FINAL PUBLISHABLE SUMMARY

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Project acronym: ENGINEER

Project title: BrEaking New Ground IN the SciencE Education Realm

Funding Scheme: SiS.2011.2.2.1-1 Supporting and coordinating actions on innovative methods in science education: teacher training on inquiry based teaching methods on a large scale in Europe

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Final publishable summary report of ENGINEER

The coordinator of the ENGINEER project is the Bloomfield Science Museum, Jerusalem (BSMJ). The consortium consists of partners from ten science museums and ten elementary schools in nine European countries and one associated country. These organisations worked together in two teams entitled 'Museum' and 'School', with the academic support of Manchester Metropolitan University (MMU) and the Boston Museum of Science (BMOS), with advocacy and dissemination support of the two networks ECSITE (the European network on science centres and museums) and ICAS (international Council of Associations for Science education), being evaluated by researchers from the University of West England (UWE) and with administrative support from ARTTIC company.

Introduction

There is strong evidence of the declining interest of young people in science topics taught in schools. This trend raises serious concerns for Europe's future ability to meet the challenges of the knowledge-based economy, as it narrows the numbers and profiles of those who wish to pursue science, technology, engineering and mathematics (STEM) careers. Although the teaching of science has been the focus of much attention on a national, European and international level in the recent years, engineering education has received little attention from educators and policy makers. The implication of engineering education for the future of STEM education can be broad: it may improve students learning and achievement in science and mathematics; increase the technological literacy of all students; develop awareness of engineering and work of engineers and boost youth interest in pursuing engineering as a career.

A shared consensus among experts in science education views inquiry based science education (IBSE) as an effective form of pedagogy that will engender the kind of real student interest needed for a turnaround in this area. The ENGINEER project took Inquiry Based Science Education (IBSE) methods one step forward and introduced engineering design challenges as its core feature. It was based on the experience and proven success in the US over the last ten years of the "Engineering in Elementary" (EiE) programme developed by BMOS. The ENGINEER project aimed to introduce engineering to the European education system, as part of the science curriculum, starting from an early age in primary schools. The ENGINEER project adopted EiE's five-steps of the Engineering Design Process (EDP): Ask; Imagine; Plan; Create and Improve in which students follow the process to develop, build and test model solutions to specific practical problems.

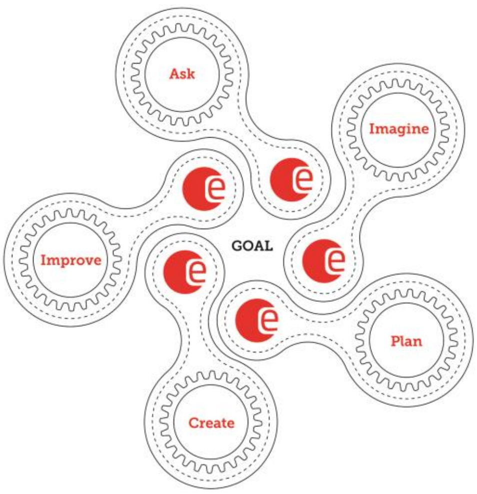


Figure 1 - The Engineer Design Process

Summary

The ENGINEER project objectives were to:

- Adapt for European usage EiE's EDP, which has been shown to increase children's technology literacy and raise their interest in science.
- Develop new engineering design challenges suited to European contexts.
- Adapt and develop teacher training materials that will increase primary school educators' ability to teach engineering and technology to their students using IBSE pedagogic methods
- Strengthen the cooperation between schools and informal science learning institutions and enrich formal science education with informal experiences in the science museums.
- Undertake advocacy activities to promote the long term goal of integrating engineering into science teaching in primary schools throughout Europe.
- Plan and implement an extensive outreach programme
- Raise the awareness about the ENGINEER project to support the outreach campaign

The ENGINEER consortium developed ten different engineering challenges in ten different engineering fields connected to the science curricula taught in primary schools in Europe. The challenges were carefully chosen to be relevant to students in the different countries. All engineering school units were supported by teacher guides and a teacher training programme. The ten museum partners also developed museum programmes for school visits and workshops on engineering topics for the general public as part of the museum's programme to visitors. All the materials were translated into ten different languages and are available for free on the project website (www.engineer-project.eu), on Scientix and on partners' websites. .

An objective evaluation process of the ENGINEER project, applied by UWE, assessed the experiences, impacts and effects at all levels of the project, with a particular emphasis on the young learner. The inputs received from the evaluation reports, as well as from the assessment process of the pilot stage of the project, helped the partners to fine tune and revise the materials they developed in the second period of the project.

