	4	4	4	44
Actual for months 1-36	0.1	3.456	5.81	4.68	5	1.75	9.89	4.8	1.64	5.29	3.89	5.83	52.136

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP4. As is evident from the Total table (in red) WP4 required 7.136 more person months than initially predicted. This was due to the time required during the first 18 months of the project to translate and adapt the EUPRBs to suit local/national demands.

### 4.5 Work Package 5 - Teacher IBSE/EUPRB Briefing

This work package is led by the University of Plovdiv, Bulgaria (Partner 5).

*Predicted* start and end dates for WP5

Start Month	1	End Month	35
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*Actual* start and end dates for WP5

Start Month	1	End Month	35
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### Objectives

- Provide high quality TB lead briefing for teachers on IBSE, conference research presentations and the EUPRBs
- Increase teacher confidence in inquiry based teaching and learning
- Oversee cascade of knowledge within school

## Significant Results

The Chain Reaction Project aimed to train teachers in how to develop and implement IBSE and EUPRBs. Each participating school was identified by the PMB and the TB and two science teachers from each school attended a training session with the TB. The location of the training was within the partner's institution. At the training session each teacher was introduced in full to the concepts behind IBSE, Chain Reaction and to the EUPRBs. The training also included sessions on preparing students for conferences. This included information about writing research papers based on the investigations completed within the EUPRBs and issues relating to confident public speaking.

The TB provided ongoing support for all participating teachers after training was completed. This included support for in-school delivery with students, colleague workshops and conference preparation and all additional training materials designed by the TB were added to the member state website so that teachers could easily access them at a later date. The TB also visited the participating schools as necessary to support teachers in delivering the materials and approaches.

### The IBSE Training

The training was delivered at a national level by the Technical Board (TB) of each partner state. Timescales and duration for training were the responsibility of the individual partners. The training was comprehensive among all the partners in terms of teaching how to use the materials provided, background to the IBSE approach, and introduction of the materials effectively to help teachers to support the development of students' inquiry skills.

The training also sought to create an environment for teachers to engage in IBSE as learner and/or facilitator which was deemed necessary for them to effectively implement IBSE in their own teaching.

A range of examples are set out below to highlight how training sessions were designed and delivered by the partners:

*In Italy* over the course of the three year project the teacher training was delivered as follows:

- YEAR 1: 9 workshops of approximately 3 hours each, from October 2013 to January 2014
- YEAR 2: 9 workshops of approximately 3 hours each, from November 2014 to January 2015
- YEAR 3: 7 workshops of approximately 3 hours each, from October to December 2015

During the workshops, teachers were introduced to scientific inquiry through an "experimental" approach. Teachers were engaged in the same activities as their students. In small groups they read the materials, designed a suitable research project, performed the experiments, and analyzed the data. This approach enabled them to more easily recognize possible difficulties their students were encountering when engaging in their projects. In this phase, seven EUPRBs were presented to them. The University staff helped the teacher in implementing the experiment and showed how to integrate the IBSE approach in their practice.

*In Slovakia* the briefing programme consisted of three one-day sessions held in the Faculty of Natural Sciences Matej Bel University Banská Bystrica. The sessions ran as follows:

- Session 1. Initial teacher briefing,
- Session 2. Networking meeting of teachers,
- Session 3. Final evaluation meeting.

These sessions were supplemented by the various types of ongoing support during the in-school delivery phase and in the preparatory time for the conference – consultations by email, by phone, visits of TBs and role models at schools, visits of individual school classes and teachers at the Faculty etc.

*In Greece* the briefing consisted of four sessions:

- a. Description of Chain Reaction objectives and 3-year plan
- b. Lecture on IBSE
- c. Presentation of four EUPRBs and discussion of implementation issues or problems
- d. Workshop: How to design my own IBSE materials from scratch. In this session teachers in groups designed a preliminary plan of a project on Ozone. Then the TB members would present participants teachers with the respective EUPRB. The main objective of this session is to make all teachers realise that they are free to design or adapt their own material based on the IBSE model if they wish and increase overall teacher confidence

The main objective was to introduce the content and methodology of EUPRBs and create a bank of interested teachers willing and eager to implement the material (even if they were not selected to take part in the Chain reaction project due to number restrictions or other parameters).

Following dissemination, briefing and training event, teacher educators had four two-weekly meetings with the participants on the onset, followed by three monthly meetings:

- designing and adapting the material
- Providing support regarding student presentation skills/ web log design skills/ research paper writing skills.
- Organising a visit by a Young scientist
- Organising teacher get-togethers
- Assessing progress

*In Ireland* the first briefing took place with a one day workshop held in early October. The second briefing took place in February with a one day workshop. Both briefing sessions were held at the University of Limerick. In total, the workshops last two full days. The workshops begin by teachers sharing what they believe inquiry to look like in practice.

### **Day One**

Working in groups, teachers discussed what they think inquiry is and what it looks like; from the perspective of the teacher and the student. Teachers reflected on the elements of inquiry that they are already implementing in their classrooms as well as features of inquiry that they would like to implement in future teaching. This gathered evidence of existing practice and allowed the teachers to reflect on improvements/developments that they could make to their own professional practice. Educational theory is constituted by the practitioners' (teachers') public description and explanations of their own practice (Whitehead 1989).

Teachers, in pairs, discussed the questions "How do you 'do' scientific inquiry in your teaching?" and "What does the inquiring student look like?" in order to create a shared understanding of what inquiry is understood to mean. Teachers placed their thoughts on post it notes that were then placed on the board. These became the talking point for discussion and debate. This process allowed for the co-construction of shared meaning for IBSE between all teachers.

The next part of the workshop focuses on vocalizing the teachers concerns and perceived barriers inhibiting their practice of IBSE in the classroom

All of the above were mapped out on mind maps and posters and are available in the workshop summary report attached.

After discussing their understanding of IBSE and identifying their concerns about implementing IBSE, the professional learning community (PLC) outlined their expectations for Chain Reaction 2015-16.

The PLC expectations for 2015-16:

- To make Science fun, engaging and exciting, change pupils' expectations of Science class-make Science class more like real Science
- Expectation of Support: from the UL Technical Board and school structures (management and peers)
- The UL Technical Board will make arrangements with each school / teacher to visit the schools to facilitate with PRB development and to observe and record the PRB implementation. Teachers also expect support from peers and management with their schools in the development and implementation

of the PRBs.

- To be recognised for participation and learning in this CPD
- To develop and improve practice: learn practical pedagogies and develop new skills by being open to new ideas and fresh approaches.
- To support each other on the *Edmodo* forum

They then engaged in a lesson study using the Green Light PRB. The purpose of a lesson study is to allow teachers to experience what students may be experiencing within the classroom. It puts the teachers into the role of the student to understand the possible frustrations, fears and eventual understanding that students may experience. There was then a de-brief after the lesson study to understand the teachers thoughts on the experience. This was portrayed on a mind map and is attached in the summary report from the workshop.

The end of the day focuses on preparing the teachers to bring their newly developed understanding of IBSE back into the classroom. The day also looks at additional teaching methodologies that can be used in line with inquiry, e.g. the Jigsaw method (which they experienced in the lesson study the day before) and the use of concept maps (they were given a PowerPoint presentation on this).

### **Day Two**

This day began by having the teachers reflect on the inquiry experience, in terms of understanding what they did in the classroom and what the nature of students learning was. Next the workshop looked at the new Junior Cycle Specification, which is being disseminated in Ireland in September and looked specifically on how the inquiry experience aligns with the new Specification. After this a presentation was given on the 5 e model of inquiry and more specifically on the “engage” feature of the 5 E model. With this, members of the TB showed demonstrations which, it is considered, can help engage students in the inquiry experience. The workshop then moved on to show the teachers another pedagogical strategy called assertive questioning that can be used with inquiry. The workshop ended with a reflection on Inquiry- What are the constraints? What does the Inquiring Teacher/ Inquiring Student look like? The PowerPoints on this from the first workshop were used as a guide to compare the teachers new believes.

All of the teachers participating in the Chain Reaction project required some form of ongoing support from the TB. This varied from partner to partner. Some examples are included below:

*In the UK* participating teachers attended an initial briefing twilight session (3 hours) which introduced them to the concept of inquiry in the science classroom in an attempt to situate the Chain Reaction approach in a wider context. Through an interactive session teachers discussed and debated the concept and related their experiences of it in their classroom to the wider group. Following this discussion, the teachers were introduced to the briefs and given time to digest the material, to ask questions and formulate draft plans to build upon back in their schools. Teachers were also able to sample some simple experimental work in labs to give them a flavour of what might be possible.

The Tb offered support via visits, and also on the telephone as necessary. The Project managers and the coordinator also visited schools to give advice and guidance.

The level of support needed was generally quite low as teachers in the UK are reasonably familiar with IBSE, although very few use it. More support was needed for preparation for the National and international conferences, in terms of the format of posters, and the content of presentations as teachers were less likely to be familiar with these types of events.

*In Italy* there was a requirement for full support in implementing the proposed EUPRBs. The main reason is that when implementing IBSE approaches teachers:

- found significant differences with their usual teacher-centred practice in implementing them
- held contradictory beliefs with respect to inquiry pedagogy
- had not previously experienced this approach

Because of this significant support was given to teachers in school which included regular visits from TB members and role models.

*In Slovakia* the TB offered teachers various types of ongoing support – consultation by email, by phone, school visits and role models at schools etc. The level of support needed was dependant on individual teachers and the selected EUPRB. Most of the teachers were very experienced, enthusiastic and creative. Project members used their expertise in the following project year during the initial briefing of the next cohort of teachers and during the conference. But even these experienced teachers were keen to invite role models and TBs to work with students as they found this aspect very motivating and helpful to both themselves and their students.

*In Bulgaria* the teachers had little experience on how to conduct IBSE and, therefore, needed their training to focus on this element. Participating teachers needed support and advice with which pedagogical approaches they could use with students in their inquiry classrooms. At first their reaction was fear and uncertainty as to whether the students would do well with their tasks. However, the teachers were impressed with the student's engagement and in the course of the work the teachers realized that their role as facilitators and advisers was highly effective in terms of student motivation and achievement.

*In France* inquiry approaches are relatively common and teachers did not require as much support. Therefore, the TB organized only 2 training sessions with teachers. The main needs of the teachers focused on how to set up EUPRBs. Some case studies based on the previous year's data was also used to help teachers improve their practice.

*In Slovenia* the teachers required significant support to understand and deliver IBSE as it is a pedagogical approach that they are not familiar with. Teachers also required professional support from the TB team regarding the EUPRBs content. Most of the teachers were not familiar with the EUPRBs content. Because of this, regular visits and electronic contact was made with participating teachers to provide necessary support and information.

*In Germany* most teachers already had a good understanding of inquiry and inquiry based science education and teaching. Therefore, questions mostly related to the implementation of the EUPRBs into the general context of teaching during school time which was difficult because of the structure of the German science curricula.

*In Georgia* teachers required support on how to implement IBSE in the classrooms. They also needed help on how to develop inquiry projects with the students, which pedagogical approaches they could use with the students, and how to prepare the materials. Georgian teachers do not have much experience with IBSE activities although a new national curriculum in science, which is based on inquiry, began in 2006-2007. Teachers need professional development and support in the implementation of IBSE in their classrooms. Therefore, a series of short sessions with participating teachers were arranged (5 x 2 hour sessions). These took place at both the university and schools and included modelling approaches. Progress visits were also made.

Some of the ongoing teacher support provided by the PMB and TB took the form of school visits before, during and after the in-school activities. Once again the frequency, length and content of these visits varied across the consortium:

*In the UK* once teachers had confirmed their plan a number of visits took place from project members. Firstly, members of the PMB visited the schools early during their planning and/or delivery phase. This visit had a number of purposes:

- to provide identify if any further support was needed by the teachers and students to carry out their inquiry projects
- to reinforce the philosophy of the project
- to monitor progress



A second visit was organised with the schools by members of TB to support the teachers and students working towards the end of their projects and provide any support necessary.

A final information session was held prior to the national conferences each year. These took part at SHU and were designed to gain feedback from teachers regarding their experiences and to provide information about participation in the national conferences. Additional support was offered to schools that were identified to participate in international conferences and included developing students work and presentations further, presentations skills, and pragmatic support for travel arrangements.

On average, the *Italian* TB observed each teacher at least two times in their classroom (from 4 to 10 hours). The teachers requested the TB to be present at the beginning of the activities to support the introduction of the project to the students. Generally, during the first visit, the TB helped the teachers in managing the classroom activities, and recorded with a video camera what was going on in order to provide a tool for reflection and discussion. During the second visit the teachers took the lead.

*In Slovakia* there were 22 visits to the participating schools during three year project. In most cases the role-models or TBs gave an introductory talk to students and the teachers focused on the selected EUPRB. The visits to schools were supplemented by 10 visits by the students and teachers to the Faculty of natural sciences at the University. They came for a lecture, or to complete an experiment at the Chemistry labs.

*For Bulgaria* different schools and different teachers needed a varied number of visits. The minimum number of visits was two; however, there were some teachers who required more attention. Therefore the TB visited them more than 5 times.

In the second and third year of the project, teachers participated in the network and helped each other by using the suggestions given by the participating teachers from the previous years.

*In Germany* each school was visited at least once during the project phase, however, the majority of schools were visited a second, third or fourth time.

During their visit at school, the Chain Reaction team members would ask the teacher how the project was going and how the students were doing with their research. They ask about the motivation of the students and if there were any problems.

The Chain Reaction project was designed to follow a cyclical model that repeated a yearly programme three times over the course of its lifetime. It was designed in this way to ensure that the experiences of one year - both positive and negative - could be used to inform the following year and allow the project to develop and improve. As such, it was anticipated that the teacher briefings would change and develop based on both formal and informal feedback provided by both the teachers involved and the TB themselves. Adaptations were encouraged to ensure that the briefing materials and content met the needs at a national and local level. All developmental delivery changes were shared as best practice across the consortium so that others could choose to adopt them when relevant to their own context.

In the *UK* the briefing programme started out with quite formal sessions in year 1, however, over time developed into a more informal daylong event where teachers were encouraged to speak about and share their experiences of IBSE, possible barriers and how the project could be implemented in school. While there was a small amount of hands on work, the majority of the discussions were more theoretical initially based around the nature and process of scientific thinking. Links between the national curriculum and IBSE were explored with particular focus on asking questions and collaboration. The teachers were then introduced to the EUPRBs and the Chain Reaction model, and were asked to discuss which briefs appealed to them and how they might use them in the classroom.

Teachers were also introduced to the concept of the national and international conferences and how they work,

and the expectations of the events in terms of presentations and posters.

In **Slovakia** the briefing programme was redesigned for the new groups of teachers in Year 2 and 3 according to experience and good practice learned from other partners, as well as with a respect to the feedback gained from the first cohort of teachers.

In Year 2 a transfer of knowledge and experience between previous and new project schools became a new part of the programme. They invited one student team – a participant of both national and international conferences – together with their teacher to share their experience with a new cohort of teachers.

In **France** the EUPRBs were tested in groups and testimonies from the previous year's teachers were added to the briefing schedule.

In the first year, after the initial briefing, a face-to-face group analysis of practices was organised. In the second year, this additional briefing and analysis took place through a Skype meeting. In the third year, the analysis was dropped as teachers found it too time-consuming and preferred phone and e-mail exchanges.

In **Germany** the initial briefings in the first year went very well, so there was no need to change the approach and the activities. However, from the second year the TB added a second teacher briefing at the University, and increased the number of visits in schools. The teachers appreciated these visits, mentioning that it motivates the students and themselves.

In **Greece** during year 1, briefing was more prescriptive with support material that teachers could use for at least a month regardless of their selected EUPRB. In year 2, they allowed for more teacher-teacher collaboration and peer discussions and there was more flexibility regarding teacher actions. In year 3, the TB introduced the online open course at UOC on IBSE framework, teaching methodology and teacher challenges as a form of formal reference point and resource, which facilitated even more flexible and targeted involvement regarding teacher needs and support.

Teachers reported using the [www.chreact.gr](http://www.chreact.gr) website regularly to find supplementary material. They also reported using the online course resources.

In **Ireland** the first briefing session used to run over 2 days however due to the fact that the teachers could not come a second day, for year 3 the first briefing session was reduced down to one day and one of the TB followed up with teachers in the school. Also year 3 saw an additional focus on alternative methodologies that could be used in line with scientific inquiry.

#### Resources: WP5 (Months 1-18)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	0.7	1.71	2.95	1.32	1.5	2.54	3.9	2.42	5.99	2.13	2.14	2.28	<b>29.58</b>

#### Resources: WP5 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	1.25	1.25	1.25	1.25	1.75	1.25	1.25	1.25	1.25	1.25	1.25	1.25	<b>15.5</b>
Actual for	0.2	0.729	2.07	2.1	2.5	0.95	7.17	2.11	4.3	2.63	0.5	0.93	<b>26.189</b>

months 19-36													
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**Resources: WP5 (Months 1-36) TOTAL**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	2.5	2.5	2.5	2.5	3.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	31
Actual for months 1-36	0.9	2.439	5.02	3.42	4	3.49	11.07	4.53	10.29	4.76	2.64	3.21	55.769

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP5. As is evident from the Total table (in red) WP5 required 24.769 more person months than initially predicted. As we can see from the evidence above, significant extra work was undertaken to provide teachers and students with the necessary support needed to design and deliver their Chain Reaction projects. Because of the Chain Reaction cyclical model the partners were able to be flexible in the project approaches and modified their approaches accordingly. However, this meant that WP resource ran severely over the estimated planned months but was necessary to enhance the quality of delivery and achievement. In addition to this, some partners (e.g. UoC and UL) found that the concepts and theory around IBSE and its application in the classroom were much less developed (or indeed absent) from their national educational approaches - this was not predicted at the project outset and meant that teachers often needed far more support in the classroom than was anticipated.

**4.6 Work Package 6 - In school delivery**

This work package is led by the University of Limerick, Ireland (Partner 10).

*Predicted start and end dates for WP6*

Start Month	7	End Month	34
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*Actual start and end dates for WP6*

Start Month	7	End Month	34
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**Objectives**

- Inquiry based teaching through delivery of the EUPRBs to approximately 10,800 students over the three year project
- Students' communication skills and confidence enhanced and developed through conference presentation preparation
- Increase teacher confidence in Inquiry Based teaching through EUPRB delivery

**Significant Results**

Work Package 6 aimed to facilitate the delivery of inquiry-based learning to thousands of students over the three year period. Within each school setting, teachers could either team-teach or teach the inquiry-based lessons individually to students between the ages of 14 and 17. As part of the process, students were asked to communicate their results through a written report which would be used to help their preparations for the National

Express Yourself Conferences. Some schools in partner countries selected one or two groups to represent them at the conference while other schools held larger national conferences where all students within their groups presented their work.

Chain Reaction in-school delivery was designed to place the students at the centre of their own scientific investigations. The approaches employed by the partner countries varied significantly based on localised requirements and pressures, however all approaches to in-school delivery focused on student-led inquiry. UL for example, had a large focus on having the teachers supported initially by the Technical Board but then gradually gave the teachers the freedom to complete the inquiry activity. SHU reported that students initially had difficulty with the open nature of the inquiry process but began to understand and enact the practice as they continued to engage in inquiry. ISU had a focus on socio-scientific relevance, as did the schools in UoL as they consider inquiry a critical methodology in understanding the importance of socio-scientific issues. The choice of school was interesting with the Bulgarian team, for example, choosing a school for future drivers and mechanics. A significant message here is that the inquiry approach can be used with all types of schools and students.

While many of the partner schools used existing EUPRBs, many also went on to design and develop new EUPRBs which were then shared across the consortium. The teachers in the UK selected the EUPRB which they felt best provided links with the curriculum. This suggests that for inquiry to be sustainable in the classroom, the in-school delivery of inquiry needs to link with the country's syllabi content.

The Jigsaw method was used by different partners (namely CIFOP and UoL) as a vehicle to allow for inquiry-based learning. This methodology was used in previous years and highlights the success of this as a method for use in the inquiry classroom.

The project's impact on Students' communication skills and confidence has been captured in the overall evaluation of Chain Reaction. This can also be said of the teachers' confidence delivering IBSE.

In-school delivery across the consortium had its own character and identity, according to the country and its culture. For a full review of the in-school processes and delivery please see the Deliverable reports for Work Package 6.

**Table 4.6.1 - Schools and Teachers - Year 2**

Partner 1 SHU		Partner 2 UNINA		Partner 3 UMB		Partner 4 TEDU		Partner 5 PU		Partner 6 CIFOP	
Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers
Don Valley Academy**	Phil Wilson & Gareth Tucker	I.I.S. "F. Degni" Torre del Greco	Gennaro Sorrentino & Antonio Palmieri	Gymnázium Vranov nad Topľou	Ján Motešícký & Lenka Pohlodová	Balgat Mesleki ve Teknik Anadolu Lisesi	Duygu Güler Hatice Tümer İnciser İpek	NSOU "Sofia", Sofia	Valentina Marinova & Svetla Kirilova	Collège Episcopal St-Etienne - Strasbourg	Florence Nicolas & Ahmed Dkhissi
Eckington School	Sam Cottrill & Chris Williams	L. S. "G. Mazzini" Nspoli	Paola Palazzo & Loredana Locci	Gymnázium Františka Švantnera v Novej Bani	Daniela Benčatová & Bohuslav Šušoliak	Mehmet Ali Hasan Çoşkun Anadolu Lisesi	Emine Yazgan Müjdem Demet Yücelgen Dilek Duvarci	SOU "Dr. Peter Beron", Svilengrad	Sevdalina Peikova & Slatka Stankova	Lycée Jean Mermoz – St-Louis	Franck Albrecht & Jean-Jacques Belen
Bradfield School	Jeannette Allen & Sarah Hambleton	L. S. "E. G. Segre" San Cipriano d'Aversa	Roberto Voccia & Maria de Chiara	Gymnázium Detva	František Strýček & Bartolomej Szakál	Elmadağ Gazi Şahin Anadolu Lisesi	Şule Ünal	PGEE, Plovdiv	Ganka Labcheva & Saveliya Becheva	LPO La Fontaine des Eaux – Dinan	Ghislaine Dufour & Erwan Martin
Winterhill School	Farran Postoyalko	IISS "F. S. Nitti" Napoli	Marina Minestrini & Domenico Colamonicci	Katolícke gymnázium Štefana Moyzesa Banská Bystrica	Iveta Kaščáková & Katarína Pavličková	TOKI Anadolu Lisesi	Zelihan Çakir	OMG, Plovdiv	Mariya Barakova & Angel Panayotov	Lycée Henri Poincaré – Nancy	Laurence Chrétien & Liborio Alessandrelli
Mexborough School	Karl Harrah & Jenifer Milner	ITTS "Marie Curie"	Vittoria Siviglia & Salvatore Sogaro	Evanjelické gymnázium Banská Bystrica	Slavomír Hanuska & Anna Šišková	Yasemin Karakaya Bilim ve Sanat Merkezi	Erhan Şahin Fatih Ferdi Keser	PG transport "Goze Delchev", Plovdiv	Nedyalka Trayanova & Mariya Hristova	Lycée Marguerite Yourcenar – Erstein	Céline Laugel & Matthieu Weber
Partner 7 UL		Partner 8 PHHD		Partner 9 UOC		Partner 10 UOL		Partner 11 JSSR		Partner 12 ISU	
Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers
OŠ Staneta Žagarja Kranj	Marko Popit & Neva Pogačnik	Elisabeth-Gymnasium Mannheim	Michael Grauli & Holger Prestor	Alikiano Lyceum Chania	Mr Ioannis Nikolaou & Mr Stylianos Stavgiannoudakis	Desmond College	Marie Corkery & Lavelle Elizabeth Cregan	King Abdullah II for Excellence school	Ahmad Adel Jad-Allah & Ola Ayed Alhessa	State School N 42, Tbilisi	Tamar Meladze & Nona Todua
OŠ Šentjernej, Šentjernej	Slavica Jordan & Roman Turk	Freie Schule LernZeitRäume Dossenheim	Robert Tuchan & Jan Dietrich	Atsipopoulou High School Rethymnon	Mr George Spyridakis & Mrs Alexandra Ntroumpogianni	Laurel Hill	Siobhan Crowe & Elizabeth Smith	Omar bin Alkatab/ Secondary School for boys	Majdi Omar & Tariq Abu-Edeh	Newton Free School, Tbilisi	Shorena Samakashvili & Irakli Kordzakhia
Osnovna šola Janka Modra, Dol pri Ljubljani	Nejc Žagar & Urška Kovač Grad	Marion-Dönhoff-Realschule	Stefan Söhne & Klaus Richter	2 <sup>nd</sup> High School Heraklion	Mr Dimitrios Kelefiotis & Mrs Sofia Papadaki	Templeogue College	Darren O'Sullivan & Anthony Kelly	Maymouna bnt Elhareth basic mixed School	Suzan Ahmad Darayseh & Abeer Mansoor Al-	School-Lyceum "AIA-GESS" named after Servantes,	Daredjan Lortkipanidze & Inga Chinchaladze

Osnovna šola n. h. Maksa Pečarja Ljubljana-Črnuče	Milan Gaberšek & Aleš Drinovec	Stephen-Hawking-Schule	Michaela Freund & Verena Leutz	6 <sup>th</sup> High School Heraklion	Mr Stylianos Terzakis & Mrs Evaggelia Lagoudaki	Columbas	Humphrey Jones & Emma McNelis	Abu Thar Alghafari Secondary school for boys	Ahmad Jamal Saadeh & Mohammad Othman Abdelatef	Tbilisi State School N 1, Bolnisi	Lela Geladze & Tinatin Pruidze
OŠ Srečka Kosovela Sežana, Sežana	Lucijana Rebec & Neva Jerič	St. Raphael Gymnasium Heidelberg	Claudia Fensterer & Sabine Seeberg	3 <sup>rd</sup> Lyceum Heraklion	Mr George Kotsiopoulos & Mrs Sultana Christoforatu	Coláiste an Spioraid Naoimh, Cork	Sian Joyce	Iskan AlJamaa Secondary School	Manal Mohammad Tayoun & Rana Jafar Jegbeer	State School N 33, Kutaisi	Nino Gubeladze & Marina Iskakova

\* winners of National Express Yourself Conferences

\*\* Attended training, pupils completed work in school but did not attend the National Conference due to teacher illness.

**Table 4.6.2 - Schools and Teachers - Year 3**

Partner 1 SHU		Partner 2 UNINA		Partner 3 UMB		Partner 4 TEDU		Partner 5 PU		Partner 6 CIFOP	
Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers
Sirius Academy, Hull	Rebecca Gilby	Scientific Lyceum "Piero Calamandrei" – Napoli	Marina De Cesare, Chiara Tarallo	Gymnázium A. H. Škultétyho, Veľký Krtíš	Ivana Drdošová, Božena Horváthová	Bahçelievler Anatolian High School	Ferda Taşdan	Secondary school "Patriarh Eftimii", Plovdiv	Stoyanka Ruseva Elena Bozhinova	Lycée Claude Bernard (Villefranche/Saône)	Emmanuelle Manca & Emeline Garcia
Ridgewood School, Doncaster	Jamie Self, Amand Dibbo	Scientific Lyceum "V. Cuoco-T. Campanella" – Napoli	Maria Moretti, Caterina Mattera, <b>extra teacher Antonella La Pegna</b>	Súkromné gymnázium Železiarne Podbrezová, Podbrezová	Martina Stieranková, Juraj Čief	Hacı Ömer Tarman Anatolian High School	Sibel Basmacı	Mathematics gymnasium "Vasil Levski", Smolyan	Nedyalka Kukleva Velichka Zgurova	Lycée Hilaire de Chardonnet (Chalon/Saône)	Matthias Schultz & Jean-Yves Beauchot
Thornleigh Salesian College, Bolton	Melissa Finlay, Ben Hughes	Scientific Lyceum "Istituto Maria Ausiliatrice" – Napoli	Angela Falvo, Aurelia Apice	Gymnázium Martina Kukučina, Revúca	Igor Baran, Martin Varchol	Ankara Atatürk High School	Hülya Berat Atalay Hacı Murat Göçmen	Mathematics gymnasium "Geo Milev", Stara Zagora	Stoyan Todorov Mariika Fizieva	Lycée Jean Monnet (Saint-Étienne)	Claire Chevrier & Sylvie Lagarde
Outwood Academy Shafton, Bamsley	Ash Harness	Scientific Lyceum "Filippo Silvestri" – Portici (Na)	Filomena Asprino, Patrizia Imperato	Gymnázium J. G. Tajovského, Banská Bystrica	Mária Kozáková, Soňa Husárová	Yakacık Anatolian High School	Aysegül Altun	Professional school "Ivan Hadjienov", Kazanlak	Tatyana Kazakova Georgi Daskalov	Lycée La Fourragère (Marseille)	Françoise Mauroux & Christine Aguerra (substituted by Marion Larroque)

Unable to recruit	Scientific Lyceum "Tito Lucrezio Caro" – Napoli	Mariarosaria Arcella, Maria Di Benedetto	Gymnázium J. A. Raymana, Prešov	Iveta Štefančinová, Jana Kobulská	Mehmet Emin Rezulzade Anatolian High School	Betül Canan Üstündağ Figan Özsoy	Language school "Bertolt Brecht", Pazardgik	Elena Blagoeva Sonya Asenova	Lycée Montchapet (Dijon)	Nathalie Fausot & Jérémie Malatesta	
	Extra school: Scientific Lyceum "V. De Caprariis" – Atripalda (Av)	Marco Mattera			Extra school: Ufuk Arslan Anatolian High School	Bircan Yiğit					
					Extra school: Yasemin Karakaya Bilim Ve Sanat Merkezi	Suat Gültekin Necva Hadim					
Partner 7 UL		Partner 8 PHHD		Partner 9 UOC		Partner 10 UOL		Partner 11 JSSR		Partner 12 ISU	
Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers	Schools	Teachers
OŠ Draga Kobala Maribor	Ervin Potnik, Irena Horvat	Heisenberg Gymnasium Bruchsal	Raoul Landt, Nina Heinen, Yuri Bayat, Steffi Kimmel	3 <sup>rd</sup> High School of Rethymnon	Mr Evaggelos Altas Mr Christos Karteroliotis	Colaiste Einde	Ann McGreavy and Mathew Lockett	The Islamic Educational College Schools	Ms.Hiba Dahnos Ms.Jumana Issa	Batumi State School N2	Nana papunaishvili Mzevinar Imedashvili
OŠ bratov Polančičev Maribor	Mladen Tancer, Romana Tancer	Heidelberg International School	Sarah Al-Benna, Luis Quijada	Model Experimental High School of University of Crete-Rethymnon	Mr Christos Mantzios Mr Ioannis Markantes	Colaiste Iognaid	Clodagh Mitchell and Barbara O'Riordan	Al-Manhal International School	Ms.Ayat Al-wahsh Mr.Tariq Al-bustanji	Borjomi State School N3	Marina Lomidze Eter Sabauri
OŠ Franja Goloba Prevalje	Samo Lipovnik, Marija Sirk Polanšek	Schönborn Gymnasium Bruchsal	Daniel Gallé, Daniel Wiesler	Voukolies High School	Mr Theodoros Paraschou Mr Panayiotis Fragkedakis	St Oliver's Community College	Ciara Lawlor and Deirdre McNamara	Mutah University Model High School	Mr.Muaweya assasfeh Mr.Sadam ramadeen	Telavi State School N4	Eka Gurgenshvili Maia Pitskhelauri
OŠ Antona Žnideršiča Ilirska Bistrica	Tatjana Vičič, Nataša Olenik	Karl-von-Drais Schule Mannheim	Afer Aslan, Ekrem Görgülü	Music School of Chania	Mr Georgios Andredakis Mrs Eirini Chalakatevaki	Gaelcholaiste Luimnigh	Eoin Tierney and Maria Kennelly	Al-Rashad Ideal Schools	Mr.Imad Al-mahrouq Mr.Abd Almajeed abu jarar	Rustavi State School N12	Marina Rostashvili Lela Chaava
OŠ Koper	Tina Kavčič, Sandra Starc	Unable to recruit		Souda General Lyceum	Mr Christos Tzetzias Mrs Niki Spartali	St Joseph of Cluny	Lynda Forde and Serena Maloney	Zarqa Private University Schools	Ms.Amal Al-shorah Ms.Buthaina Al-awadat	Bakhutsikhe State School	Nino Samadashvili Ana Luashvili





Table 4.6.1 lists the schools and teachers who participated in the project during years 2 and 3. An issue with teacher illness in year 2 prevented one school from attending the national conference in the UK - this school had however, attended all of the training workshops and delivered the programme in school with students. In year 3 both Germany and the UK failed to recruit one of the five schools expected due to issues around curriculum/management changes at a local level. However, Italy and Turkey were able to over recruit with Italy having one additional school involved (six in total) and Turkey having two (seven in total).

The local and/or national contexts experienced by the consortium partners impacted on the ease at which schools were recruited. Some partner examples are highlighted below:

*In Bulgaria* the interest in the project was so great that there were no problems in recruiting schools to participate. In the first year teachers from Plovdiv who were already well known to the PMB and/or TB were contacted to take part in the project.

In the second year it was decided to include schools outside of the city and so the Ministry of Education was contacted for their support and contacted teachers in these schools agreed to participate in the project. During the third year, after a presentation at the National Teachers Conference in Blagoevgrad, there were so many teachers applying to participate in Chain Reaction that the PMB were forced to turn schools down.

*In France* during the set up of the project, there were some difficulties in enrolling schools. Teachers were not enthusiastic about the project and school head teachers were reluctant to engage their schools with the consortium due to schools in France already having significant experience of inquiry approaches. Two schools withdraw a few weeks before the initial briefing and the TB had to find two new schools in a very short space of time.

In the second and third years, things were much easier as the executives from a number of academies had shown a great interest in the project and encouraged some schools to participate.

The recruiting of schools was not a difficult task *in Slovenia*. Schools were recruited via professional contacts, for example by contacting former students (trainee teachers), now teachers at different schools in Slovenia. The second parameter of the choice was the location of the schools. The PMB were careful that different parts of Slovenia and the rural/urban schools were adequately represented.

At the beginning of the project, *the German* PMB and TB found it easy to find and recruit schools that were interested and ready to work with the project.

The acquisition of schools in year 3 was a little more difficult, since the schools from the region were very active and therefore, busy with a variety of regional, national and international projects. Thus, the TB sent out letters to schools in the region to stimulate interest. At the Teacher Briefing in October 2015 five schools were represented. But one of those schools withdrew. At the end of the acquisition period, four schools were recruited. The TB tried to recruit the fifth school until January 2016 but with no success.

In the *UK* recruitment of schools is often problematic as a result of pressures on teacher time due to the curriculum and assessment demands. This was particularly acute in year 3 of the project, as the result of the introduction of a new science curriculum for the school year 2015-16. This meant that teachers and schools were even more unwilling to commit extra curriculum time for projects that were not seen as being core to the curriculum and examination results.

For *Ireland* it was easier in year 2 and 3 as the project had some national recognition at this stage. The PMB and TB were also able to provide interested teachers with information on the potential agendas for the workshops and the national conference. Alongside the feedback from year 1 teachers this helped to recruit the required number of schools. Some of the year 1 teacher's actively facilitated in the recruitment of year 2 teachers. For example,

one of the teachers from year 1 sent an email to a large cohort of teachers within a particular organisation identifying the professional development opportunities from being involved in Chain Reaction.

Chain Reaction is very popular in **Georgia**. Each year the PMB/TB received more than 20 proposals from the schools hoping to participate.

Each year an announcement about recruitment was made via Facebook. In the third year Georgia had 23 applications for the project. They undertook interviews with all applicants and choose 5 schools.

#### Resources: WP6 (Months 1-18) TAKEN FROM INTERIM REPORT

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	1.5	1.24	0.82	1.35	1.76	0.61	1	1.98	3.69	1.39	1.81	1.28	<b>18.43</b>

#### Resources: WP6 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	1.5	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	3	1.75	1.75	<b>22</b>
Actual for months 19-36	1.2	2.914	1.68	2.4	2.75	0.62	6.18	2.77	3.05	4.56	1.69	1.42	<b>31.234</b>

#### Resources: WP6 (Months 1-36) TOTAL

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	3	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	6	3.5	3.5	<b>44</b>
Actual for months 1-36	2.7	4.154	2.5	3.75	4.51	1.23	7.18	4.75	6.74	5.95	3.5	2.7	<b>49.664</b>

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP6. As is evident from the Total table (in red) WP6 required 5.664 more person months than initially predicted. The additional person months were required by partners 2, 4, 5, 7, 8 and 9. In-school delivery varied from partner to partner based on national/local demands – or indeed specific demands from school to school. This impacted on the time required to deliver this work package. In addition in-school delivery developed over the course of the project with partners introducing changes/new elements based on feedback and experience. This also had an impact on the amount of time spent on WP6.

## 4.7 Work Package 7 - Conferences

This work package is led by the University of Heidelberg, Germany (Partner 8).

*Predicted start and end dates for WP7*

Start Month	7	End Month	36
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*Actual start and end dates for WP7*

Start Month	7	End Month	36
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### Objectives

- 36 national and three international events over the three year project
- High quality online briefing for role models
- Dissemination of work through public attendance at events

### Significant Results

#### **National Express Yourself Conferences**

The National Express Yourself Conferences took place in all twelve participating countries between February and April of each project year. Every conference reflected as much as possible, professional science conferences with presentations from student teams composed of up to five students per school. Each student team was required to present their findings to their peers, teachers, and a panel of adjudicators made up of practicing science researchers and role models, as well as wider audience members including representatives from local civil society and employers. Role models were selected and invited by each partner team according to their scientific networks and the thematic focus of schools' chosen Chain Reaction project. The role models were briefed in each partner country individually.

The conference agendas all included introductions to the aims of the project, student presentations, poster sessions, a lunch and a final where teams were identified to represent their country at international Express Yourself Conferences. Each event had its own character and identity, according to the country and its culture. For example:

In **Turkey**, the project coordinator of the Turkish team delivered an initial speech and stated that the conference will enable students to enhance their interest and enthusiasm towards science. Each role model briefly talked about cancer and evolution which stimulated the interest of the students resulting in many questions from the student audience. The curiosity and the intense questioning from students impressed the role models to a degree where they gave students their contact information, so the students could reach the role models beyond the conference and project for further questioning about the research.

In **Slovenia**, twelve student teams presented their research results to the science community with oral presentations and power point presentations and an additional, twelve groups informed the audience about their research project through a poster session. Five evaluators evaluated all of the presentations and a team was chosen to represent Slovenia at the international “Express Yourself Conference”. All participating students received a certificate of attendance in acknowledgement of their work on Chain Reaction.

In **Germany**, the students were welcomed at registration with a conference backpack, including a conference booklet with all the students’ projects and abstracts, a pen and writing pad as well as a small lunch box. The local television “Rhein-Neckar Fernsehen” covered the event and interviewed some students about their participation in Chain Reaction and about their future science plans. <http://www.rnf.de/mediathek/video/schueler-forscher-aus-der-region/>. Moreover, the local newspaper “Rhein Neckar Zeitung” wrote an article about one of the participating schools—Heidelberg International School. Furthermore, the German students decided to develop their own research projects. Therefore, the German national “Express Yourself Conference” in year 3 had presentations about different ways to gain electric energy, for example during exercising in a fitness gym, by creating a low-budget solar panel, by using solar power in a model of an updraft power station and by gaining of electric energy by the transformation of sound waves.

Where possible University academics, education authorities and policy makers were invited to national conferences in order to maximize the dissemination and impact of chain reaction project.

During the presentation part of the different national conferences, each student team presented their research results in many different ways and as creatively as they wished. They ‘expressed themselves’ at an effective scientific level. For example, in Germany the students built a working low budget solar panel. Another student team built a model of an updraft power station and demonstrated how energy is gained by using solar power. Some teams had prepared demonstrations, used models, showed videos or used other additional materials like bicycles, lamps and living plants.

Throughout the presentations and discussions, the students proved that they had developed an understanding of scientific approaches and skills including curiosity, objectivity and critical reflection. Moreover, they showed that they were able to apply the knowledge and skills they gained during the project to solve other problems. They developed self-confidence and self-reliance through problem solving and teamwork. The students gained experience they will be able to use for their professional career after school. They know how to present results publicly and they can answer questions under stress and pressure when presenting.

The lectures of the role models impressed the majority of students which was evidenced by the range and number of interesting and intelligent questions as well as ensuing discussions with the role models. The students experienced effective information and demonstrations regarding possible careers in science, and especially the feeling of how it is to work as a scientist.

### **The International *Express Yourself* Conference**

At the National Express Yourself Conferences each year, each partner country chose a team to go forward to the International Express Yourself Conference based on set criteria. These were held across Europe in the following venues:

Year 1	Sheffield Hallam University, UK	May 13 <sup>th</sup> 2014
Year 2	University of Heidelberg, Germany	May 11 <sup>th</sup> - 12 <sup>th</sup> 2015

It was decided in Sheffield in 2014, after the first International Express Yourself conference, that future conferences would be accompanied by an additional half day inquiry workshop organized for the students and their teachers. This was trialled in Germany during year 2 and was met with great success. As such it was part of the programme again in Year 3 in Bulgaria. The half day events offered the students an opportunity to work with their peers from across Europe on scientific challenges and puzzles. This extra session meant that in years 2 and 3 the conference was presented over a two day period.

In Year 3 the students were set the challenge of working in International teams to generate a *Chain Reaction* process. The students interacted with each other, solved problems by discussing different solutions, used scientific terms and worked hand in hand to create their own Chain Reaction process. The interaction with each other generated friendships and an international student network was the goal of this activity.

All teams from the National Conferences, coming from the 12 partner countries, participated at the international Express Yourself Conference. The conferences took place as planned in terms of a research conference with all teams presenting their work on an international stage.

Each presentation differed from the presentation before, but in a very positive way. Some of the students used different types of media like video or music to complete their presentation and to emphasise their results. Here are some of the great examples which impressed the audience during the year 3 International conference:

The **Jordanian** team impressed with a commercial-style presentation, which included self-made videos of their research process and of the results they generated. They started with an actual problem in the field of feeding the world and were very conclusive in their recommendation to use coffee dregs as fertilizer. They achieved cooperation with different coffee sellers in Jordan, who will now provide farmers with coffee dregs in order to help to fertilize their plant cultivation. This is strong evidence of the impact on local and potentially national society of students' research through the Chain Reaction project.

The student team from the **UK** showed the audience, that there are many different methods to build a portable hydroelectric power station. Some team members checked the general design of a PHEPP, others looked into the efficiency of large power plants. In conclusion, each team member engaged in research in another area and they all came together to share their research results in a creative and informative presentation.

The **Slovenian** student team developed different blade-types and looked into different kinds of efficiency-development of water turbines. They constructed a model, where a range of blades could be tested. With the help of a water tank, they could test the different blades under controlled conditions. The turbine models were jointed with measured weights, which were lifted when the turbine ran. The students established, with their model, that the most efficient blade for a water turbine was a curved, circular blade. The students presented their research very illustratively with different charts and images of their designed blades.