An extensive outreach activity programme was operational in each of the ten countries targeted at disseminating the Engineering School Units to more teachers, teacher trainers and schools. The outreach plan aimed to encourage teachers, trained in inquiry-based pedagogic methods, to implement the use of the engineering units in the classroom. The outreach programme exceeded the target numbers. Over 1,000 schools were involved; 1,400 teachers participated in teachers' trainings; and more than 25,000 people participated in one of the engineering workshops.

An important goal of ENGINEER project was to make a change in the attitude toward STEM education. It aimed to introduce engineering education to local and national policy makers and to lobby European decision-makers to deepen their support for the widespread introduction of engineering into the teaching of science in schools and museums, promoting ENGINEER's programme as a practical and proven way of teaching science. More than 500 advocacy activities were organised by the partners. Thanks to the great amount of advocacy and dissemination activities, led by ECSITE, the project contributed to raising interest in the Engineering part of STEM education by formal education, industry and informal education.

The process

In the beginning of the project MMU designed, delivered and analysed a survey of science curricula and pedagogies across the consortium in order to identify appropriate science topics within each country's curriculum for development as engineering challenges. This led to a prioritisation of the range of science topics and engineering fields which would appeal to all children, boys and girls. Next stage was the development of the unit design template based on a prototype unit developed by the researchers in MMU, which served in the design workshop, as training material, together with the EiE materials. All the units developed by the partner, used the same template and were organised in four lessons plus introductory lesson, according to the five-steps of the Engineering Design Process (EDP): Ask; Imagine; Plan; Create and Improve in which students follow the process to develop, build and test model solutions to specific practical problems. Emphasis in the unit design was placed on the use of inexpensive local materials to support the engineering design challenge component of each unit, differentiation for a range of abilities, and appropriate science and pedagogic support for teachers. School units were also subsequently adapted as shorter museum activities for school classes based on the EDP. Additionally, a template for the Professional Development Guide (PDG) was developed along with workshop plans for teachers and teacher trainers, and a modular format for Teacher Training Workshop that can be tailored by each country according to local conditions. All workshops were hands-on and introduced the EDP to teachers by ensuring that they carried out the activities themselves.

The pilot stage began with a pilot workshop, aiming to introduce and train the participants in all the engineering design units. The ten countries were divided into five pairs who worked together in the development and testing stages.

During the pilot stage of the project each school tested the first version of two units: the one they developed in collaboration with their museum partner and another from their partner country. EFour museums tested the training workshop for teachers and the professional development guide in which the workshop plans are written. The ten PDG's were designed to be used as part of a training handbook for teacher training but they were also developed as standalone tool for future use by teachers to be able to use without training.

Figure 2 - The Israeli and the Greek Engineer challenges in Israel

The second period of the ENGINEER project was devoted to the revision of the ten engineering design challenges and to the revision of the teacher training materials and workshops. The detailed feedback from the pilot stage, as well as the evaluation data gathered by UWE, gave vast insights into what needed to be revised. A post-pilot workshop enabled the museum and school teams to discuss their units with their partner country, with the EiE team from BMOS and with the MMU team. After the revision of the engineering units and PDG, all materials underwent a process of English (ICASE) pedagogic and science editing provided by MMU. BMOS further provided support and ideas from their experience on how to operate engineering challenges in a museum environment.

Figure 3 - Pilot Workshop, in Amsterdam on 8-11 October 2012

One of the main objectives of the project was the planning and implementation of an extensive outreach programme. The partners invested extensively in the recruitment of targeted schools, teachers, teacher trainers and the general public. The main activity has been the extensive teacher training programmes in all ten countries, using the PDG's. This focused on introducing the use of engineering units as part of science teaching in schools and supporting teacher with kits of materials. At the same time the museum partners implemented the methods as part of their museum activities, school programmes and family workshops, all based on lessons from the engineering units and focused on one or more of the EDP stages.

Figure 4 – Teachers' training in Sweden – teachers carrying out "Stable Table" and "Super sucker" activities

Figure 5 Engineer activities in Schools "Super sucker" (left) and "Design a glider" (right) in England

Figure 6 - Museum activities "Super sucker" in Sweden (left) and "Huff and puff" in Israel (right)

In order to maximise input another main objective was to raise awareness about the ENGINEER project to support the outreach campaign. The partners initiated many disseminations activities on local, national and European levels, using tools such as Engineer website, news and events on the partners' websites, distribution of brochures and posters, newsletters, a Facebook page of the partners; articles and publications, conference presentations, special meetings and professional workshops.