The student team from **Slovakia** built a model, which explained impressively how powerful solar energy is and how humankind can harness and use this everyday power in the best way. They presented to the audience, how the problem of fossil fuel heating could be solved and how efficient solar power is for heating water.

The **German** student team impressed with their idea of making a low-budget solar panel – guided by a suggestion they found in the internet. First, they explained to the audience how in general a solar panel works, and then they showed their ideas, research questions and thoughts accompanying their research process. Especially a problem with the solar sensitive dye Rhodamine B was mentioned and that the solution to this problem is the exchange from one oxygen atom with a silicon one. As a highlight during their presentation, the students just built a solar panel, which worked fine using an overhead projector lamp and showed that the solar

panel gained electric energy from light.

In Year 3 of the project an exciting teacher networking workshop took place which mirrored the work being undertaken by the students. While teams of students designed and created their Chain Reaction processes, teachers collaborated in international teams to solve their own scientific problems which aimed to model potential inquiry approaches and techniques they could adapt for their practice. The teachers were asked to empathise with how the students may feel when faced with a difficult question by undertaking their own scientific inquiry. Much like the students they had to work together to test theories and draw conclusions with their peers from across Europe. A key purpose of this extra activity was to further establish an international teacher network. Teachers were encouraged to use the main website to develop collaborative partnerships, exchange ideas and to share experiences. All of the teachers responded positively to the workshop and opportunity to speak with international peers and we anticipate that many will continue to communicate via the main website.

**Table 4.7.1 - Dates and Venues of National Express Yourself Events 2015**

Participant No.	Short name	Country	National EYC 2015	Venue	Role model names
1	SHU	UK	March 18 <sup>th</sup>	Sheffield Hallam University	Amy Irvine, Ashleigh Thompson, Rosie Brook, Adam Cox, Elspeth Whitby, Rizwan Ali, Simone Croft, Amaku Metu, Steve Bates, Elizabeth Heywood
2	UNINA	IT	April 17 <sup>th</sup>	Carlo Ciliberto Hall - Unina	M.Sc. Viviana Correra, Dr. Paolo Massarotti, Dr. Pasquale Noli, Dr. Emanuele Orabona
3	UMB	SK	April 10 <sup>th</sup>	Stará Lesná	Šimon Budzák, Zuzana Fecková, Jozef Suja
4	TEDU	TR	March 14 <sup>th</sup>	Ted University	Prof. Dr. Hüseyin Avni Öktem, Prof. Dr. Tayfun Özçelik
5	PU	BG	April 12 <sup>th</sup>	Plovdiv University, Compass room	Prof Tinko Eftimov – physicist, Asoc. Prof. Georgi Dyankov - physicist, Nikova Petrov, PhD, Director of the National Observatory, Prof. Semir Naimov – biologist, Asoc. Prof. Yordanka Dimova – chemists, Aneliya Dakova – PhD student, Marieta Ivanova – PhD student
6	CIFOP	FR	March 26 <sup>th</sup>	Astronomical observatory of Lyon	Célia Jacobberger-Foissac, Eléa Heberle, Edwige Schreyer, Kevin Dorgans, Jonathan Jumeau
7	UL	SI	March 13 <sup>th</sup>	University of Ljubljana, Faculty of Education	Jurij Franko, Gregor Veble
8	PHHD	DE	March 4 <sup>th</sup>	Heidelberg	Christian Mildemberger, Diana Griesinger
9	UOC	EL	March 21 <sup>st</sup>	Department of Chemistry University of Crete	Dr Raluca Buiculescu, Dr Vasilios Papadimitriou, Prof. Georgios Vasilikogiannakis
10	UOL	IE	March 20 <sup>th</sup>	University of Limerick	Kealan Doyle, Niamh Shaw, Laura Comber , Blathin Casey
11	JSSR	JO	March 14 <sup>th</sup>	Jordan University /King Abdullah faculty for Information Technology	Dr. Amaar Balasmeh, Dr. Mohammed Tarawneh, Dr.Etemad Jafreh, Dr. Ayman Sulaiman, Dr. Ahmad Qublan
12	ISU	GE	March 14 <sup>th</sup>	Tbilisi, Ilia State University	

**Table 4.7.2 - Dates and Venues of National Express Yourself Events 2016**

Participant No.	Short name	Country	National EYC 2016	Venue	Role model names
1	SHU	UK	March 1 <sup>st</sup>	SHU	Lucy Morris, Myles Butler, Katherine Inskip, Anokhee Parikh, Dr Laura Cole, Mootaz Salman, Hasan Aldewachi, Steve Bates, Adam Washington
2	UNINA	IT	March 18 <sup>th</sup>	Red Hall – Naples University Federico II	M.Sc. Edvige Gambino, Dr. Roberta De Luca, M.Sc. Silvia Galano
3	UMB	SK	7 <sup>th</sup> – 8 <sup>th</sup> April	Stará Lesná	Šimon Budzák, Zuzana Fecková, Jozef Suja, Ľuboš Polák
4	TEDU	TR	March 12 <sup>th</sup>	TEDU VENUE	Doç. Dr. Mehmet Somel, Prof. Dr. Emin Kansu
5	PU	BG	26.03.2016	6 <sup>th</sup> auditorium of the Main Building of PU	Prof Tinko Eftimov - physicist, Nikova Petrov, PhD, Director of the National Observatory, Prof. Semir Naimov – biologist, Asoc. Prof. Yordanka Dimova – chemists, Georgi Djuganov- agronomic, Aneliya Dakova – PhD student, Marieta Ivanova – PhD student
6	CIFOP	FR	March 24 <sup>th</sup>	Claude Bernard University, Lyon	Martina Ulvrova, Lucile Marty, Alix Augustin, Claire Mallard, Yuko Krzyzaniak, Cécile Clavaud, Jonathan Jumeau, Vincent Langlois Antoine Bérut
7	UL	SI	24 <sup>th</sup> - 25 <sup>th</sup> March	Hotel Jelovica, Bled	Andreja Gomboc, Luka Ambrožič
8	PHHD	DE	15 <sup>th</sup> March	University of Education Heidelberg, Keplerstraße 87, 69120 Heidelberg	Carolin Klonner, Dr. Nils Wolf
9	UOC	EL	2 <sup>nd</sup> April	Department of Chemistry, University of Crete	Dr Raluca Buiculescu, Dr Vasilios Papadimitriou, Mr Theocharis Nazos, Mr Asterios Charisiadis
10	UOL	IE	14 <sup>th</sup> March	University of Limerick	Walter Stanley, Sean Kirwan, Colette Kelly, Laurence Gill, Ronan Sulpice
11	JSSR	JO	19 <sup>th</sup> March	Al-Zarqa Private University	Dr.Etemad Jafreh, Dr. Mohammad abu Ali, Dr. Mohammad salahat, Dr. Jamal abu elRuz, Dr.Fayez el-Saudi
12	ISU	GE	27 <sup>th</sup> February	Ilia State University	



Table 4.7.1 shows the venues and dates for the National Conferences held in 2015 across the consortium. It also includes details of the scientific role models involved in the project and in the conferences themselves. Table 4.7.2 illustrates the venues and dates for the National Conferences held in 2016.

**Table 4.7.3a - Participants at the National Express Yourself Conferences 2014**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Students	166	210	48	162	88	87	67	88	142	64	175	90	<b>1387</b>
Teachers	10	20	12	10	12	12	9	14	14	7	50	10	<b>180</b>
Rolemodels	8	5	2	2	6	5	2	6	4	1	4	2	<b>47</b>
Other Participants	10	90	6	176	12	28	22	50	60	13	125	20	<b>612</b>
<b>Total</b>	<b>194</b>	<b>325</b>	<b>68</b>	<b>350</b>	<b>118</b>	<b>132</b>	<b>100</b>	<b>158</b>	<b>220</b>	<b>85</b>	<b>354</b>	<b>122</b>	<b>2226</b>

**Table 4.7.3b - Participants at the National Express Yourself Conferences 2015**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Students	162	344	64	264	77	87	103	71	110	125	220	95	<b>1722</b>
Teachers	8	17	13	21	10	16	12	12	30	9	20	15	<b>183</b>
Rolemodels	10	4	2	2	7	5	2	2	3	2	5	2	<b>46</b>
Other Participants	19	51	10	62	8	50	9	60	30	10	60	5	<b>374</b>
<b>Total</b>	<b>199</b>	<b>416</b>	<b>89</b>	<b>349</b>	<b>102</b>	<b>158</b>	<b>126</b>	<b>145</b>	<b>173</b>	<b>146</b>	<b>305</b>	<b>117</b>	<b>2325</b>

**Table 4.7.3c - Participants at the National Express Yourself Conferences 2016**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Students	126	329	64	282	45	112	69	55	110	89	300	85	<b>1666</b>
Teachers	10	21	13	27	10	21	11	10	30	9	20	20	<b>202</b>
Rolemodels	9	3	2	2	7	9	2	2	4	1	5	2	<b>48</b>
Other Participants	26	52	15	70	10	30	13	38	20	9	40	6	<b>329</b>
<b>Total</b>	<b>171</b>	<b>405</b>	<b>94</b>	<b>381</b>	<b>72</b>	<b>172</b>	<b>95</b>	<b>105</b>	<b>164</b>	<b>108</b>	<b>365</b>	<b>113</b>	<b>2245</b>

**Table 4.7.4 - Total No. of Participants at the National Conferences (Years 1-3)**

	Year 1	Year 2	Year 3	Total
Participants Totals	2226	2325	2245	6796

Table 4.7.3a, 4.7.3b and 4.7.3c illustrate the number of students attending the National Express Yourself conferences during Year 1 (2014), Year 2 (2015) and Year 3 (2016). These totals do not include other pupils participating in the project within school - some schools chose to only bring a representative selection of students to the events based on performance and/or achievement within school. Across the full consortium the National Conferences were attended by a total of 2226 participants and audience members in year 1, 2325 in year 2 and 2245 in year 3. Across the full three years of the project the National Conferences were attended by a total of 6796 participants and audience members (as reflected in table 4.7.4).

**Table 4.7.5 - Total No. of Participants at the International Conferences (Years 1-3)**

	<b>Year 1</b> (Sheffield Hallam University, UK)	<b>Year 2</b> (University of Heidelberg, Germany)	<b>Year 3</b> (University of Plovdiv, Bulgaria)	<b>Total</b>
Students	198	90	77	<b>365</b>
Teachers	36	28	48	<b>112</b>
Role models	4	2	0	<b>6</b>
Other Participants	69	61	100	<b>230</b>
<b>Total</b>	<b>307</b>	<b>181</b>	<b>225</b>	<b>713</b>

Table 4.7.5 illustrates the total number of participants attending the three international conferences. The project consortium recognises the significance of reaching such a large range and number of students and teachers over the course of its three years with 6796 conference attendees at a national level and 713 at our prestigious international events.

The Chain Reaction project also recognises the success of reaching 5140 students and 677 teachers through our National and International Conference programme.

**Resources: WP7 (Months 1-18)**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	5.6	3.21	4.79	4.75	7.1	3.71	1.8	9.41	2.51	1.08	6.68	3.57	<b>54.21</b>

**Resources: WP7 (Months 19-36)**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	9	7	8	8	7	7	7.25	9.75	5.75	8.5	9.75	8	<b>95</b>
Actual for months 19-36	7.4	8.364	7.03	6.6	11.2	5.88	4.48	16.92	9.36	5.94	12.63	10.43	<b>106.234</b>

**Resources: WP7 (Months 1-36) TOTAL**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	

Planned for months 1-36	18	14	16	16	14	14	14.5	19.5	11.5	17	19.5	16	<b>190</b>
Actual for months 1-36	13	11.574	11.82	11.35	18.3	9.59	6.28	26.33	11.87	7.02	19.31	14	<b>160.444</b>

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP7. As is evident from the Total table (in red) WP7 required 29.556 fewer person months than initially predicted. The person months required for the months 1-18 were significantly less than set out at the beginning of the project due to this time frame only including one National and one International conference for all partners. This meant that the second half of the project required the larger proportion of person months as it included two National and two International conferences for all partners.

#### 4.8 Work Package 8 - Impact and Dissemination

This work package is led by the Jordan Society for Scientific Research, Jordan (Partner 11).

*Predicted start and end dates for WP8*

Start Month	10	End Month	36
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*Actual start and end dates for WP8*

Start Month	10	End Month	36
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Objectives

- Disseminate the work of the project to a wide audience including science education professionals, policy makers, the science community and the general public

#### Significant Results

There has been significant progress in the area of impact and dissemination across the consortium. This includes a number of publications and presentations. Please see Work Package 8 Deliverable Report for full list.

#### International Teacher Workshop

Perhaps the most significant dissemination and impact event delivered by the Chain Reaction project was the Teacher workshop held in Plovdiv, Bulgaria on 10<sup>th</sup> May 2016.

This event was first proposed to the consortium at the PMB held on 15-16<sup>th</sup> October 2015 in Tbilisi, Georgia (see the deliverable report on the PMB\_Georgia\_Oct15\_V1 - relating to this meeting for further information), as part of the final Chain Reaction International Conference in Plovdiv in May 2016.

The proposed workshop had a number of aims

- to enable teacher networking across and within partner countries and to form international links
- to enable the teachers to share experiences, best practice etc.

- to further enhance and deepen the learning and experience of IBSE gained as part of Chain Reaction

All members agreed that the workshop was a realistic concept with strong learning potential and stated that they would be able to fund the event. Plovdiv University agreed that it would host the event as part of the international conference. As this event was not included as part of the DoW the Consortium sought the approval of the PO which was granted. Planning took place over the intervening months.

The workshop was run by representatives from three partners, plus Stuart Bevins as the Coordinator who introduced and closed the day as well as chairing the teacher's CPD session. Marika Kapanadze from ISU, Georgia ran an ice breaker session where teachers were asked, in international groups to, to determine the weight of two coins using only a package of A4 paper and some metal paper clips. The groups fed back on how they had done this to the wider workshop.

The second session was run by Pat Moore from SHU, UK and followed on from a pre workshop task that was sent to all attendees. She asked the teachers, this time in country groups, to reflect upon their experiences, any changes to their practice as a result of their involvement in the project and the barriers that they had faced. They were then asked to write these down as a group. A final session on this at the end of the day asked them to think about how they would move forward from the project in the classroom given what they had learned.

The third session, run by Murat Gunel of TED University, Turkey was an Inquiry session, where the teachers in international groups were asked to behave as learners in establishing questions, doing experiments and assessing results. More information on the sessions can be found in the Extra Materials.

The attendees at the event were teachers that participated in the Chain Reaction project over the three years of the project, plus partners - both PMB and Technical Board. Over 50 teachers attended the workshop. A booklet was produced that gave contact details of each teacher to encourage networking beyond the project.

The reaction to the workshop was very positive. All the teachers engaged with the workshop and the sessions. Despite some concerns about language barriers the group work in international groups did not, in the main, seem to present barriers to the discussions. For example, teachers used gestures and drawing to communicate to one another. Teachers who lacked confidence in their English language skills were supported by a member of their country PMB.

Partners were asked to carry out brief interviews with the teachers that attended the workshop.

A number of key themes were identified from the interviews:

1. The novelty of the international approach, it is unusual for teachers to be able to see how education and teaching works in other countries, and to be able to speak to their international peers.
2. The novelty of a hand-on practical approach to the teacher workshop
3. The connections built within and between the international teacher groups
4. Communication - while some found this a challenge it was clear that the international groups had managed to communicate via the IBSE tasks that they had been given
5. Taking away the approaches experienced - a number of teachers noted that they would try the practical tasks with their own students or indeed as CPD in their schools
6. A drive to change their practice in the light of the conference and the workshops

The feedback sheets generated from Pat Moore's session also revealed commonalities between countries for example:

Barriers:- lack of time, need to teach curriculum (for exams), cost of materials for IBSE, team working and motivation, teacher inexperience

Changes: Students - more motivated, better at team working, confidence, better communication skills, leading their own learning, more independent, better at asking questions, freedom, there is no failure

Teachers - better at using team working, using inquiry all the time, professional development, collaboration between schools and university, working with like-minded teachers, re-ignite interest in science teaching, creative approach

Ways forward: share experiences, start a science fair, link schools, doing action research, write new EUPRB and share them, train others in school in IBSE/share good practice, join in other EU projects, incorporate IBSE into schemes of work

Overall the workshop gave teachers a good opportunity to network, both in their national context and with teachers from other countries, with their participation in the Chain Reaction project and their interest in science teaching and student progress providing common ground. It also allowed all the attendees to see that the challenges faced by science teachers in implementing IBSE in the classroom are, to a greater or lesser, degree, universal. The workshop also gave teachers the opportunity to exchange ideas and experiences, and to experience for themselves being learners and also group working with people they were unfamiliar with. Although the language barrier had been identified before the workshop as being potentially problematic, in the event it did not cause many problems, as the teachers found other ways to communicate and they were also supported by members of the PMB as necessary. Overall it was a very successful event for all concerned, with teachers learning and having a new experience as well as being able to network.

### Sheffield Hallam University - UK

1. Internal seminars - The team gave two internal seminars. An Internal seminar for Sheffield Institute of Education on 24<sup>th</sup> January 2016 was given by Stuart Bevins, Josephine Booth and Eleanor Byrne. In accepting the invitation we aimed to inform colleagues about the project itself and also about EC funded projects and working with international partners. We aimed to give the audience a brief overview of the project, its aims, and objectives and the outcomes we had seen both in England and across the consortium. There was also information given about the resources and we showed the videos made by the German partners as a good illustration of the project and the international conferences. We also presented evidence of impact gathered by the evaluation process and on the numbers of schools, teachers and pupils reached by the project. We also spoke about consortium working and the challenges and processes involved in coordinating a large project across 12 countries. The seminar was attended by colleagues from across the Sheffield Institute of Education including Professor John Leach (Pro Vice-Chancellor for the Faculty of Development and Society) and Professor Nick Hodge (Professor in Education, Childhood and Inclusion).

The reception to the seminar was very positive. We covered the scope and aims of Chain Reaction, its outcomes and objectives as well as the partners involved and the reception of the projects work across the consortium, including discussion of the different contexts that the various partners work in. Questions were asked about the inclusiveness of the project and how impact had been observed. We were also asked about the resources (EUPRBs) and how they had been adapted across the consortium, as well as how the CPD for the project had worked across the partners. The national and international conferences were discussed and their part in the project. Attendees were very interested in how the project worked as a consortium and in the role of project management and coordination.

Seminar at post doctoral forum - 21st January 2016, Sheffield Institute of Education - The Post-doctoral Forum provides opportunities for researchers at all levels of experience and career to discuss findings and outcomes from large and small scale research and knowledge exchange projects.

The purpose of delivering a talk to this particular audience was to ensure that SloE colleagues and wider university colleagues had a clear understanding of the Chain Reaction project – its aims and outcomes. Additionally and crucially, a large portion of the talk discussed experiences from managing and delivering large scale EC projects including processes, partnerships, and preparation of proposals.

2. ESERA (European Science Education Research Association) Conference in Helsinki, Finland - poster presentation

## UNINA - Italy

### Conference presentations

1. ESERA (European Science Education Research Association) Conference in Helsinki, Finland. - 31/08/2015. Oral presentation: “Investigating about science teachers’ transformations when implementing inquiry-based teaching-learning sequences”

During the presentation, the main aims and characteristics of the project Chain Reaction were described, putting in evidence the results of the research carried out by the group of Physics Education of the Department of Physics, Naples, about the transformations made by teachers involved in the project while implementing inquiry activities in their school practice.

**2. Papers** - We worked on and submitted two papers, related to ChReact, for the Proceedings of GIREF-MPTL 2014.

“Secondary students’ views about scientific inquiry”

“Science teachers’ transformations while implementing inquiry-based teaching-learning sequences”

## UMB - Slovakia

1. Conference presentation and a paper published in the conference proceedings - *Stratégia rozvíjania bádateľsky orientovaného prírodovedného vzdelávania v projekte CHAIN REACTION* (The strategy of development of inquiry-based science education in the Chain Reaction project) - Prešov, 30. 9 – 2. 10. 2015

The talk was presented at the international scientific conference *Science, Education and Society*. Main aim of the conference was to share experience of the use of different teaching approaches and aids among researchers in the field of theory of education, university teachers, teacher trainers and teachers from secondary schools.

At this conference, we presented one of the possible ways of implementing inquiry-based activities in science education. We focused on a presentation of an inquiry-based activity model which has been used in the preparation of activities that were developed within the Chain Reaction project. At the end of our presentation we discussed experiences with the use of mentioned activities in real science lessons. The audience was researchers in the field of theory of education, university teachers, teacher trainers and teachers from secondary schools from Slovakia, the Czech Republic, Ukraine and Hungary. The audience expressed interest mainly in practical experiences with implementing the developed activities in science lessons – how to motivate pupils, how to facilitate pupils during their activity, etc.

The paper was accepted and published at the conference proceedings.

2. Conference presentation and two papers published in the conference proceedings - Bratislava, 1<sup>st</sup> – 3<sup>rd</sup> June 2016\*

1. Uplatňovanie integrovaného prístupu prostredníctvom realizácie aktivít bádateľského charakteru.  
*Application of integrated approach through the implementation of the inquiry-based activities*
2. Možnosti využitia bádateľských aktivít vo výučbe prírodovedných predmetov  
*The possibilities of the use inquiry-based activities in science lessons*

The international conference *The Innovations and Trends in Science Education* was focused on solving current problems relating to innovation and trends in science education.

Five topics were discussed at the conference:

- 1) Problems and perspectives of teachers' education.
- 2) Curricular trends in science education.
- 3) Research in theory of science teaching.
- 4) Digitalization of education.
- 5) Preparation of future science teachers.

We contributed to the Section 2 theme on Curricular trends in science education and introduced approaches used in the Chain Reaction project that could be incorporated into curricula at lower and upper secondary levels.

The aim of the paper *The possibilities of the use inquiry-based activities in science lessons* was to outline the strategy for the use of investigative activities within the project Chain Reaction through practical demonstrations of the developed activities. We introduced two activities – Cosmic Website and PHEPP (the portable hydro-electric power plant).

The paper *Application of an integrated approach through the implementation of inquiry-based activities* pointed out the importance of a comprehensive perception of natural phenomena in terms of the both content and methodology used in the Chain Reaction.

In general, the response of the audience was positive. The questions were focused on time needed for in-school delivery of the introduced activities. The approaches used to motivate students at the beginning of the activities were discussed as well.

## TEDU

### Conference presentations

1. Sabanci University Istanbul, Turkey on April 11, 2015 - 12<sup>th</sup> Good Practices in Education Conference

In 2015, the Chain Reaction project's PRB implementation entitled as "To Think as Learning Science: Plants in Space" by Orhan Asci, Prof. Dr. Murat Gunel, Kutlu Tanriverdi, and Ceyda Gok was accepted to be presented at the 12<sup>th</sup> Good Practices in Education Conference. The accepted manuscript aimed to examine the impacts of an inquiry-based science education on "Life Science Biology" unit in 9<sup>th</sup> grade curriculum on students' critical thinking skills. Within the scope of the "Life Science Biology" unit, students went through inquiry based processes regarding the Chain Reaction project's PRB about plants in space. The findings of this study revealed that there were statistically significant differences between control and experimental groups in terms of students' critical

thinking skills. Students in the experimental group significantly got higher scores on critical thinking test than those students in the control group. See Appendix C for an image of the presentation's abstract page in the conference booklet on page 21. Note that the whole conference booklet, including preface, agenda, and abstracts of oral and poster presentations and workshops can be reached from the Website, <http://www.egitimdeiyornekler.org/assets/iok-kitapcik-07.04.15-rev10.pdf>. See Appendix D for the pdf version of the PowerPoint presentation at the conference. Based on the conference statistics in 2015, a total of 835 submissions were made to be "Good Education Practices" in Turkey and out of these 835 submissions only 44 poster and 101 oral presentations were selected as "Good Education Practices" in Turkey. In other words, the Chain Reaction project's implementation was selected as one of the 145 "Good Education Practices" in Turkey in 2015. It was also stated in the conference statistics that there were approximately 1200 participants at the conference. This means that about 1200 people had an opportunity to read the abstract of one of the Chain Reaction Project's PRB implementation at the conference. Moreover, our news about this presentation posted on the Project's Facebook page reached 722 people.

## 2. At Sabanci University Istanbul, Turkey on April 2, 2016 - 13<sup>th</sup> Good Practices in Education Conference

In 2016, the Chain Reaction project's PRB presentation titled 'Learning science as doing: Portable Hydroelectric Power Plants' by Sefa Özenir, Prof. Dr. Murat Gunel, and Kutlu Tanrıverdi was accepted for the 13<sup>th</sup> Good Practices in Education Conference. The accepted paper aimed to discuss an inquiry-based science education on 'Electricity and Magnetism' unit in 10<sup>th</sup> grade curriculum. Within the scope of the Electricity and Magnetism unit, students went through inquiry based processes regarding the Chain Reaction project's PRB about hydroelectric power plants and presented their findings in the Science Festival organized at TED University. See Appendix E for the image of this presentation's abstract page in the conference booklet on page 34. Note that the whole conference booklet, including preface, agenda, and abstracts of oral and poster presentations and workshops can be reached from the Website, <http://www.egitimdeiyornekler.org/konferans-programi-2>. See Appendix F for the pdf version of the PowerPoint presentation at the conference. Based on the conference statistics in 2016, a total of 928 submissions were made to the Good Education Practices conference in Turkey and out of these 928 submissions only 30 poster and 65 oral presentations were selected as Good Education Practices in Turkey. In other words, the Chain Reaction project's implementation was selected as one of the 95 Good Education Practices in Turkey in 2016. It was also stated in the conference statistics that there were about 1250 participants at the conference. This means that about 1250 people had a chance to read the abstract of one of the Chain Reaction Project's PRB implementation at the conference. Also, our news about this presentation posted on the Project's Facebook page reached at 374 people.

In these workshops, we aimed:

- to disseminate Chain Reaction PRBs and classroom implementations to academicians, teachers, school principals, parents, people who are interested in education from the private sector, and representatives of educational NGOs in Turkey;
- to support professional development of Chain Reaction teachers via engaging them in one of the best national education conferences in Turkey
- to help Chain Reaction teachers to form a professional network as sharing and discussing their classroom experiences with the conference participants.

Audience

- (1) Teachers
- (2) Academicians



- (3) School principals
- (4) Representatives of educational NGOs
- (5) Parents
- (6) People who are interested in education from the private sector

### 3. Conference Presentation (Argumentation-Based Inquiry [ABI] Conference) - At the Washington State University College of Education in Spokane, Washington, United States on August 5-7, 2015

In this workshop, we aimed to present the impacts of Chain Reaction Project on participant teachers and students based on the findings obtained from evaluations. The audience was Researchers, Graduate students and Teachers.

A paper titled 'Moving from Instruction to Learning: A Case of Nationwide Professional Development Project' by Prof. Dr. Murat Gunel was accepted by the ABI conference in August 2015. The paper aimed to present and discuss findings regarding the impacts of ABI based professional development project within 21 states of Turkey on participant teachers and their students. The study data included academic achievement tests, and critical thinking tests as well as video records of classroom implementations, observation protocols, surveys and interviews. See Appendix A for the image of this presentation's abstract page in the conference booklet on page 8. Note that the whole conference booklet, including preface, agenda, and abstracts of presentations can be reached from the Website, <https://abic.education.wsu.edu/documents/2015/07/abi-conference-program.pdf>. See Appendix B for the pdf version of Dr. Gunel's Prezi presentation at the conference. By presenting at this conference, we disseminated significant findings from the project.

4. Conference Presentation (1<sup>st</sup> Regional Forum on Science Education in the Arab Curricula) in Carthage, Tunisia on April 7-8, 2015. Dr. Gunel presented a speech in which he discussed the main problems in adapting United States and European based reforms and implementation into the system and then he introduced the Chain Reaction project as exemplary implementation. Finally, he discussed the impacts of the project on teachers and students. With the attached Prezi presentation delivered during the forum, Dr. Gunel met the aim of disseminating the Chain Reaction project and findings obtained from the project to a variety of audience from Tunisia and other Arab countries.

## PU, Bulgaria

### Presentations and CPD

1. In-service Physics Teacher training seminar, organized by Ministry of Education, Plovdiv region, Compass Hall, Plovdiv University, 12.05.2016 (14.00-18.00) This kind of training event is organized each year. Generally they are one or two days long and aim to realize continuing professional development for teachers. I was invited as a science educator to present activities from the Chain Reaction project and the IBSE approach. Two Chain Reaction teachers (2015) – G. Lavcheva and N. Trayanova were invited as educators too. For the teachers in Bulgaria IBSE approaches are a new concept. In the past 60 years there have been attempts to apply this approach in science education, but with very limited success. The presentation discussed Inquiry teaching and learning as a pedagogical method and gave examples from Chain Reaction activities.

The teachers spoke about their experience using IBSE in the frame of the Chain Reaction project. The student teams presented results of their investigation also. 67 physics and chemistry teachers and 4 professors in Didactics participated in the training. The lecture about IBSE and the Chain Reaction project was presented. Some results of the students work on the project were shown.

The following questions were posed:

- How long students were worked on the EUPRB Green Light?
- How many times the students had visited the University labs?
- What part of the work students worked themselves?

## 2. 43th National conference for Physics Education. Blagoevgrad, 2-5 April, 2015

Participation in this National conference was good chance to present the Chain Reaction project in front of policymakers and the physics teachers. We shared the results of the work in EUPRB 'Green Light.'

Two teachers (G. Lavcheva and K. Katzrova) presented their experience of using IBSE in physics lessons during the work on the project.

The presentation was titled 'An Attempt to Implement the Inquiry Based Science Education Approach in Physics Education in the Study of Light Sources in Secondary School', by *Zhelyazka Raykova, Kostadina Katsarova (ChReact teacher), Ganka Lavcheva (ChReact teacher)*

A large number of physics teachers and policymakers from the Education Ministry took part in this conference and interest in the presentation was strong. A number of teachers showed interest in the project and its philosophy. The teachers raised questions about :

- the time needed for teaching using IBSE]
- is IBSE usable for every kind of schools?

The paper was published in the Conference proceedings and we also received an invitation to publish a modified version of the paper in the National Journal of Physics.

## 3. 44th National Conference for Physics Education Yambol, 7-10 April 2016 One teacher – Neli Traynova and I took part in this National event to presented the project and the results from it in front of Bulgarian teachers.

Paper presented: *'EU Project Chain Reaction – good practices for using IBSE.'*

Mrs. Nely Traynova also presented a paper titled *'A possibilities to use IBSE in informal education.'* The teacher shared her experience on the work of the project Chain Reaction. More than 100 physics teachers and policymakers from Ministry of Education attended.

Interest in the project was significant once again and we received questions about IBSE and its application for all types of schools and students. The teachers asked if they can use IBSE in regular lessons or outside the classroom. They were interested in hearing from the teachers who took part in the project.

Mrs. N. Traynova presented her work with the students through the EURPB 'PHEPPs.' She highlighted the interest of the students in working through an inquiry approach and their motivation to take part in the NEYC 2015.

The papers have been published in the Conference proceedings.

## CIFOP

### Conference presentation

1. Participation of the CIFOP Chreact Manager (Dr Mounir Gouja) to a workshop on IBSE in the curricula of the state members of ALECSO, National Center of Training Professional Educators, Carthage - Tunisia, April 7-8, 2015.

This regional workshop aimed to host experts and researchers in science education from different state members of ALECSO in order to examine the reality of the pedagogy of teaching sciences in the Arab curricula and potential of its scientific and economic impact and on regional development. The workshop examines the leading experiences in this topic in order to capitalize on the best educational practices in teaching sciences. The Chain Reaction project was introduced by CIFOP as a partner of ALECSO in this event.

Target audience:

- Academics and researchers in science education,
- Policy makers in education,
- School inspectors and science teachers,
- Science Centres and educational research laboratories,
- Organizations interested in educational and pedagogical issues

Mrs Michèle Prieur, as a CIFOP trainer specialized in IBSE, introduced the Chain Reaction project during her presentation. On the other side, Dr Murat Gunel, as a representative of the Chain Reaction coordinator (Dr Stuart Bevins), presented some results of the project regarding the impacts of IBSE in terms of student interest in sciences and teachers professional development.

The following points were the most important recommendations that resulted from this workshop and would constitute the main axes of the Regional Forum on IBSE that would be held in 2016:

- The teaching of science and philosophy in conjunction with their history
- Teaching Science between merge and retail
- Curriculum engineering - constructivist approaches in teaching and learning science: the inquiry based approach
- Implementation of a project to strengthen the teaching of science in the Arab educational systems depending on the IBSE.

2. Dr Cédric Lémery participated in a regional meeting of innovative teachers in Lyon. The event was organised by the innovation in education support team of the Rectorat of Lyon. PMB member, Dr Cedric Lemery, accompanied by Mrs Priscille Cheney (1<sup>st</sup> year Chain Reaction teacher and TB member) had the opportunity to present the EUPRBs and the Chain Reaction toolkit during a forum session.

The audience shows a great interest in the pedagogical material. The Gabon's executives were very interested by the organisation of the project. The trainer were interested by the EUPRBs and the toolkit, longing for its translation in French in order to set up training for teachers in the frame of the current reform of science education in lower secondary school.

Dr Lémery had the opportunity to present Chain Reaction and its toolkit to the rector of Académie de Lyon who assures her strong interest in IBSE.

## Social media

Facebook: <https://www.facebook.com/chainreactionfrance>

Twitter: <https://twitter.com/ChainReactionFr>

## University Ljubljana - Slovenia

### Journal Articles

1. Šinigoj, V. & Avsec, S. (2014) Dejavniki zadovoljstva učencev s poizvedovalnim učenjem vsebin naravoslovja in tehnike. *Portorož*, 181-184
2. Šinigoj, V. & Avsec, S. (2014) Poizvedovalno učenje robotike z reševanjem tehniških in tehnoloških problemov. *Portorož*, 177-180
3. Skrt, T., Avsec, S. & Kocijančič, S. (2015) Obravnava učinkovitosti vetrnih turbin temelječa na induktivnih učnih strategijah. *Portorož*, 155-158
4. Avsec, S. & Kocijančič, S. (2014) Effectiveness of Inquiry-Based Learning: How do Middle School Students Learn to Maximise the Efficacy of a Water Turbine? *International Journal of Engineering Education*. 30, (6A), 1436–1449
5. Avsec, S., Rihtarsič, D. & Kocijancic, S. (2016). The Impact of Robotics-Enhanced Approach on Students' Satisfaction in Open Learning Environment. *International Journal of Engineering Education*. 32, (2A), 804–817
6. Avsec, S. & Kocijančič, S. The effect of the use of an inquiry-based approach in an open learning middle school hydraulic turbine optimisation course. *World Transactions on Engineering and Technology Education*. 12 (3), 1-9
7. Avsec, S. (2016) Profiling an inquiry-based teacher in a technology-intensive open learning environment. *World Transactions on Engineering and Technology Education*. 14, (1), 25-30
8. Avsec, S. & Kocijančič, S. (2016) Water and wind turbines optimisation using inquiry-based teaching: a Chain Reaction case study. *World Transactions on Engineering and Technology Education*. 14 (1) 64-69
9. Rihtarsic, D., Avsec, S. & Kocijančič, S. (Published online 2015) Experiential learning of electronics subject matter in middle school robotics courses. *Int J Technol Des Educ*.
10. Avsec, S. & Kocijančič, S. (2016) A Path Model of Effective Technology-Intensive Inquiry-Based Learning. *Educational Technology & Society*, 19 (1), 308–320.

## PHHD - Germany

### Media

18.03.2016	RNF Broadcast	<a href="http://www.rnf.de/mediathek/video/schueler-forscher-aus-der-region/">http://www.rnf.de/mediathek/video/schueler-forscher-aus-der-region/</a>
23.03.2016	Article in local newspaper RNZ	<a href="http://www.chreact.de/node/105">http://www.chreact.de/node/105</a>
30.03.2016	Article on PHHD Main Website	<a href="http://www.chreact.de/node/104">http://www.chreact.de/node/104</a>
April 2016	Article in News On	<a href="http://www.chreact.de/node/103">http://www.chreact.de/node/103</a>
13.04.2016	Article and Gallery on Science Blog ChainReaction Germany	<a href="http://blog.chreact.de/blog/2016/04/13/2016-neyc-gallery/">http://blog.chreact.de/blog/2016/04/13/2016-neyc-gallery/</a>

To promote their third national conference, PHHD invited the television company Rhein-Neckar Fernsehen (RNF) to the national conference (2016) who in turn televised a broadcast about the event on 18<sup>th</sup> March 2016, the video broadcast link is listed in Annex PHHD 1. Moreover, [the local newspaper Rhein-Neckar-Zeitung published](#)

an article about the national Express Yourself Conference with the emphasis on the work of the Heidelberg International School .Annex

## University of Crete - Greece

1. The University of Crete Chain Reaction team held five dissemination events on Inquiry Based Science Education (IBSE) addressing the needs of local science teachers whose students have taken up project work. Our main objective was to introduce the content and methodology of EUPRBs and create a bank of interested teachers willing and eager to implement the material (even if they were not selected to take part in the Chain reaction project due to number restrictions or other parameters). One hundred and fifty science teachers attended these events over the three year of the project.

During the dissemination event, teachers had the chance to hear what the objectives of the Chain Reaction Project are, and were provided with examples of work based on existing literature and a selection of EUPRBs. Upon the completion of the dissemination events, science teachers attended a workshop in which they had the chance to contribute towards the design of relevant classroom materials and initial project plan on one EUPRB topic in ways that comply with IBSE.

During the dissemination events, teachers were briefed on the objectives of the Chain Reaction Project. Examples of work based on existing literature and a selection of EUPRBs were subsequently distributed to them. The EUPRBs were analysed in detail, explaining to the teachers the selection process, as well as the flexibility in applying them to their classes. In addition, we put emphasis on optimizing the selected EUPRB to the specific class, based on the capabilities and needs of the students.

The majority of the questions were related to the pathways the teachers must follow in the class. Some example questions are:

- 1) Can we choose any of the existing EUPRBs, including the non-translated ones?
- 2) How much information can we provide to the students during the implementation of the EUPRBs?
- 3) If we do not like any of the EUPRBs can we choose a topic of our own?
- 4) What will happen if some students in the class are not interested?

The aims of the event were twofold: The first and main aim was to inform the teacher's community of the Chain reaction project. The larger the number of participants, the more impact this dissemination activity has. In the events we had more than 150 teachers participated. This number is sufficiently large to conclude that the teacher community in Crete were fully aware of the project, its aims, and the effect it can have to their teaching methodologies.

The second aim was to choose the teachers that participated each year. This aim was also fully achieved, since each year we had the 5 schools required, including backup teachers in the case of an early leave of someone.

## 2. Online course on IBSE

A new open access ten week online course designed by UoC in period 9 has been available online in period 10 (September 2015) and has been used for the training of the new science teachers. The course is based on the experience and the material created under the Chain Reaction project and is expected to encourage sustainability of IBSE practices. <https://opencourses.uoc.gr/courses/course/view.php?id=348>

This was aimed at Pre-service and in-service science teachers, teachers educators, and university students. The on line course has been awarded as one of the best among 2500 online and distance learning courses available in Greece in 2015/2016.

### 3. Online teacher forum hosted at Chain reaction Website

An open-access and visible by all Forum facilitated the interaction between all stakeholders. Role Models, teachers with previous relevant experience and Technical board members were involved and participated in a constructive way. Ideas and implementation options were discussed adopted or modified to suit each context.

Forum discussions were structured as follows:

1. Setting the scene and motivating students
2. Scientific method (what and how)
3. Facilitating student search of reliable internet resources
4. Group dynamics and assessment
5. Deciphering experimental method-(in)dependent variables/ control group
6. Presentation skills and communicating research
7. Implementation of EUPRBs

An open-access and visible by all on line Forum facilitated the interaction between all stakeholders. Role Models, teachers with previous relevant experience and Technical board members were involved and participated in a constructive way. Science teachers were invited to participate.

Immediate feedback from the participating teachers verified the value of using the Forum as a means of communication and coordination. Teachers overcame their initial hesitation to expose themselves and activities online and the whole venture was constructive and beneficial to all participants.

The impact of the online discussion was substantial especially for the first four weeks of the training programme as the conversations were read by other secondary teachers that are interested in running IBSE projects in the near future. In fact, up to date, the average number of views in each section of the Forum ranges from 2000 to 3000.

<http://www.chreact.eu/forum/viewforum.php?f=15&sid=edf14c2ab14f4128a473e0f451a7c68f>

### 4. Conference attendance

1. "Approaches of Inquiry Based Science Learning in Secondary Education" Kallia Katsampoxaki, 1<sup>st</sup> International Conference on: New Developments in Science and Technology Education (NDSTE 2014), 29-31 May 2014, Corfu, Greece (<http://ndste2014.weebly.com/> )
2. "IBSE Case Study: Student perceptions of science and inquiry after a two year IBSE project In a Greek secondary school " Kallia Katsampoxaki and Nikos Chaniotakis, Scientix National Conference: Inquiry based learning and Creativity in Science Education, 9-10 October 2015, Athens, Greece (<http://www.scientix.ea.gr/> )
3. "Evaluation and implementation of teaching approaches small research / exploratory learning for secondary school teachers and students", Maria Fouskaki, Conference: Mediterranean - Waterline:

Posing interdisciplinary questions in teaching, 4-8 December 2015, West Crete, Greece  
(<http://mediterraneanmappingunkownedu.weebly.com/> )

4. "Interactive Learning in Science and Engineering Education" Nikos Chaniotakis, International Conference: Mediterranean Sea Connects Us: Progress in Education with Local Communities, 9-13 December 2015, West Crete, Greece

In all conferences, the aim of presenting the Chain Reaction project was to inform the local and international education community about the IBSE learning approach supported by the project, as well as the impact of the implementation of the project to all stakeholders (teachers and students, teacher educators and consortium members). Around 300 teachers, university professors and researchers in the area of science and technology education from more than 50 universities and research institutes from 15 countries all over the world participated in NDSTE 2014 conference. In addition to them, more than 100 Greek school science teachers and university professors attended the events organized in West Crete in December 2015, while the International Event had participants not only from Greece but from other Mediterranean countries (Italy, Turkey, Romania and Cyprus).

The oral presentations given in national and international conferences about the Chain Reaction were focused on disseminating the learning approach and impact of the project, sharing the new practices within the area of science education. The idea of the project was welcomed from the educational community, which expressed a great interest in understanding the structure and the implementation of EUPRBs in the class. In addition, the Conferences provide international researchers a significant and friendly opportunity to network and collaborate, promoting the values of Education for Sustainable Development.

The work presented in the conference was also written as a full paper and published at NDSTE conference proceedings 2014: Katsampoxaki-Hodgetts K. et al (2014) "Approaches of inquiry based science education in secondary education in Greece"

### **Journal Articles**

Kallia Katsampoxaki-Hodgetts, Maria Fouskaki, Katy Siakavara, Roumpini Moschochoritou, Nikos Chaniotakis (2015). Student and Teacher Perceptions of Inquiry Based Science Education in Secondary Education in Greece. American Journal of Educational Research, 3(8), 968-976.

### **University of Limerick**

**1. Social media** - Presence on both social media sites and university education website. The latter serves as a legacy webpage which will be accessible beyond the lifetime of the project. The purpose was to help to disseminate the key milestones of the Chain Reaction project with regular engagement on both twitter and our Facebook page. Also the presence on the Education and Professional Studies website signifies its importance in the university in terms of the engagement between teacher educators and the professional development of teachers. The content located on the university education website has a specific focus on teacher resources linked to the new Junior Cycle Science Specification in Ireland.

<https://twitter.com/ChainRXNIreland>

<https://www.facebook.com/chainreactionireland/> (until 2015 and then twitter became the main social media output as it was felt that twitter would reach a wider audience more quickly)

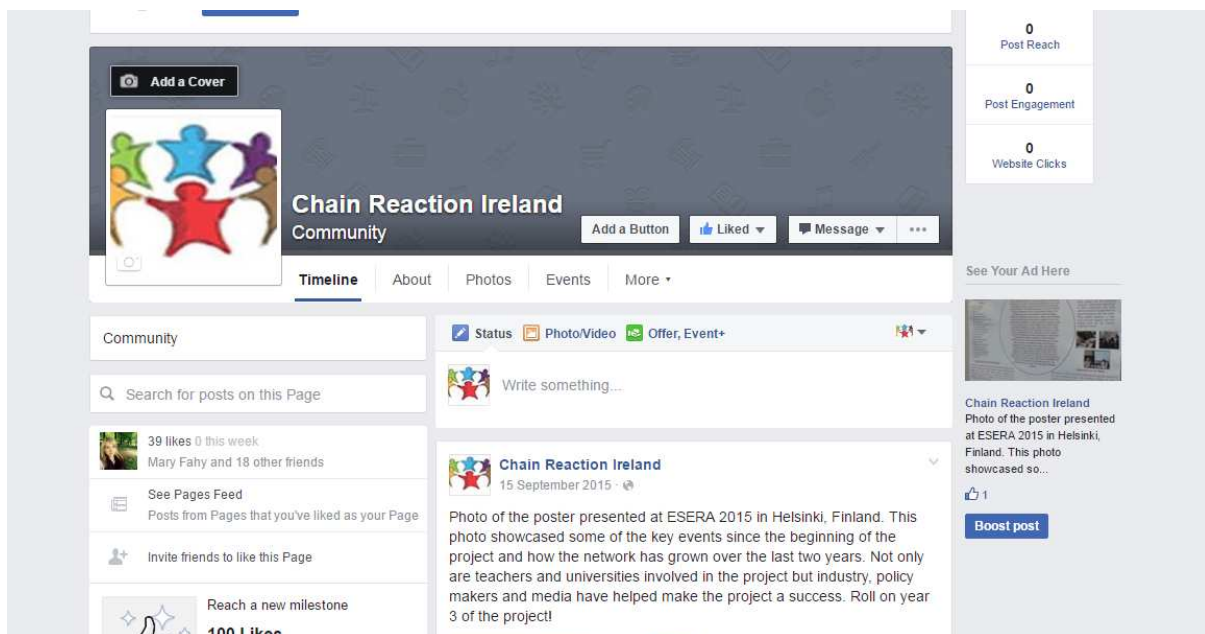
Link to teachers resources: <http://www.ul.ie/eps/node/1551>. Overall description of the project on the university education website

<http://www.ul.ie/eps/node/1531>

### Screenshot of Twitter



### Screenshot of Facebook



**2. Changes to the Irish Curriculum -** The partner was invited to take part in the National Council for Curriculum and Assessment (NCCA) in significant way as a result of their involvement with Chain Reaction. The experience of working in Chain Reaction, as described below, was used to inform and support the development of the Junior Science Specification (JSS). The JSS places a strong emphasis on student experience of the 'Nature of Science' which is essentially related to Inquiry Based Science Education (IBSE) and alongside the traditional strands of



physics, chemistry and biology a new strand focusing on earth and space science was developed. This is the same content focus of the majority of the Pupil Research Briefs (PRBs) initially provided by Chain Reaction. The experience of working on the project was illustrated by:

Exemplifying IBSE - As the group discussed Learning Outcomes (LOs) associated with the Nature of Science (NoS) strand the partner was able to draw on concrete examples of teacher planning and in-class practice that illustrated the practicality and pedagogical structure of such practice. This included practical work in laboratories but also, more significantly, as pen and paper activities realisable in typical classroom conditions. The group were particularly impressed with the “Green Light” PRB which was completed by Irish students in a double class (80 minutes) and with a depth and quality of learning that was associated with the experience, addressing NoS and physics LOs. Examples like this played an important role in developing the Policy makers thinking about the possibilities within the JSS.

Expectations of student capacity - The previous science syllabus allows students to be assessed at ‘honours’ or ‘pass’ levels representing different levels of challenge to students. The JSS will be assessed at “common” level, presenting a common challenge to all students. This was a major concern to the teachers of the SDG as teaching in Ireland has traditionally been very teacher directed, resulting in passive student engagement with curriculum. As a result, teachers have very low expectations for what students are capable of achieving in a very limited range of teaching, learning and assessment methodologies. Again the exemplification of pedagogical and assessment approaches provided by the Chain Reaction experience challenged these expectations, illustrating how a differentiated approach to learning can help to raise expectations of student performance. The partner was also able to draw on evidence from our teacher workshops where teachers explicitly discussed this and how it provoked changes in their practice.

Expectations of teacher capacity - This work took place in a period of significant industrial unrest and this significantly influenced the participation of the union representatives with the process, often claiming that teachers would be reluctant to participate in the change required to teach the open LOs of the JSS. Chain Reaction served to illustrate this capacity and in particular the teachers’ ability and willingness to design their own PRBs with their students, drawing inspiration from the teacher workshops. In addition the importance of professional collaborations and discussions about IBSE were illustrated.

In summary, in a period of significant flux and change, Chain Reaction served an important exemplification purpose in shaping the thinking of the group that developed the new national science syllabus for lower secondary school.

3. Poster presentation at the European Science Education Research Association (ESERA) Conference - Helsinki: 28<sup>th</sup> of August to the 2<sup>nd</sup> of September

To provide the international research community with information on the Chain Reaction project in terms of the project goals, key milestones, what it has achieved and participants’ experiences of their involvement in Chain Reaction. The latter reflects both the teachers experience in terms of their professional development and students’ experiences in terms of the impact of the inquiry approach on their learning. This poster was designed by the team in UoL but was sent to the consortium for feedback.

## ISU, Georgia

### Conference and poster presentations

1. International Conference “Science Education and Green Chemistry for a Sustainable Future” Haifa, Israel, 2.12.15 – 3.12.15. Marika Kapanadze was invited to make a speech there. She shared Chain Reaction project

experience and our results. There were colleagues from different countries (Israel, USA, Germany), also pre-service and in service science teachers from Israel from different colleges and universities.

2. International Conference IOSTE - International Organization for Science and Technology Education - Istanbul, Turkey, 24 – 26 April, 2015

3. Inquiry based science education and project chain reaction in Georgia ESERA 2015 Conference, Helsinki, Finland, 31.08.15 – 4.09.15 - poster presentation

4. LeLa Tagung Saarbrücken, Germany, 13-15 March, 2016 - LeLa Tagung is a German speaking conference. Marika Kapanadze presented the project there. She presented the project to the audience from the point of view of active learning with the science experiments and outdoor activities, done in the frame of the project. There was great interest in the project. Questions asked about PRBs, how we implement them in the classroom and outside of the classroom (example Batumi school of the third year).

4. Iliia State University 4th Science Picnic - Tbilisi, Georgia, September 26, 2015

Science Picnic is a free of charge event that is open to general public, schools, universities, NGOs, government, etc., that are interested in science popularization and scientific shows, presented during the event. Iliiauni Science Picnic publicizes and advertises through various ways to allow interested groups to attend the event.

In camps located in Vake Park, fascinating experiments and shows in biology, physics, astronomy, chemistry, archaeology, and other fields were presented. The most interesting scientific shows were performed on the stage. The visitors had opportunity to participate in experiments and to get acquainted with the latest scientific achievements. The promotional competitions were held for children and the winners were awarded.

In 2015 the number of attendants exceeded 20 000. It should also be noted that in 2015, the innovative inventors' first exhibition was held in Georgia. The event enjoyed the visitor's great interest.

There were some camps of Chain Reaction participant's school and also Chain Reaction ISU Team have it's own camp. The aim was popularisation of IBSE and networking.

There were science educators, teachers, students from the different universities and schools of Georgia and Partners from foreign counties.

There was great enrolment of Chain Reaction teachers and students in picnic activities.

There were one camp of ISU project team and 7 camps of project participant schools:

- Public school#42, Tbilisi
- Buckswood private school, Tbilisi
- AIA-GESS private school, Tbilisi
- Public school #4, Telavi
- Public school #12, Rustavi
- Public school #33, Kutaisi
- Newton private school, Tbilisi

## Media and press releases

- Shu( Partner 1)  
[http://www.theboltonnews.co.uk/news/14487788.Young\\_scientists\\_present\\_their\\_findings\\_at\\_international\\_conference/](http://www.theboltonnews.co.uk/news/14487788.Young_scientists_present_their_findings_at_international_conference/)
- PU (Partner 5)  
<http://u4avplovdiv.com/%D0%BF%D0%BB%D0%BE%D0%B2%D0%B4%D0%B8%D0%B2-%D0%BF%D0%BE%D1%81%D1%80%D0%B5%D1%89%D0%B0-200-%D1%83%D1%87%D0%B5%D0%BD%D0%B8%D1%86%D0%B8-%D0%BE%D1%82-12-%D0%B4%D1%8A%D1%80%D0%B6%D0%B0%D0%B2%D0%B8-%D0%BF/>  
<https://www.plovdiv24.bg/novini/plovdiv/Treta-nacionalna-uchenicheska-konferenciya-shte-se-provede-v-PU-628088>

Maritza newspaper (the main paper in Plovdiv)

Article: “The students from Jordan fertilized seeds of coffee”

- CIPOF (Partner 6) : <http://www.chreact.fr/node/144> and <http://www.chreact.fr/node/145>

Social Media is used by a large number of our partners to disseminate information and activity. This includes Facebook, Twitter and YouTube. Table 4.8.1 lists the social media outlets used by each partner.

**Table 4.8.1: Social media outlets**

Partner		Web link
UNINA	Facebook	<a href="http://www.facebook.com/Chain-Reaction-Italia-175657355967579">http://www.facebook.com/Chain-Reaction-Italia-175657355967579</a>
	Twitter	<a href="http://twitter.com/chreactitalia">http://twitter.com/chreactitalia</a>
	YouTube	Chain Reaction Italia ( <a href="http://www.youtube.com/channel/UCZfav1ToHTXyr9VpnrKEY8g">www.youtube.com/channel/UCZfav1ToHTXyr9VpnrKEY8g</a> )
	Slideshare	<a href="http://slideshare.net/chreact">slideshare.net/chreact</a>
UMB	Facebook	<a href="https://www.facebook.com/events/936900619725788/">https://www.facebook.com/events/936900619725788/</a>
		<a href="https://www.facebook.com/KatedraFyziky/posts/831179170344256">https://www.facebook.com/KatedraFyziky/posts/831179170344256</a>
		<a href="https://www.facebook.com/gymdetva/?fref=ts">https://www.facebook.com/gymdetva/?fref=ts</a> (14 <sup>th</sup> April 2016, 3 <sup>th</sup> September 2015, 19 <sup>th</sup> May 2015 ect)
		<a href="https://www.facebook.com/media/set/?set=a.915058298545497.1073741893.102930186424983&amp;type=3">https://www.facebook.com/media/set/?set=a.915058298545497.1073741893.102930186424983&amp;type=3</a>
TEDU	Facebook	<a href="http://www.facebook.com/chreactr">www.facebook.com/chreactr</a>
PU	Facebook	<a href="https://www.facebook.com/groups/181464145583895/?fref=ts">https://www.facebook.com/groups/181464145583895/?fref=ts</a>
CIFOP	Facebook	<a href="https://www.facebook.com/chainreactionfrance">https://www.facebook.com/chainreactionfrance</a>
	Flickr	<a href="https://www.flickr.com/photos/chainreaction-france/">https://www.flickr.com/photos/chainreaction-france/</a>
	Twitter	<a href="https://twitter.com/ChainReactionFr">https://twitter.com/ChainReactionFr</a>
UL	Facebook	<a href="https://www.facebook.com/groups/1477701262521340/?fref=ts">https://www.facebook.com/groups/1477701262521340/?fref=ts</a>
PHHD	Facebook	<a href="http://www.facebook.com/ChainReactionDe">www.facebook.com/ChainReactionDe</a>
UOL	Facebook	<a href="http://www.facebook.com/chainreactionireland">www.facebook.com/chainreactionireland</a>
	Twitter	<a href="http://www.twitter.com/ChainRXNIreland">www.twitter.com/ChainRXNIreland</a>
JSSR	Facebook	<a href="https://www.facebook.com/groups/451109088335098/">https://www.facebook.com/groups/451109088335098/</a>
ISU	Facebook	<a href="https://www.facebook.com/groups/1375675819338568/?ref=bookmarks">https://www.facebook.com/groups/1375675819338568/?ref=bookmarks</a>

Consortium partners have discussed the impact of participation in the Chain Reaction project which has been wide ranging among the participating schools. Below are some examples from partners exploring impact on schools. The 12, 24 and 36 month evaluations provide greater evidence of project impact (see WP9):

#### Slovakia

Firstly, the project has had an impact on the participating schools – on teachers, students and on the whole

school atmosphere – expressed by teachers at evaluation sessions at the end of each project year as well by teachers who were invited to an initial briefing of new cohorts of teachers.

Even within one school year teachers stated that they could see an increased motivation in students to learn science subjects. The teachers observed involvement of students with generally weak performance in science subjects—children with learning difficulties and low social conditions. The project motivated those students extremely positively according to participating teachers. The group project work has changed students who have been identified as ‘outsiders’ by the school to fully engaged members of the class community. Overall, the self-confidence of students has increased.

An impact of the project on one of the schools from the first group of schools was described at the talk of teacher Zuzana Polakova at Chain Reaction public seminar (Banská Bystrica, 5th February 2016): an interest of students to learn physics has increased significantly – the students choose optional physics lessons and physics themes for their projects, they are interested in participation at physics competitions and other physics activities, several students decided to study physics at university.<sup>3</sup>

## UK

Participant teachers all reported positive impacts on themselves and their students as a result of their Chain Reaction involvement. Teachers particularly cited improved student self-confidence in speaking, asking questions and performing scientific tasks. The majority of teachers suggested that their own practice had benefitted from involvement and that they felt their repertoire of classroom techniques had been expanded. However, there is a caveat to this—a number of teachers felt that it will be difficult to deploy inquiry in their classrooms through normal curriculum work as inquiry projects tend to take up more time than they would normally allocate to specific topics and this would hinder curriculum coverage. Nevertheless, all teachers agreed that an inquiry approach to classroom science can greatly enhance students’ learning of scientific concepts, scientific skills and processes, and increase motivation and positive attitudes towards school science and the potential of scientific careers.

## Greece

### **Student attitude shift and future career choices: ALIKIANOS CASE STUDY**

The study below is based on the questionnaire for students used for the publication Kallia Katsampoxaki-Hodgetts et al. “Student and Teacher Perceptions of Inquiry Based Science Education in Secondary Education in Greece” in American Journal of Educational Research Vol. 3, No. 8, 2015, pp 968-976 and the fact that the same group of students in Alikianos, Chania Crete took part in Chain reaction project for two years, as they moved on to a different school (High school to Lyceum) and their new science teachers implemented the project using a different EUPRB. Here are some conclusions drawn from that study:

Alikianos IBSE case study,

“...in the second year of Chain Reaction IBSE implementation students seemed to have more consolidated views regarding their choice of future career. In fact, whilst in year one students were not sure of whether they should follow a science career (44%), the following year there was a considerable increase in favour of it, (35% over 19%), whilst the negative answers remained the same (Question 1). When students were asked what they liked the most during the project, after a year, they seemed to prefer working in teams (60%) whereas in the second year, they seemed to be divided between working in teams (35%) and presenting their findings in the plenary sessions (30%). More specifically, part of the typical procedure in class during the project was that students would discuss in teams and plenary sessions coordinated by the teachers so as to clarify confusing issues, share research-related updates and plan their next course of action. Interestingly, the percentage of

<sup>1</sup> KOCTÚROVÁ, Z.: Bádateľsky orientované vyučovanie prírodovedných predmetov v podmienkach Gymnázia Andreja Sládkoviča. A talk given at the seminar “IBE at science subjects”. Banská Bystrica, 5<sup>th</sup> Feb. 2016.

students participating in discussions almost doubled the second year (Question 3: 80%). In addition, regarding student attitude towards mistakes we notice a clear shift between the two years, 72% and 90% of students attesting that it was not difficult to admit it when they found out there was an error with 72% in 2014 and a surprising 90% in 2015 (Question 4). Another notable difference between the two years was the second year science teachers' emphasis on improving student scientific literacy, knowledge and practical use of dependent and independent variable, graph and table writing and presentation of their findings. In fact, 74% of students in 2015 over only 16% in 2014 attested the use of graphs and tables during findings. A similar improvement in students' confidence to use science literacy skills after participation in the inquiry labs has also been documented in the literature<sup>4</sup>.

All the above are indicative not just of an attitude shift on behalf of the students but also evidence of student ownership and participation increase due to familiarity with this approach. Researchers and science teachers alike need to be wary of students' initial perceptions of inquiry especially when it is the first time they are involved in this as they might have been accustomed to the traditional teaching method. In fact, with inquiry based approach being more time-consuming, students tend to dislike the extra work required in order to think problems through on their own showing preference for memorisation of knowledge [1]. In this light, students' responses in this study regarding teacher contribution and interested should look rather grim at first glance as only 63% of them documented teacher personal interest to help whereas 16% of them perceived teacher contribution and interest as rather negligible. As mentioned earlier, teachers' intervention was expected to be minimal and essential only if it was to correct student misconceptions or when students stumbled over something.

## Italy

### A sample of teacher feedback remarks:

".. I really enjoyed being part of the project for my personal and professional growth... Having met people so different but professionally similar helps you to understand and learn many things... Both the training experience and the Bulgarian international conference have brought a breath of youth in my professional experience, especially from the relationships viewpoint. Many ideas have been brought in, which I hope we will put into practice in the following years... We will keep you update of what we will do. Thanks for everything and especially thanks for the patience you had with us"

*Chiara Tarallo, Liceo "Piero Calamandrei", Napoli, Italy*

"... Surely it was a good experience for me and my pupils ..."

*Antonella La Pegna, Liceo "V. Cuoco-T. Campanella", Napoli, Italy*

"... I was really happy when you asked me to participate in this project last year... I knew that it would have been very interesting, as indeed it was. I had fun and, above all, the project has made me willing to keep on improving my professional knowledge... I hope we can still work together in the future years..."

*Maria Moretti, Liceo "V. Cuoco-T. Campanella", Napoli, Italy*

"... I really thank you very much for having involved in the project my school and me. My involvement, as well as that of my students, has triggered in the colleagues who participated in the training meetings a self-evaluation process of science teaching as it happens in the classroom.... I am sure that our experience will bloom in the coming years. Thanks again and I hope to have other opportunities to work with you and your group..."

*Filomena Asprino, Liceo "F. Silvestri", Portici, Italy*

"...I wanted to thank you for letting me participate to this wonderful experience... Thanks to Chain Reaction my way of teaching physics has really changed ..."

*Marina De Cesare, Liceo "Piero Calamandrei", Napoli, Italy*

<sup>2</sup> Zadeh I, Zion M. Which Type of Inquiry Project Do High School Biology Students Prefer: Open or Guided? Research in Science Education 2012; 42:831-848.

"... I can safely tell you that the project was interesting and engaging.. I hope that in the future there will be other collaborations..."

*Caterina Mattera, Liceo "V. Cuoco-T. Campanella", Napoli, Italy*

## **Ireland**

The Chain Reaction project took place at a time in Ireland where we were not only going through curriculum change but also facing industrial relation issues as a result of the new curriculum initiatives. As partners we were concerned initially about not only recruiting schools but retaining teachers and students in the inquiry experience. On reflection, the teachers and students who represented us so well during this project is what we need to be focusing on in these uncertain times. The effort, enthusiasm and engagement from teachers and students alike was incredible to see. The teachers delivered their inquiry lessons through heavy time and curricular constraints and wanted, not only for their students to engage in personal development, but to go on a learning journey themselves. The partners in UoL are convinced that the approach used, the focus on a professional learning community between TB members, pre-service and in-service teachers led to genuine and insightful learning, not only for the teachers but for the TB members.

It was important to reduce the often present barrier between academia and the real school context and the teachers responses suggest that this has been done by linking the theory and practice of scientific inquiry. This was mainly done by illustrating that inquiry does not have to be "bells and whistles" in every lesson with open inquiry a constant practice. We advocated for partial inquiry and developing an inquiry habitus in day to day practices in the classroom. Simple things like getting students to draw conclusions would be considered partial inquiry practice. We also wished to address the misconception that scientific inquiry has to include big, expensive experiments. Paper and pencil inquiry is still very much at the heart of this constructivist practice. Providing teachers with alternative options helped them to make inquiry possible in their classroom.

Overall the Chain Reaction project has provided a steep professional learning curve for teachers, students and the partners themselves and we are convinced that the sustainability of scientific inquiry is something that will remain in participants classroom practices, long after the project has ceased. This has so far been echoed by teachers from previous years and it will be interesting to seeing whether the experience in Chain Reaction has planted the seed for teachers as they begin the new Science syllabus in September which is largely focused on inquiry practices at the heart of the learning experience.

## **Jordan**

### **Coffee Dregs Jordan**

One of the participating students from the winning school at Jordan who worked on the coffee dregs project, informed her grandfather about the impact of coffee dregs on the plant growth and germination. Her grandfather was amazed by this result and he tried himself to examine the effect of coffee dregs on the growth of plants growing in their garden. The grandfather did add the coffee dregs on some plants and did not add them to the others. After several days he found that the plants which were fertilized by coffee dregs grew better than those which did not. The grandfather was very happy with the plant growth result and appreciated his granddaughters work, and told her that he is very proud of her. This change in the grandfather's attitude towards the child's education is a significant finding.



Raya Maraqa, another participating student got very excited after she saw the coffee dregs results. She did create an animation story that talks about the coffee dregs and plants and did publish it in the scratch social media. The story was very informative in a simple way.

<https://scratch.mit.edu/projects/101429159/>

**Cosmic Web Site (National winner, the team from NSOU “Sofia”, 2015)**

During the preparation of the national conference the students had the pleasure to witness a rare astronomical event, which was reflected in their project- Cosmic website. On the 20 of March 2015 they observed partial solar eclipse. There wasn't much time for preparation in advance, therefore the students observed it in the court yard. The students were familiarized with the necessary safety measures for a safe observation. They found old floppy disks which they disassembled and used them to observe the event. They even managed to take a picture (see below) and they published the picture of this astronomical event on the webpage of the project and provided a short explanation. For them it as an existing experience which they shared with other students in their school.



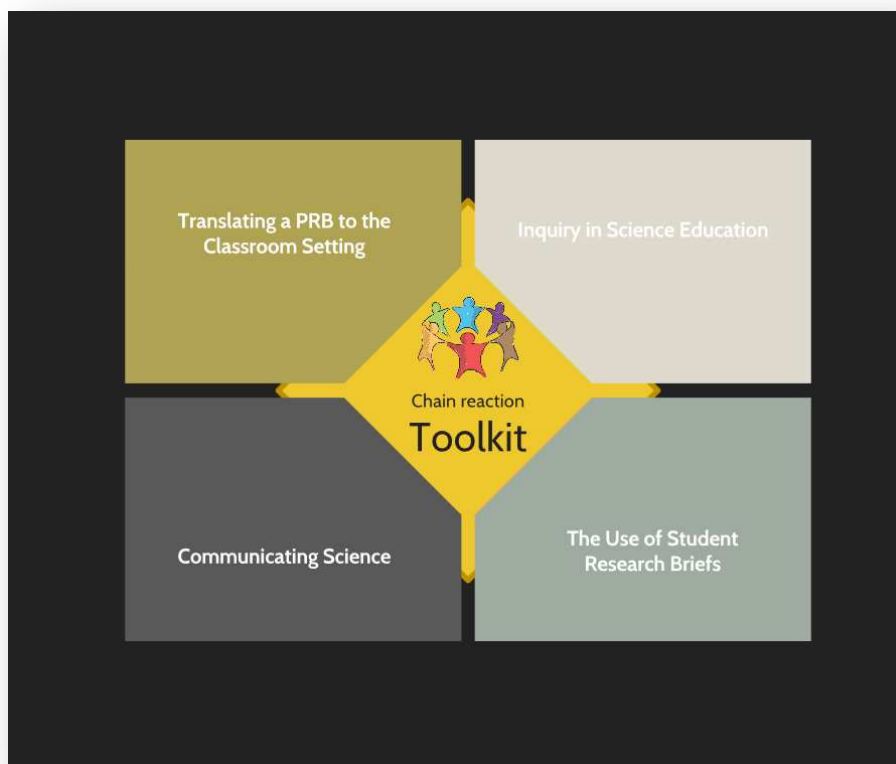
**PHEPPS ( one of the teams from Professional School for Transport “Goze Delchev”, Plovdiv, 2015)**

In order to examine the characteristics of the model and to test how it functions the students made a trip to a nearby town through which a river passes. However, the current was very strong and carried away the model. Although the students were very disappointed they have firmly decided to continue their participation and assembled a new model. This time they looked for a river closer to Plovdiv, which had a slower current. They found one in a nearby village but there the current was too slow to drive the propeller. The students and their scientific experiment became an attraction for the village people. All the elder people living in the village came to their aid by blocking the water stream as to enhance the water flow to the level necessary to conduct the experiment.

**Green Light (SOU “Patriarh Eftimi”i, Plovdiv, 2016)**

One group who were working on the topic “Green Light” explored the benefits of LED lighting. At the same time the parents of one of the participating girls were having some renovations done to their apartment. She persuaded her parents of the benefits of the LED lights and based on her research decided to use LED lights in all rooms. By the end of the school year the parents shared how pleasantly surprised they were with the work of their daughter on the project and that they were really satisfied with having LED lighting in the house.

**Chain Reaction Legacy and the Toolkit**



A significant legacy element of the project is the 'Chain Reaction Tool-kit'. This is available through the main website and is available free as an interactive document whereby teachers can choose the areas of inquiry which they want to explore or download as a pdf document. As well as an introduction to inquiry based science education there are four key areas for teachers to explore:

- Translating a PRB to the classroom setting



- Inquiry in science education
- Communicating science
- The use of student briefs


These four areas provide a framework for science teachers to understand inquiry in the science classroom and to establish and facilitate an inquiry culture in their science classroom. The areas include, sample lesson plans and guidelines, inquiry and communication skills, its applications and implications for science. Together with the PRBs, the toolkit provides a high quality, tested resource that science teachers can gain easy access to in developing an inquiry classroom. This tool-kit provides a unique resource that newly qualified teachers to vastly experienced teachers will find useful and effective for their practice.

### Inquiry in Science Education

Government education departments within many countries have made significant commitments to improving students' experience and participation in science education. A common objective among these efforts is to promote scientific inquiry as an effective way of developing students' understanding of scientific concepts and procedures.

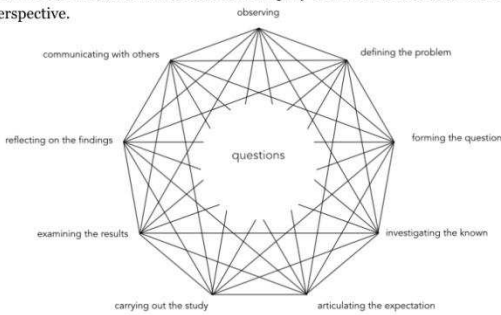
Scientific Inquiry is shown to increase:

- motivation
- achievement
- Institutional interest and attitudes
- understanding of the Nature of Science.



### How can it be Represented?

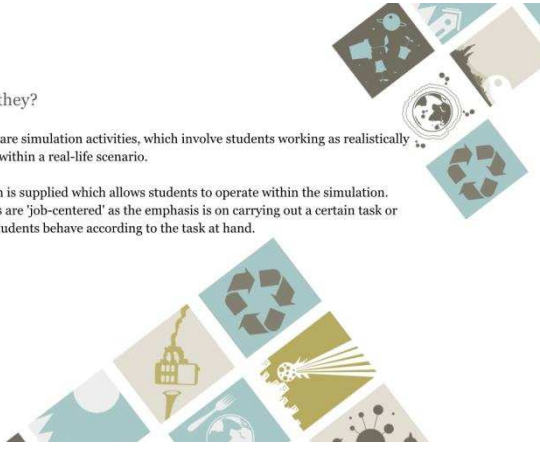
Scientific inquiry represents what scientists do and the model displayed below (Harwood, 2004) shows the features of inquiry both from a scientist's and student's perspective.



### What are they?


Most PRBs are simulation activities, which involve students working as realistically as possible within a real-life scenario.

Information is supplied which allows students to operate within the simulation. Simulations are 'job-centered' as the emphasis is on carrying out a certain task or tasks and students behave according to the task at hand.



### Tips for Presenting- Know the Situation

- Who is in the audience?
- What will the room be like?
- What resources are available?
- What do they already know?
- How long will the presentation last?



### Resources: WP8 (Months 1-18)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	1	1.45	0.71	1.2	1.5	1.11	0.6	2.71	3	2.95	1.72	1.97	19.92

### Resources: WP8 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total

	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	1.5	1.5	1.5	1.5	1.5	1.5	1.25	2	1.25	2	2.5	1.25	<b>19.25</b>
Actual for months 19-36	2.3	1.571	5.41	4.38	2.5	2.23	3.14	7.87	7.22	6.78	3.28	2.47	<b>50.351</b>

### Resources: WP8 (Months 1-36) TOTAL

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	3	3	3	3	3	3	2.5	4	2.5	4	5	2.5	<b>38.5</b>
Actual for months 1-36	3.3	3.021	6.12	5.58	4	3.34	3.74	10.58	10.22	9.73	5	4.44	<b>70.271</b>

### Resources: WP8 (Months 37-38) *Reporting period*

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 37-38	2.6	0	1	1.99		0.35	2.3	1.77	0	1.2	5.94	0.4	

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP8. As is evident from the Total table (in red) WP8 required 32.771 more person months than initially predicted. A number of these additional PMs were required for Report Writing (both the Periodic and Final Reports) at the end of the project.

## 4.9 Work Package 9 - Evaluation

This work package is led by Sheffield Hallam University, UK (Partner 1).

*Predicted* start and end dates for WP9

Start Month	1	End Month	36
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*Actual* start and end dates for WP9

Start Month	1	End Month	36
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### Objectives

- To complete a thorough evaluation of *Chain Reaction* across all partners and participants
- To draw out elements of best practice and success
- To suggest improvements where necessary

The evaluation of *Chain Reaction* was overseen and led by the Centre for Education and Inclusion Research (CEIR) at Sheffield Hallam University. CEIR was an independent research unit, which specialised in assessing educational and other interventions.

## Significant Results

This part of the project started at the project kick off with Mike Coldwell, Director of CEIR presenting on a theoretical framework for the evaluation. After feedback from the partners it was amended and CEIR produced tools for each partner to translate and use to start the evaluation process for Chain Reaction.

Table 4.9.1 - Tools produced

Tool and audience	Date
Questionnaire - Partners	Autumn 2013
Questionnaire - Teacher Educators	Autumn 2013
Questionnaire - Teacher Baseline	Autumn 2013
Questionnaire - Teachers - National Conference	Various
Questionnaire - Pupils - National Conference	Various
Questionnaire - Teachers - International Conference	May 2014

All tools were sent to the partners for translation as necessary and were then administered to their target audiences. Partners then either sent these to SHU, or in some cases performed their own data collation, inputting and analysis.

Analysis of these can be found in the CEIR's 12 month, 24 month and 36 month reports, to be found in Deliverable Report 9.1. The 36 month report draws together data from across the three years to provide conclusions and recommendations.

### Some points to be considered:

The three reports cover the data collection from across the lifespan of the project, and compares, where possible, responses.

Methods used were survey-based, using a theory-based approach to evaluation. Theory-based evaluation designs start from the perspective of understanding the theory underlying how a programme or initiative works to produce outcomes in specific contexts. We adapted the design to fit Teacher Professional Development. A starting point for this was to build programme *logic models* to understand how elements fit together. The programme logic models for this study were developed in conjunction with project partners in the initial partners meeting. Whilst in a survey based design not all of these outcomes can be measured, it gives a useful overview of the partner views on potential outcomes and sets the context for the presentation of findings.

### Key findings from specific elements are as follows.

#### National Conferences: Pupils

1. Each year nearly 1100 pupils aged mainly 13-17 (mean, median and mode 15 years) took part in national conferences. The fewest came from France and the most from Italy each year.
2. Close to 50% were girls and 50% boys. Most were from mixed sex schools, except in Jordan. Attendance at the international conference was more often in single sex groups (9 out of 22 schools).

3. Approximately 60% of pupil participants gave presentations, many also with posters. Only 30-50% Pupils from UK, Slovenia and Italy gave presentations, whereas almost all from Jordan, Greece and Bulgaria have done so. The very small numbers of the oldest and youngest attending were least likely to give presentations.
4. Around 92% of pupil participants enjoyed 'Express Yourself', though only 50% strongly agreed with this statement.
5. All other questions asked of the pupils received about 85% total agreement, with the order of responses very consistent from year to year; i.e. overall enjoyment, enjoyed the research, learned about team work, enjoyed the real scientist visits, learned a lot overall, have a better understanding of how scientists work and, lowest, feel confident about presenting their work (70% agree).
6. Every year the school visits from real scientists generated high satisfaction (53-56% strongly agree) and dissatisfaction (in total 2-4% disagree). This emphasises the importance of involving suitable scientists that can inspire young people.
7. There was a correlation between age and the statement 'I felt my team was in charge of the work I presented at Express Yourself', with older pupils agreeing more than younger pupils.
8. Respondents aged 14 or over gave more '*strongly agree*' responses than younger pupils. This could either be because adolescents tend to express more extreme opinions than younger children, or because the scheme is more suitable for the 14-16 age group.
9. Girls gave more '*strongly agree*' responses than boys (mean difference 7%), who gave more '*neutral*' responses (mean difference 3%). But the order of responses was the same for every statement.
10. The order of mean % total agreement (agree + strongly agree) by country (ignoring Q7, confidence in giving presentations) was: Jordan 100%, Georgia 95%, Slovenia 90%, Bulgaria 89%, Turkey 88%, Italy 88%, France 87%, Ireland 84%, Slovakia 75%, Greece 75%, UK 70%, Germany 63%.
11. These variations could indicate (i) that pupils in some countries learned more about IBSE than those from other countries, or (ii) pupils in some countries felt their current science teaching already uses this approach or (iii) cultural norms within some nationalities expect (young) people to express greater agreement than others.

### National Conferences: Teachers

1. In each of 3 years approximately 100 teachers from up to 12 countries completed questionnaires at national conferences.
2. Of these, approximately 55%-60% were classroom/ subject teachers, 30-35% were heads of science departments or teachers with additional responsibility, 5% were head teachers and 3% were laboratory technicians or senior technicians. Greece and Bulgaria always included head teachers; all respondents from Slovenia and Turkey were classroom teachers; and UK included technicians each year.
3. Between 70- 75% of all teacher respondents '*strongly agreed*' they enjoyed the national conference in which they participated. For Q2-5 (learned a lot, will make changes to teaching, share what I learned within school and beyond school), total agreement was 74-79% for each questionnaire.
4. Head teachers tend to agree more or more strongly than other staff roles with all statements.
5. Teachers from Jordan tend to give highest agreement or '*great extent of outcomes*' for all statements in each questionnaire, with Italy also giving high scores. Germany and UK teachers tend to give lower agreement or reported outcomes.
6. '*Increased enthusiasm for science and/or science teaching and learning*' was reported to a great extent by around 60% of all respondents to the conference questionnaires and over 90% '*to some extent*'.
7. Dissemination of Chain Reaction materials and IBSE approach to colleagues was the lowest reported personal outcome (great extent, 42%), but still occurred to some extent for around 90% of respondents.
8. The outcome for pupils most widely noted by teachers is the development of team skills (mean 70%).
9. In terms of outcomes for schools or departments, '*changed approaches to aspects of science teaching*' consistently has the highest '*great extent*' response (35-41%), whereas sharing practice and innovation across the school occurs most '*to some extent*'.
10. The wider outcomes of collaborative approaches between schools and development of local, national or international networks were reported '*to no extent*' or not applicable by at least 20% of all respondents.
11. Almost all respondents agreed they were '*highly motivated to take part in this activity*', with at least 55% strongly agreeing. Similar proportions would take part again, given the opportunity.

12. Encouragingly low numbers reported that other pressures hinder their engagement with CR (22-44% any agreement).
13. Total agreement that other colleagues are supportive has risen from 68% to 85% to 92% over the 3 years of the conferences.
14. Overall, the large majority of responses to all statements are positive, there are widespread positive outcomes and almost all participants benefited, as shown by various measures.

### **International Conferences: Pupils**

1. Pupils from all countries except Bulgaria supplied responses to questionnaires about the international conference; 55 in 2015 and 57 in 2016. These were 4-8 pupils from one school in each country.
2. Approximately 50% were girls and 50% boys, but attendance at the international conference was more often in single sex groups (9 out of 22 schools).
3. Almost all pupil participants gave both posters and presentations. This contrasts with the national conferences where approximately 30-40% gave posters only, 30% presentations only and 30-40% gave both.
4. These pupils were much more confident about giving presentations (over 85% agreed) compared with 70% agreement in national conferences.
5. Enjoyment and learning about working in a team received the highest total agreement.
6. There was less consistency in the order of agreement in the international conferences than the national conferences, but this is probably due to the small numbers.

### **International Conferences: Teachers**

1. International conferences were held in all 3 years. Different questions were asked at the first (2014) international conference from those asked in 2015 and 2016, so they are not comparable. See 2014 report.
2. Around 20 teachers responded to questionnaires at the international conference each year. It is not clear how many of these completed other questionnaires, e.g. national conference or end of project evaluations.
3. As in national conference questionnaires, almost all teacher participants enjoyed the international conferences each year. They also agreed they would share what they learned with colleagues in their school.
4. Personal and professional outcomes are also very similar for national and international conferences, with increased enthusiasm for science and science education reported to a great extent the most, followed by collaborative working with colleagues. Improved classroom practice is the least reported outcome.
5. 'Great extent' and 'total agree' responses are in general even higher at the international than national conferences for all sets of questions.
6. Responses about outcomes for schools or departments, and about wider outcomes, are very similar for international and national conferences.
7. Somewhat disappointingly, only 8 and 9 participants at the international conferences stated that they had developed international networks to a great extent and 3 and 2 felt it was not applicable.
8. Personal motivation and enthusiasm to take part again are usually at the top of the list for both national and international conferences, and requirement to take part and difficulty in doing so due to other pressures are consistently at the bottom.
9. 'My School is very positive about IBSE' gained higher agreement at international conferences (83 & 95%) than national conferences (79 & 82%) whereas 'line manager support' and 'other colleagues' support' received lower agreement in international events.

## End of Project survey: Teachers

1. 150 teachers responded to the end of project survey, from every country except Bulgaria. Of these 71% were class teachers (a much higher proportion than responded to national conference surveys, 55-60%). Also, there were only 2 head teachers, 31 senior teachers and no technicians. 37% took part in year 1, 41% in year 2, 6% in year 3 and 3% in all 3 years.
2. The top personal/professional outcome was 'Increased knowledge of IBSE pedagogy' (66% great extent, 33% some extent). Increased enthusiasm for science and science teaching and learning was also widely noted (59% great extent, 38% some extent), as in all conference questionnaires.
3. Only 23% noted any outcome in terms of career development such as promotion; mostly teachers with additional responsibility for science.
4. 70% of heads of science departments reported a great extent of changed 'thinking about science' and 80% of them reported 'some extent' of improved classroom practice. All other roles reported around 50% for these questions.
5. For most questions, teachers involved in more recent years reported higher % of outcomes experienced to a greater extent, and especially those involved in all 3 years. This could either be because the effects of the project wear off or, hopefully, because improvements become the 'new normal'.
6. Teachers put pupils' 'motivation and enjoyment of science' ahead of 'specific areas of learning' such as, in other surveys, team working skills, in this end of project questionnaires.
7. Responses to questions about outcomes for schools and departments agreed with conference questionnaires, in which 'changed approaches to aspects of science teaching' was noted to the greatest extent and 'department and school plans for science teaching' to a great extent' the least. From 10-24% of respondents reported 'no extent' of these outcomes.
8. Of the wider outcomes, the most positive response is to sharing learning with local schools (71%), rather than collaborative approaches (55%) or wider networks (59%).
9. Teachers from Jordan, Turkey and Georgia reported the highest agreement or extent of outcomes for most questions, but notably, those from Jordan did not report high experience of interaction with other schools locally, nationally or internationally. UK teachers, on the other hand, expressed higher networking outcomes than in national conferences, or other questions in this survey.
10. The school being very positive about professional development was reported more frequently than the school being very positive about IBSE. This suggests that a school being interested in professional development in general, rather than science teaching in particular, is a feature of participation in Chain Reaction.

## End of Project Survey: Partners

1. Responses were received from 67 participants from every country except Bulgaria. Of these 33 (49%) were partners, 18 (27%) were teacher educators, 2 were project managers, and 9 (13%, all from France) were role models.
2. This compared with 27 (59%) partners, 17 (37%) teacher educators and 2 (4%) others (total 46) in a baseline survey in autumn 2013. Thus, in the end of project survey there are more of all roles except teacher educators, including several more 'others'.
3. Validating and confirming knowledge about IBSE, understanding new or recent thinking about it and specific approaches to aspects of IBSE pedagogy all recorded 39-43% 'great extent' of outcome' and 88-93% 'some + great extent' of outcome. These responses were in the exact order of hoped-for personal outcomes stated in the base line survey (see 2014 report).
4. For almost every personal or professional outcome the experienced 'no extent' of outcome was lower than anticipated. However the % of 'great extent' of outcomes (mean 36%) was also lower than anticipated (mean 41%), the increase all being in outcomes experienced 'to some extent'.
5. Approximately 50% of the partners experienced all outcomes to a great extent, which was as hoped for the 3 'aspects of IBSE' statements, but more than hoped for management skills, delivering professional development and changed thinking about IBSE, which were only hoped-for to a great extent by around 30% of partners. Teacher educators experienced the outcomes to a lesser extent, although their initial hopes were very similar to the partners'.

6. Sharing learning in the locale and stronger collaboration between Chain Reaction schools were both experienced to a great extent by around 40% of all respondents and to at least some extent by over 80%. Improvements in approaches to mathematics teaching, however, were only noted to any extent by 26%. Partners and teacher educators noted similar % outcomes.
7. The order of wider outcomes is as hoped-for, but in these questions the extent of outcomes is less than hoped for (which was 95% at least some extent and 48% great extent).
8. UK and Slovakia respondents noted almost no wider outcomes to a great extent, whereas Jordan respondents noted a great extent in all 3 outcomes.
9. As in every questionnaire, motivation to take part received the highest agreement (99%, of which 84% strongly agreed compared with 68% of teachers in the end of project questionnaire), while 'required to take part' and 'other pressures make it difficult' received the lowest agreement (36% and 16%).
10. For all other statements about support from colleagues and management, and positive attitudes within their organisation, the partner respondents agreed somewhat less than the teacher respondents.
11. Almost every statement about support from colleagues and management, and positive attitudes within their organisation (Q27-31), received higher total agreement and strong agreement from partners at the end of the project than in autumn 2013, usually more than 10% higher. These increases in positive attitudes from colleagues and managers as well as teachers and partners bode well for the continuation of IBSE.
12. Of those responding to the partners' survey, the partners gave higher agreement to nearly all the personal and school context statements than the teacher educators, role models, project managers or others. Role models only agreed that they were highly motivated to take part.
13. Partner respondents from Ireland, Turkey and Germany gave several 100% 'strongly agree' responses to the statements about personal and school contexts.
14. By contrast some statements received 0% 'strongly agree' responses from partner respondents in UK, France and Greece.

#### Resources: WP9 (Months 1-18)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	0.9	1.27	0.46	2.86	1.5	0.49	1.04	0.68	1.07	0.6	0.97	0.49	12.33

#### Resources: WP9 (Months 19-36)

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	5	1.75	1.5	1.75	1.5	1.5	1.5	1.75	1.25	1.75	1.75	1.75	22.75
Actual for months 19-36	1.8	1.721	1.43	4.19	3	0.43	2.03	1	1.79	2.45	2.46	2.22	24.521

#### Resources: WP9 (Months 1-36) TOTAL

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	10	3.5	3	3.5	3	3	3	3.5	2.5	3.5	3.5	3.5	45.5
Actual for months 1-36	2.7	2.991	1.89	7.05	4.5	0.92	3.07	1.68	2.86	3.05	3.43	2.71	36.851

**Resources: WP9 (Months 37-38) Reporting period**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 37-38	2.1	0	0	0	0	0	0	0	0	0	0	0	2.1

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP9. As is evident from the Total table (in red) WP9 required 8.649 fewer person months than initially predicted. This PM surplus was due in part to the work undertaken by the external evaluators. Evaluation tools were designed, shared, adapted and translated early on in the project which allowed the consortium to undertake the evaluation with confidence.



## 5. Deliverables and milestones tables

### 5.1 Deliverables - Period 2

Del. no.	Deliverable name	WP no.	Nature	Dissemination level	Delivery date from Annex I (project month)	Actual delivery date	Comments
1.2	Review Meetings	1	R	PU	18, 24, 30, 36	18, 24, 29, 34, 36	Month 30 review meeting took place one month early in month 29 due to schedules and logistics. An additional PMB was called by the Coordinator in order to discuss project outputs, the final international conference and teacher workshop and the reporting obligations of the project. This was approved by the Commission and took place in month 34.
2.2	Website updates	2	O	PU	24, 36	24, 36	Updates to main and partner websites have taken place as necessary
5.1	IBSE/EUPRB briefing for teachers	5	D	RE	18, 30	18, 30	Undertaken as planned
6.1	Pupil EUPRB conference papers written	6	O	RE	22, 34	22, 34	Undertaken as planned
7.1	National Conferences	7	R	PU	23, 35	23, 35	Undertaken as planned with conferences taking place across full consortium
7.2	International Conferences	7	R	PU	24, 36	24, 36	Undertaken as planned: Year 2: University of Heidelberg, Germany Year 3: University of Plovdiv, Bulgaria
8.1	Interim Report (including Financials)	8	R	PU	18	18	Submitted
8.2	Final Report (including Financials)	8	R	PU	36	38	Submitted after 60 day period
8.3	Public Seminar	8	O	PU	36	36	
9.1	Evaluation Report for each year of	9	R	PU	24, 36	24, 36	Please see Deliverable Report 9.1

	project (including conferences)						
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## 5.2 Milestones - Period 2

TABLE 2. MILESTONES							
Milestone no.	Milestone name	Work package no.	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual achievement date	Comments
14	Year 2 IBSE/EUPRB briefing completed with all teachers across all partner states	5	PU	18	Yes	18	
15	Management review meeting (all partner states)	1	SHU	18	Yes	17	This meeting took place slightly early in order that the periodic report could be discussed in detail
16	EUPRB activities completed in all participating schools across all partners states	5	PU	22	Yes	22	
17	12 x national student conferences across all 12 partner states and 1 x international conference (Germany)	7	PHHD	24	Yes	24	
18	Year 2 interim evaluation report	9	SHU	24	Yes	33	This report was late as a result of difficulties in gathering data from partners on the previous year's activities. The window

							available for the external evaluators to do the work was then missed and we had to wait for their availability
19	End of year 2 management review meeting	1	SHU	24	Yes	24	The meeting took place in month 2 but the report was compiled in month 26
20	All Year 3 schools/teachers identified (10 teachers from five different schools)	5	PU	27	Yes	27	UK was only able to recruit 4 schools - changes to the science curriculum meant that teachers were reluctant to take on more work
21	Year 3 IBSE/EUPRB briefing completed with all teachers across all partner states	5	PU	30	Yes	30	
22	Management review meeting (all partner states)	1	SHU	30	Yes	29	PMB took place slightly early as a result of partner commitments
23	PRB activities completed in all participating schools across all partners states	5	PU	34	Yes	34	
24	12 x national student conferences across all 12 partner states and 1 x international conference (Jordan)	7	PHHD	36	Yes	36	
25	Final evaluation report	9	SHU	36	Yes	38	Report completed slightly late due to delays in receiving data
26	End of project management review meeting	1	SHU	36	Yes	36	

*Note that an additional PMB was called by the Coordinator in March 2016 in order to discuss project outputs, the final international conference and teacher workshop and the reporting obligations of the project. Please see relevant Deliverable report for details*

## 6. Project management

### Management activities

Sheffield Hallam University (SHU) is the Project Coordinator. Management tasks across the project fall into Work Package 1, with SHU recording time against this work package for both coordination and national management responsibilities.

#### 6.1 Work Package 1 - Management

Predicted start and end dates for WP1

Start Month	1	End Month	36
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Actual start and end dates for WP2

Start Month	1	End Month	36
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### Objectives

- Coordinating Partner (partner 1) to oversee the successful running of *Chain Reaction* across all partners
- National implementation of *Chain Reaction*
- Regular reporting from all partners
- Administration of project and financial management of national budgets
- Completion of project milestones

The Coordinating Partner leads the Project Management Board (PMB), which is made up of representatives from all participating partners (SHU, UNINA, UMB, TEDU, PU, CIFOP, UL, PHHD, UOC, UOL, JSSR & ISU). The PMB is jointly responsible for;

- Ensuring all deadlines/milestones are met
- Report writing as necessary
- Ensuring that evaluation strategy is followed
- Obtaining ethical approval for project
- Maintaining strong communication links with the relevant national Technical Board (TB)
- Attending all review meetings and submitting data to be included in all review meeting reports
- Ensuring financial records are kept and submitted appropriately
- Monitoring all aspects related to gender and any ethical issues that might arise

### Significant Results

All deliverables and milestones for months 19-36 have been successfully met and regular reporting procedures have been established to keep all participants up to date. The PMB has managed and maintained links with the national TBs with relevant information from PMB meetings feeding down. Review (PMB) meetings were attended by at least one representative from all of the consortium partners.

## Consortium/Project Management Board meetings held during months 19-36

Table 6.1.1 - full project meetings (months 19-36)

Type	Date	Venue
Project Management Board	12-13 May 2015	University of Education Heidelberg, Germany
Project Management Board	15-16 October 2015	Iliia State University, Tbilisi, Georgia
Project Management Board	10 March 2016	Grand Hôtel Saint-Michel, Paris, France*
Project Management Board	11-12 May 2016	Plovdiv University, Plovdiv, Bulgaria

\* this was an additional PMB called by the Coordinator - see relevant deliverable report for details

### Review of project progress at 24 month meeting

The Review meeting was held at the University of Heidelberg, Germany on 12<sup>th</sup> -13<sup>th</sup> May 2015. All of the project partners were represented.

The meeting started with a discussion of the national student conferences which were unanimously agreed as a positive experience for those involved – students, teachers and role models. All partners were also very positive about the international conference that had been hosted by the University of Heidelberg the previous day. The Team in Heidelberg had also held an inquiry activity morning on the 15<sup>th</sup> which was a great success - it was decided that this approach should also be taken at the third and final international conference in 2016, and that this should be longer in duration. There was some discussion around the scientific content of the student presentations and on how to make this stronger.

All partners responded positively regarding progress with no major issues reported. The consortium took some time to reflect on the successes and areas on which to work for the third year of the project. Partners were instructed to send all the evaluation material to the Coordinating Partner (ASAP), however some partners have had difficulty in obtaining the required data. Nevertheless, the reflection session identified initial thoughts and areas for improvement. Given it was the second year of the project, the areas for improvement were much reduced as a result of steps taken after year 1. It was also anticipated that the review meeting would give areas for improvement for the whole consortium. Holding the national conferences earlier for example, had meant that all partners were more prepared, and were able to prepare the schools and teachers better than in year 1. Other identified areas for improvement included the web presence and keeping all partner websites updated. Sheffield Hallam University and The University of Heidelberg indicated that they had found recruitment of schools difficult in year 2, and Sheffield Hallam University noted that it could be more difficult in year 3 as the secondary science curriculum was changing, meaning that teachers were less likely to be inclined to want to take part in external projects. Other partners offered suggestions for support, however environments and education systems differ across contexts.

On the topic of the third international conference to be held in 2016, as a result of the tensions in the Middle East it was agreed that it would no longer be possible for the conference to be held in Jordan as planned. After some discussion and consideration of the financial and logistical implications of hosting the conference, it was decided by the PMB that University of Plovdiv, Bulgaria would host the conference and the final PMB, in May 2016. The consortium discussed the production of a "best practice guide" for the IBSE approach demonstrated by Chain Reaction. It was suggested that this should take the form of a "toolkit". Ideas for this were collected in terms of aesthetics, aims, audience and format from all partners.

### **Review of project progress at 29 month meeting**

The Review meeting was held at Ilia State University, Tbilisi, Georgia on 15<sup>th</sup>-16<sup>th</sup> October 2015. All of the project partners were represented.

The meeting started with the coordinator feeding back and outlining how the Review meeting had gone in May of 2015. Feedback was shared from the Project Officer and expert panel as to how the consortium needed to change approaches, particularly as regards the reporting of deliverables, and a more systematic recording of some elements of the project. Overall, the review had been very positive but specific areas identified by the review for improvement were outlined. This led to a series of templates being suggested for partners to complete in order to record how for example, a EUPRB has been adapted for use in particular partner country.

The consortium committed to providing a "best practice" guide under the DoW to form part of a project legacy. This was discussed as being a Chain Reaction "toolkit". There was some debate over the nature of this toolkit, including the difficulty of the approach being illustrated as much of our success has been related to face to face contact with teachers. After discussion it was decided that a working group would be established to progress the concept and bring ideas together.

A new idea about a further project legacy was discussed - a teacher workshop to be run at the international conference, concurrently with the student inquiry day. This would involve each partner bringing along 2/3 teachers from previous years who would attend a workshop along with one of the teachers from the winning schools from the third year. The partners were asked to consider whether they thought this was a good idea and if so whether they would be able to pay for the extra teachers out of their existing budgets. It was noted that this idea would have to be put to the EC as it is not in the original DoW.

### **Review of project progress at 34 month meeting**

This was an additional PMB called by the Coordinator in order to discuss project outputs, the final international conference and teacher workshop and the reporting obligations of the project.

The Review meeting was held at the Grand Hôtel Saint-Michel, Paris on 10<sup>th</sup> March 2016. All of the project partners were represented.

During the meeting the timeline for reporting was re-emphasised and the importance of starting the process early. It was noted that templates had been produced for reporting. Partners were also reminded to get all the evaluation materials back to SHU as quickly as possible.

The meeting then moved on to discuss the project legacies, the first of these was the IBSE toolkit which has been worked upon collaboratively by a number of partners. The discussion then moved onto the teachers' workshop in Bulgaria. This was first brought up as an idea at the Georgia meeting, and having been agreed that this was a good idea, the Co-ordinator sought permission from the Project Officer at the EC for the event, as it was not contained in the DOW. This permission was granted. The format of the day was discussed and ideas exchanged as to the feasibility of some of the suggestions with regards language and communication.

### **Review of project progress at 36 month meeting**

The Review meeting was held at Plovdiv University on the day of 11th May 2016, and the morning of the 12th May. All of the project partners were represented.

As the meeting was the last one for the project the agenda was different from previous meetings. There was a brief discussion about the final international conference, the inquiry day for pupils and the teacher workshop. These were all considered to have been very successful. The remainder of the meeting was spent discussing and working on the content for the final report.

*For more Information on the project progress meetings please see the relevant Deliverables report.*

**Resources: WP1 (Months 1-18)**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 1 - 18	13.7	2.06	4.89	1.69	1.5	5.42	0.35	3.09	4.24	3.46	1.37	0.99	<b>42.76</b>

**Resources: WP1 (Months 19-36)**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 19-36	9.25	0.5	0.5	0.5	0.75	0.75	0.5	0.75	0.75	0.75	0.75	0.75	<b>16.5</b>
Actual for months 19-36	13.5	1.079	2.58	1.62	1	6.35	2.95	2.84	1.31	1.03	0.16	0.91	<b>35.329</b>

**Resources: WP1 (Months 1-36) TOTAL**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Planned for months 1-36	18.5	1	1	1	1.5	1.5	1	1.5	1.5	1.5	1.5	1.5	<b>33</b>
Actual for months 1-36	27.2	3.139	7.47	3.31	2.5	11.77	3.3	5.93	5.55	4.49	1.53	1.9	<b>78.089</b>

**Resources: WP1 (Months 37-38) *Reporting period***

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Actual for months 37-38	0.2	0	0.1	0		1.26	0.1	0	0	0	2.23	0	

The resource usage tables show the person months over the course of the project, and per 18-month period, as well as the actual time spent per partner on WP1. As is evident from the Total table (in red) WP1 required 45.089 more person months than initially predicted. For many of the project partners this was their first FP7 and EU funded project. Therefore they were perhaps unprepared for the scale of the management tasks that they were presented with and therefore the predicted PMs in the DoW were unrealistic. The amount of support needed by partners was also very high initially when the project was being set up and systems established both in partner institutions and also across the consortium, which led to the coordinating partner needing far more time on management activities than had been anticipated.



## Project Planning

Chain Reaction worked on a yearly cycle of training and delivery of objectives across the consortium and had a clear yearly project plan and with associated deliverables/milestones. While there were a few problems experienced by some partners as regards recruitment/retention of schools, and in school delivery, some of these issues were unavoidable as a result of the national context (for example industrial action or curriculum changes). Regardless of these small difficulties all partners delivered the project successfully.

Regular review meetings (held every six months with one additional meeting held in month 34) ensured all members of the consortium felt up to date with progress and provided a forum for the sharing of best practice. Progress was reviewed throughout and assessed in order to make improvements year on year.

## Communication and management

Communication between beneficiaries was frequent and well managed. This took place via telephone, email and Skype as appropriate. The work undertaken was organised by work packages and the work package leaders had responsibility for monitoring and managing the work contained within these. The Coordinating Partner resolved problems regarding finance and management throughout the life of the project - it is worth noting that the majority of partners were new to both European funding streams and FP7 projects at the outset. This meant that more time was dedicated to the management of the project than anticipated in the indicative person months for WP1. The coordinating partner endeavoured to answer queries quickly and provided standardised reporting templates (for example timesheets, which were approved by the EC Finance Officer). Partners were requested to report on their progress by work package every three months. This reporting took place using templates and was sent to the Work Package Leaders for collation then sent on to the coordinating partner. This enabled the consortium to review progress and to review the time being spent on each work package by each partner.

### 6.2 Dissemination and use of the knowledge

Dissemination has been achieved through the main project website and the individual partner sites. In addition many partners have used Social Media to reach different audience with varying degrees of success, for example, to date, TEDU have received over 1100 *likes* on Facebook.

In addition to online dissemination members from across the consortium have undertaken formal presentations and completed papers discussing aspects of the Chain Reaction project. It is hoped that this activity will continue for some time after the project has ended as more partners begin to write up and share their findings. For more details on the papers and talks conducted to date please see WP8.

Experience and understanding gained from involvement in programme allowed partners to pull together learning and create the Chain Reaction Online Toolkit which can be accessed via the main project website. This resource draws upon the IBSE training provided both *to* and *by* the TB. It forms an outline for teachers and educators to understand the message behind Chain Reaction and explore some of the useful hints and tips collated through the projects many experiences. The Toolkit represents a sustainable legacy for the project forming a permanent online resource.

Work Package 8 is dedicated to the impact and dissemination activities associated with Chain Reaction - please see this section for a comprehensive breakdown of activities.

## 7. Explanation of the use of the resources

### 7.1 Planned versus Actual effort

**Table 7.1.1 Person Months (Months 19-36)**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Estimated for months 19-36	33.5	21	22.5	22	21	20.25	21	25.5	21	25	25.5	22.75	281
Actual for months 19-36	28.4	18.843	27.02	25.61	35.05	17.96	35.34	40.28	41.74	33.78	28.62	23.3	355.943

**Table 7.1.2 Person Months by Work Package (Months 19-36)**

Participant no. / short name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total person months (19-36)
Part. 1 / SHU	13.5	1.7	0.3	0	0.2	1.2	7.4	2.3	1.8	28.4
Part. 2 / UNINA	1.079	1.75	0.429	0.286	0.729	2.914	8.364	1.571	1.721	18.843
Part. 3 / UMB	2.58	2.96	1.73	2.13	2.07	1.68	7.03	5.41	1.43	27.02
Part. 4 / TEDU	1.62	3.12	0.6	0.6	2.1	2.4	6.6	4.38	4.19	25.61
Part. 5 / PU	1	3.1	4	5	2.5	2.75	11.2	2.5	3	35.05
Part. 6 / CIFOP	6.35	1.09	0.33	0.08	0.95	0.62	5.88	2.23	0.43	17.96
Part. 7 / UL	2.95	1.6	2.1	5.69	7.17	6.18	4.48	3.14	2.03	35.34
Part. 8 / PHHD	2.84	4.11	1.87	0.79	2.11	2.77	16.92	7.87	1	40.28
Part. 9 / UOC	1.31	12.31	2.4	0	4.3	3.05	9.36	7.22	1.79	41.74
Part. 10 / UOL	1.03	1.92	3.26	4.01	2.63	4.56	5.94	6.78	2.45	32.58
Part. 11 / JSSR	0.16	3.54	2.57	1.79	0.5	1.69	12.63	3.28	2.46	28.62
Part. 12 / ISU	0.91	3.13	0.96	0.83	0.93	1.42	10.43	2.47	2.22	23.3
<b>TOTAL</b>	<b>35.329</b>	<b>40.33</b>	<b>20.549</b>	<b>21.206</b>	<b>26.189</b>	<b>31.234</b>	<b>106.234</b>	<b>49.151</b>	<b>24.521</b>	<b>354.743</b>

**Table 7.1.3 Person Months by Work Package (Months 1-36: TOTAL ACROSS PROJECT)**

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total person months (1-36)
Part. 1 / SHU	27.4	3.6	1.5	0.1	0.9	2.7	13	3.3	2.7	55.2
Part. 2 / UNINA	3.139	4.78	3.739	3.456	2.439	4.154	11.574	3.021	2.991	39.293
Part. 3 / UMB	7.47	5.1	4.82	5.81	5.02	2.5	11.82	6.12	1.89	50.55
Part. 4 / TEDU	3.31	6.65	5.45	4.68	3.42	3.75	11.35	5.58	7.05	51.24
Part. 5 / PU	2.5	5.2	6.5	5	4	4.51	18.3	4	4.5	54.51

Part. 6 / CIFOP	11.77	3.05	2.62	1.75	3.49	1.23	9.59	3.34	0.92	<b>37.76</b>
Part. 7 / UL	3.3	2.7	5.6	9.89	11.07	7.18	6.28	3.74	3.07	<b>52.83</b>
Part. 8 / PHHD	5.93	9.37	5.71	4.8	4.53	4.75	26.33	10.58	1.68	<b>73.68</b>
Part. 9 / UOC	5.55	24.6	8	1.64	10.29	6.74	11.87	10.22	2.86	<b>81.77</b>
Part. 10 / UOL	4.49	2.67	6.18	5.29	4.76	5.95	7.02	9.73	3.05	<b>49.14</b>
Part. 11 / JSSR	1.53	6.55	5.03	3.89	2.64	3.5	19.31	5	3.43	<b>50.88</b>
Part. 12 / ISU	1.9	6.87	4.94	5.83	3.21	2.7	14	3.22	2.71	<b>45.38</b>
<b>TOTAL</b>	<b>78.289</b>	<b>81.14</b>	<b>60.089</b>	<b>52.136</b>	<b>55.769</b>	<b>49.664</b>	<b>160.444</b>	<b>67.851</b>	<b>36.851</b>	<b>642.233</b>

**Table 7.1.4 Person Months by Work Package (Months 1-38: INCLUDING MONTHS 37 & 38 ALLOCATED FOR REPORT WRITING)**

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	TOTAL
Part. 1 / SHU	27.6	3.7	1.5	0.1	0.9	2.7	13	5.9	4.8	<b>60.2</b>
Part. 2 / UNINA	3.139	4.78	3.739	3.456	2.439	4.154	11.574	3.021	2.991	<b>39.293</b>
Part. 3 / UMB	7.57	5.1	4.82	5.81	5.02	2.5	11.82	7.12	1.89	<b>51.65</b>
Part. 4 / TEDU	3.31	6.65	5.45	4.68	3.42	3.75	11.35	7.57	7.05	<b>53.23</b>
Part. 5 / PU	2.5	5.2	6.5	5	4	4.51	18.3	4	4.5	<b>54.51</b>
Part. 6 / CIFOP	13.03	3.05	2.62	1.75	3.49	1.23	9.59	3.69	0.92	<b>39.37</b>
Part. 7 / UL	3.4	2.7	5.6	9.89	11.07	7.18	6.28	6.04	3.07	<b>55.23</b>
Part. 8 / PHHD	5.93	9.37	5.71	4.8	4.53	4.75	26.33	12.35	1.68	<b>75.45</b>
Part. 9 / UOC	5.55	24.6	8	1.64	10.29	6.74	11.87	10.22	2.86	<b>81.77</b>
Part. 10 / UOL	4.49	2.67	6.18	5.29	4.76	5.95	7.02	10.93	3.05	<b>50.34</b>
Part. 11 / JSSR	2.23	6.55	5.03	3.89	2.64	3.5	19.31	5.94	3.43	<b>52.52</b>
Part. 12 / ISU	1.9	6.87	4.94	5.83	3.21	2.7	14	3.62	2.71	<b>45.78</b>
<b>TOTAL</b>	<b>80.649</b>	<b>81.24</b>	<b>60.089</b>	<b>52.136</b>	<b>55.769</b>	<b>49.664</b>	<b>160.444</b>	<b>80.401</b>	<b>38.951</b>	<b>659.343</b>

**Planned versus Actual effort**

**Table 7.1.5 Person Months (Months 1-38)**

Partner	1	2	3	4	5	6	7	8	9	10	11	12	Total
	SHU	UNINA	UMB	TEDU	PU	CIFOP	UL	PHHD	UOC	UOL	JSSR	ISU	
Estimated for months 1-38	67	42	45	44	42	40.5	42	51	42	50	51	45.5	<b>562</b>
Actual for months 1-38	60.2	39.293	51.65	53.23	54.51	39.37	55.23	75.45	81.77	50.34	52.52	45.78	<b>659.343</b>
	<b>+6.8</b>	<b>+2.707</b>	<b>-6.65</b>	<b>-9.23</b>	<b>-12.51</b>	<b>+1.13</b>	<b>-13.23</b>	<b>-24.45</b>	<b>-39.77</b>	<b>-0.34</b>	<b>-1.52</b>	<b>+0.28</b>	<b>-97.343</b>

**Table 7.1.6 Percentage output by Partner and WP**

Participant no. / short name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9
<b>Part. 1 / SHU</b>	45%*	6%	2%*	0.1%	1.9%	4%	21%	10%	10%*
<b>Part. 2 / UNINA</b>	8%	12%	9%	9%	6%	11%	29%	8%	8%
<b>Part. 3 / UMB</b>	15%	10%	10%	11%	10%	5%	23%	12%	4%
<b>Part. 4 / TEDU</b>	6%	13%	11%	9%	7%	7%	22%	11%	14%
<b>Part. 5 / PU</b>	5%	10%	12%	9%	7%*	8%	34%	7%	8%
<b>Part. 6 / CIFOP</b>	31%	8%	7%	5%	9%	3%	25%	9%	3%
<b>Part. 7 / UL</b>	6%	5%	11%	19%*	21%	13%	12%	7%	6%
<b>Part. 8 / PHHD</b>	8%	13%	8%	7%	6%	6%	36%*	14%	2%
<b>Part. 9 / UOC</b>	7%	30%*	10%	2%	13%	8%	15%	12%	3%
<b>Part. 10 / UOL</b>	9%	5%	12%	11%	9%	12%*	14%	22%	6%
<b>Part. 11 / JSSR</b>	3%	13%	10%	7%	5%	7%	38%	10%*	7%
<b>Part. 12 / ISU</b>	4%	15%	11%	13%	7%	6%	31%	7%	6%

\*Work Package Lead Partner

Table 7.1.6 shows the breakdown of effort by work package and by partner.

## 8. Financial Statements – Form C and Summary Financial Report

Separate Financial Statement from each beneficiary submitted via the Participant Portal.

### 8.1 Certificates on the Financial Statements

List of Certificates which are due for this period, in accordance with Article II.4.4 of the Grant Agreement.

Beneficiary	Organisation short name	Certificate provided? yes / no	Any useful comment, in particular if a certificate is not provided
1	SHU	YES	Total budget for project does not exceed EUR375k
2	UNINA	NO	Total budget for project does not exceed EUR375k
3	UMB	NO	Total budget for project does not exceed EUR375k
4	TEDU	NO	Total budget for project does not exceed EUR375k
5	PU	NO	Total budget for project does not exceed EUR375k
6	CIFOP	YES	
7	UL	NO	Total budget for project does not exceed EUR375k
8	PHHD	YES	
9	UOC	NO	Total budget for project does not exceed EUR375k
10	UOL	NO	Total budget for project does not exceed EUR375k
11	JSSR	NO	Total budget for project does not exceed EUR375k
12	ISU	NO	Total budget for project does not exceed EUR375k

## Certificates on the Financial Statements for Period 2

Partner 1 - SHU

### FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	SHEFFIELD HALLAM UNIVERSITY	Participant Identity Code	999842148
Organisation short Name	SHU	Beneficiary nr.	1
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

#### 1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			48,601.40	67,866.24	27,979.02	144,446.66
Subcontracting			21,417.11	0.00	0.00	21,417.11
Other direct costs			28,846.37	13,459.02	2,106.52	44,411.91
Indirect costs			15,489.55	16,265.05	6,017.11	37,771.71
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	114,354.43	97,590.31	36,102.65	248,047.39
Maximum EU contribution	0.00	0.00	104,286.22	87,018.03	32,191.53	223,495.78
Requested EU contribution						223,495.78

#### 2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

#### 3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

#### 4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
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#### 5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

#### 6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Name of the Person(s) Authorised to sign this Financial Statement	
Efe Ervero	
Date of electronic transmission and signature	
08/07/2016 00:00:00 0	

SHU - Adjustment Form C

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	Yes (for period 1)
To	31/05/2016		
Legal Name	SHEFFIELD HALLAM UNIVERSITY	Participant Identity Code	999842148
Organisation short Name	SHU	Beneficiary nr.	1
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			258.10	0.00	247.77	505.87
Subcontracting			0.00	0.00	0.00	0.00
Other direct costs			0.00	0.00	1,022.25	1,022.25
Indirect costs			51.62	0.00	254.00	305.62
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	309.72	0.00	1,524.02	1,833.74
Maximum EU contribution	0.00	0.00	276.17	0.00	1,358.92	1,635.09
Requested EU contribution						1,635.09

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Efe Ervero	
	Date of electronic transmission and signature	
	08/07/2016 00:00:00	

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II	Participant Identity Code	999976590
Organisation short Name	UNINA	Beneficiary nr.	2
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			63,261.84	9,134.99	13,286.40	85,683.23
Subcontracting			0.00	0.00	19,890.00	19,890.00
Other direct costs			60,349.08	0.00	1,822.64	62,171.72
Indirect costs			24,722.18	1,827.00	3,021.81	29,570.99
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	148,333.10	10,961.99	38,020.85	197,315.94
Maximum EU contribution	0.00	0.00	132,263.68	9,774.44	36,056.67	178,094.79
Requested EU contribution						178,094.79

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?  
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No  
No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Leonardo MEROLA [ecas id nmeroleo]	
	Date of electronic transmission and signature	
	22/06/2016 15:45:28 89	

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	Univerzita Mateja Bela v Banskej Bystrici	Participant Identity Code	998462517
Organisation short Name	UMB	Beneficiary nr.	3
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			27,400.25	5,100.21	23,315.52	55,815.98
Subcontracting			0.00	0.00	20,000.00	20,000.00
Other direct costs			28,188.43	5,418.16	10,496.59	44,103.18
Indirect costs			11,117.74	2,103.67	6,762.42	19,983.83
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	66,706.42	12,622.04	60,574.53	139,902.99
Maximum EU contribution	0.00	0.00	59,479.89	11,254.66	56,178.96	126,913.51
Requested EU contribution						126,913.51

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	--	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	<b>Name of the Person(s) Authorised to sign this Financial Statement</b>
	Ivana KYPETOVA [ecas id nkypetiv]
	<b>Date of electronic transmission and signature</b>
	15/07/2016 15:31:29 331



FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	TED UNIVERSITESI	Participant Identity Code	954235658
Organisation short Name	TEDU	Beneficiary nr.	4
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			69,986.72	11,984.20	0.00	81,970.92
Subcontracting			0.00	0.00	0.00	0.00
Other direct costs			65,095.98	0.00	0.00	65,095.98
Indirect costs			27,016.54	2,396.84	0.00	29,413.38
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	162,099.24	14,381.04	0.00	176,480.28
Maximum EU contribution	0.00	0.00	144,538.49	12,823.09	0.00	157,361.58
Requested EU contribution						157,361.58

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	--	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Murat GUNEL [ecas id nguelmt]	
	Date of electronic transmission and signature	
	23/07/2016 21:01:50 496	

Partner 6 – CIFOP

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	CENTRE INTERNATIONAL DE FORMATION PEDAGOGIQUE - CIFOP SA	Participant Identity Code	970938476
Organisation short Name	CIFOP	Beneficiary nr.	6
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			52,390.59	45,355.80	0.00	97,746.39
Subcontracting			0.00	0.00	0.00	0.00
Other direct costs			0.00	0.00	0.00	0.00
Indirect costs			10,478.12	9,071.16	0.00	19,549.28
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	62,868.71	54,426.96	0.00	117,295.67
Maximum EU contribution	0.00	0.00	56,057.93	48,530.71	0.00	104,588.64
Requested EU contribution						104,588.64

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? If yes, please mention the amount (in €)

No
----

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19? If yes, please mention the amount (in €)

No
----

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1? Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No
No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No
----

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Date of electronic transmission and signature	

CIFOP - Adjustment Form C:

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	Yes (for period 1)
To	31/05/2016		
Legal Name	CENTRE INTERNATIONAL DE FORMATION PEDAGOGIQUE - CIFOP SA	Participant Identity Code	970938476
Organisation short Name	CIFOP	Beneficiary nr.	6
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			53,520.21	38,521.39	61,533.77	153,575.37
Subcontracting			0.00	0.00	0.00	0.00
Other direct costs			0.00	7,190.07	0.00	7,190.07
Indirect costs			10,704.04	9,142.29	12,306.75	32,153.08
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	64,224.25	54,853.75	73,840.52	192,918.52
Maximum EU contribution	0.00	0.00	57,266.62	48,911.26	65,841.13	172,019.01
Requested EU contribution						172,019.01

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement? If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19? If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Date of electronic transmission and signature	

## FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	UNIVERZA V LJUBLJANI	Participant Identity Code	999923240
Organisation short Name	UL	Beneficiary nr.	7
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

## 1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			33,628.68	6,712.33	46,306.98	86,647.99
Subcontracting			0.00	0.00	17,829.84	17,829.84
Other direct costs			31,538.30	5,938.07	4,304.94	41,781.31
Indirect costs			13,033.40	2,530.08	10,122.38	25,685.86
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	78,200.38	15,180.48	78,564.14	171,945.00
Maximum EU contribution	0.00	0.00	69,728.67	13,535.93	71,984.59	155,249.19
Requested EU contribution						155,249.19

## 2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?

No

If yes, please mention the amount (in €)

## 3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?

No

If yes, please mention the amount (in €)

## 4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

## 5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

## 6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Name of the Person(s) Authorised to sign this Financial Statement	
	Janez KREK [ecas id nkrekjan]
Date of electronic transmission and signature	
	14/07/2016 13:37:09 726

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	Yes (for period 2)
To	31/05/2016		
Legal Name	UNIVERZA V LJUBLJANI	Participant Identity Code	999923240
Organisation short Name	UL	Beneficiary nr.	7
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			33,628.68	6,712.33	46,306.98	86,647.99
Subcontracting			0.00	0.00	17,829.84	17,829.84
Other direct costs			31,538.30	5,938.07	4,304.94	41,781.31
Indirect costs			13,033.40	2,530.08	10,122.38	25,685.86
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	78,200.38	15,180.48	78,564.14	171,945.00
Maximum EU contribution	0.00	0.00	69,728.67	13,535.93	71,984.59	155,249.19
Requested EU contribution						155,249.19

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No
----

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No
----

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No
----

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No
----

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No
----

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Janez KREK [ecas id nkreljan]	
	Date of electronic transmission and signature	
	12/07/2016 13:35:22 359	

"Because of the data protection regulations at our University it is not allowed to give names with certain personal data. In the "Explanation of the use of the resources" we mentioned the "staff category". "  
Manuela Welzel-Breuer, University of Education Heidelberg (Partner 8)

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	PADAGOGISCHE HOCHSCHULE HEIDELBERG	Participant Identity Code	986249538
Organisation short Name	PHHD	Beneficiary nr.	8
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			96,312.00	12,624.72	47,756.58	156,693.30
Subcontracting			18,000.00	2,391.50	0.00	20,391.50
Other direct costs			29,154.24	5,027.02	1,059.00	35,240.26
Indirect costs			25,093.25	3,530.35	9,763.12	38,386.72
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	168,559.49	23,573.59	58,578.70	250,711.78
Maximum EU contribution	0.00	0.00	152,248.88	21,278.86	52,232.67	225,760.41
Requested EU contribution						225,760.41

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No
----

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No
----

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?  
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No
No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
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5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

Yes
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Name of the auditor	PKF Riedel Appel Hornig GmbH Heidelberg	Cost of the certificate (in €)	2,391.50
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6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Janine JAHNKE [ecas id njahnkja]	
	Date of electronic transmission and signature	
	20/07/2016 09:03:43 139	

PHHD - Adjustment form C

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	Yes (for period 1)
To	31/05/2016		
Legal Name	PADAGOGISCHE HOCHSCHULE HEIDELBERG	Participant Identity Code	986249538
Organisation short Name	PHHD	Beneficiary nr.	8
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			8,004.53	993.28	7,921.90	16,919.71
Subcontracting			0.00	0.00	0.00	0.00
Other direct costs			0.00	0.00	0.00	0.00
Indirect costs			1,600.91	198.66	1,584.38	3,383.95
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	9,605.44	1,191.94	9,506.28	20,303.66
Maximum EU contribution	0.00	0.00	8,564.85	1,062.81	8,476.43	18,104.09
Requested EU contribution						18,104.09

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Janine JAHNKE [ecas id njahnkja]	
	Date of electronic transmission and signature	
	20/07/2016 08:59:28 930	

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	PANEPISTIMIO KRITIS	Participant Identity Code	999588978
Organisation short Name	UOC	Beneficiary nr.	9
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			48,466.60	3,501.68	30,447.12	82,415.40
Subcontracting			0.00	0.00	19,890.00	19,890.00
Other direct costs			23,144.86	4,830.35	3,222.63	31,197.84
Indirect costs			14,322.29	1,666.41	6,733.95	22,722.65
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	85,933.75	9,998.44	60,293.70	156,225.89
Maximum EU contribution	0.00	0.00	76,624.26	8,915.27	55,916.63	141,456.16
Requested EU contribution						141,456.16

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	GEORGE TSIRONIS [ecas id ntsigorg]	
	Date of electronic transmission and signature	
	13/07/2016 11:48:13 456	



FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	UNIVERSITY OF LIMERICK	Participant Identity Code	999809071
Organisation short Name	UOL	Beneficiary nr.	10
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			70,291.00	5,063.00	85,214.00	160,568.00
Subcontracting			0.00	0.00	17,910.00	17,910.00
Other direct costs			30,880.00	6,408.00	8,127.00	45,415.00
Indirect costs			20,234.20	2,294.20	18,668.20	41,196.60
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	121,405.20	13,765.20	129,919.20	265,089.60
Maximum EU contribution	0.00	0.00	108,252.97	12,273.97	117,784.87	238,311.81
Requested EU contribution						238,311.81

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	Name of the Person(s) Authorised to sign this Financial Statement	
	Thomas VAUGHAN [ecas id nvaughth]	
	Date of electronic transmission and signature	
	22/07/2016 15:31:01 276	

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	JORDAN SOCIETY FOR SCIENTIFIC RESEARCH	Participant Identity Code	972530149
Organisation short Name	JSSR	Beneficiary nr.	11
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			77,146.80	480.00	39,252.50	116,879.30
Subcontracting			0.00	0.00	20,000.00	20,000.00
Other direct costs			49,451.34	2,920.83	0.00	52,372.17
Indirect costs			25,319.63	680.17	7,850.50	33,850.30
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	151,917.77	4,081.00	67,103.00	223,101.77
Maximum EU contribution	0.00	0.00	135,460.01	3,638.89	62,000.18	201,099.08
Requested EU contribution						201,099.08

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No
----

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No
----

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?  
Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No
No

Name of the auditor	Cost of the certificate (in €), if charged under this project

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No
----

Name of the auditor	Cost of the certificate (in €)

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

Name of the Person(s) Authorised to sign this Financial Statement	
	oraib NAWASH [ecas id nnawasor]
Date of electronic transmission and signature	
	23/07/2016 00:50:50 277

FP7 - Grant Agreement - Annex VI - Coordination and support action

Form C - Financial Statement (to be filled in by each beneficiary)			
Project nr.	321278	Funding scheme	Coordination and support action
Project Acronym	ChReact		
Period from	01/12/2014	Is this an adjustment to a previous statement?	No
To	31/05/2016		
Legal Name	ILIA STATE UNIVERSITY	Participant Identity Code	999612937
Organisation short Name	ISU	Beneficiary nr.	12
Funding % for RTD activities (A)	N/A	If flat rate for indirect costs, specify %	20.00

1. Declaration of eligible costs/lump sum/flat rate/scale of unit (in €)

	Type of Activity					Total (A+B+C+D+E)
	RTD (A)	Demonstration (B)	Coordination / Support (C)	Management (D)	Other (E)	
Personnel costs			9,705.13	747.50	3,557.37	14,010.00
Subcontracting			0.00	0.00	19,938.09	19,938.09
Other direct costs			12,412.89	786.70	8,808.69	22,008.28
Indirect costs			4,423.60	306.84	2,473.21	7,203.65
Lump sums/flat rate/scale of unit declared			0.00			0.00
<b>Total</b>	0.00	0.00	26,541.62	1,841.04	34,777.36	63,160.02
Maximum EU contribution	0.00	0.00	23,666.28	1,641.59	33,169.77	58,477.64
Requested EU contribution						58,477.64

2. Declaration of receipts

Did you receive any financial transfers or contributions in kind, free of charge from third parties or did the project generate any income which could be considered a receipt according to Art.II.17 of the grant agreement?  
If yes, please mention the amount (in €)

No
----

3. Declaration of interest yielded by the pre-financing (to be completed only by the coordinator)

Did the pre-financing you received generate any interest until 31/12/2012 according to Art.II.19?  
If yes, please mention the amount (in €)

No
----

4. Certificate on the methodology

Do you declare average personnel costs according to Art.II.14.1?

No
----

Is there a certificate on the methodology provided by an independent auditor and accepted by the Commission according to Art.II.4.4?

No
----

Name of the auditor		Cost of the certificate (in €), if charged under this project	
---------------------	--	---	--

5. Certificate on the financial statements

Is there a certificate on the financial statements provided by an independent auditor attached to this financial statement according to Art.II.4.4?

No
----

Name of the auditor		Cost of the certificate (in €)	
---------------------	--	--------------------------------	--

6. Beneficiary's declaration on their honour

We declare on our honour that:

- the costs declared above are directly related to the resources used to attain the objectives of the project and fall within the definition of eligible costs specified in Articles II.14 and II.15 of the grant agreement, and, if relevant, Annex III and article 7 (special clauses) of the grant agreement;
- the receipts declared above are the only financial transfers or contributions in kind, free of charge, from third parties and the only income generated by the project which could be considered as receipts according to Art.II.17 of the grant agreement;
- the interest declared above is the only interest yielded by the pre-financing until 31/12/2012 which falls within the definition of Art.II.19 of the grant agreement;
- there is full supporting documentation to justify the information hereby declared. It will be made available at the request of the European Union and in the event of an audit by the European Union and/or by the Court of Auditors and/or their authorised representatives.

	<b>Name of the Person(s) Authorised to sign this Financial Statement</b>
	Manana SALUKVADZE [ecas id nsalukma]
	<b>Date of electronic transmission and signature</b>
	04/07/2016 13:54:58 218

## 9. Appendices

### 'Express Yourself' presentation judging criteria

School:

Team:

Topic:

Evaluated by:

Please rate each category out of 5.

5 = excellent, 4 = very good, 3 = good, 2 = satisfactory, 1 = less than satisfactory

	Category	Rating
Content	The students' scientific understanding	
	The depth of scientific investigation	
	Relevance between the collected data/observations and the question	
	The quality (including breadth and depth) of the work undertaken	
	Use of literature	
	Recommendations for further research	
Presentation	Active participation of all group members	
	Use of slides (layout, bullet points, not text etc.)	
	The usage of supporting materials	
	The students' enthusiasm	
	Communication of work undertaken/scientific content	

	Attracting audience's attention	
	Response to questions raised by the audience	
	<b>TOTAL</b>	