ENGINEER advocacy efforts were crucial in moving from the successful introduction of engineering in schools and museums in partner countries to a more comprehensive introduction of engineering into formal and informal science education throughout Europe. Advocacy activities, aimed at each of the target constituencies identified in the advocacy action plan, took place in each of the partner countries. ECSITE as the leader of the advocacy programme, with the support of BMOS, carried out a range of activities including: a workshop for all museum partners, guidelines for national and local advocacy plans and useful materials , such as an easily translatable leaflet, a booklet as a real interactive object that was sent to science education networks and a video that was published on the website and used in European events. BMOS President, Ioannis Miaoulis, attended many meeting in Europe to discuss and promote the ENGINEER project. As part of the 2014 ECSITE annual conference in the Hague, a high level event was organised and attended by 55 policymakers and directors of science centres and museums who are in a position to influence national and European policies by and many disseminations activities took place: a preconference workshop for museum educators and guides, a main session presentation and participation in the open market showcase of all the museums units.

The product

Country	Engineering field	Science Field	Unit name	Design problem/context
Israel	Biomedical engineering	Human body, Respiratory system	Huff and puff: Designing a device for measuring exhalation volume	Build a device which can measure lung capacity to help diagnose why a friend has difficulty breathing
Italy	Geotechnical engineering	Geology	Knee deep: Designing and constructing a water pond	Understand how to build a pond to replace one that is lost in new building
Netherlands	Acoustic engineering	Sound	Music to the ears: Designing and creating a sound generator	Design a string sound generator to compose a soundtrack for a silent movie
Sweden	Electrical engineering	Electricity	Super Sucker: Designing a machine to clean up litter	Build a vacuum cleaner to clean up the classroom quickly
Czech Republic	Agricultural engineering	Plants	Life support: Direct water flow to plants	Design a system to water plants to support life on a new planet.
Denmark	Materials engineering	Materials, heat transfer, insulation and methods in science	Frisky feet: Winter-proof a pair of shoes	Design insulated shoe soles when the baggage goes missing on a trip to Greenland.
Greece	Ocean/Marine engineering	Sinking and Floating	High and dry: Protecting objects on a floating platform	Build a floating platform to transport belongings to an island without getting wet.
France	Mechanical engineering	Simple Mechanics Energy	Popular mechanics: Becoming a designer of machines	Design mechanical toys for children in Africa which tell well-known stories;
UK	Aeronautic engineering	Forces	High flyers: Building a glider with everyday materials	Build a glider to carry messages between two friends who live next door to each other
Germany	Mechanical engineering	Balance and Forces	A fine balance: Building a hanging sculpture	Design a hanging sculpture with multiple tiers for the school assembly hall.

ENGINEER in figures

Pilot phase:

In the Pilot of the Engineer design challenge in schools the following have been involved:

- 35 school classes - 875 students and 70 teachers

In the Pilot of the Engineer activities in Museums the following have been involved:

- 52 school classes – 1230 students and 100 teachers
- 820 museum visitors

All the activities have been advertised by the schools and museums partners through their local channels. For museums the main tools have been: museums websites, teachers and visitors newsletters.

Outreach programme

The result from outreach year is the partners have involved over 1000 schools in the different activities during the outreach. The activities for schools have covered school programmes in the museums, teacher trainings in the museums, training of teachers´ trainers and training of teachers by the teachers 'trainers.

Engineer programmes in schools

These teacher trainings have had wide impact:

- Over 1400 teachers in the ten EU and one associate country were trained to use the ENGINEER material in schools, several of them have already used the material in their classes and many more have plans to use the material this upcoming year (2014/2015). From follow up we know that over 10 200 students have already used the units in school, and that over 16 000 students will be using the units this school year. Many teachers were trained during spring 2014 and in the last month of the project so it is natural that they plan to use the material in the upcoming school year 2014/2015. The impact continues however further on since that the trained teachers will use the material several times in different classes in the upcoming years.
- Additional impact is foreseen as the museum partners will continue to offer teacher trainings on the ENGINEER material, several planned already for 2015, and additional museums who are not project partners will start to use the guides to train teachers. “The teacher guides” and “The professional development guides” were used in the trainings and we have seen that these guides are useful for teachers and also for educators in museums and by other like teachers´ trainers. The ultimate impact is that we will have more teachers with ability to teach engineering and technology to their students using IBSE pedagogic methods.

Figure 7 - Pictures sent by schools in England whose teachers ran the "Design a glider" Engineer activity with pupils

Engineer activities in museums

Over 25 000 people have participated in one of the engineering workshops for schools or for general public in the science museums. The workshops have been both drop in workshops and more scheduled ones with clear start and ending times. The result is that the project now has a wide dissemination and the concept and methods of ENGINEER are widely spread among families and students.

We have seen that the ENGINEER activities can be easily adapted to different countries and different museums and that the activities are popular among teachers, students and general public. Some adapted the activities to fit their local context and their museum exhibitions and spaces. In the coming years, many museums all over Europe have the possibility to download the museum units and adapt them to fit their needs. We also have seen that many of the partner museums are planning for further ENGINEER activities in the future. Some museums already design new types of exhibits based on the EDP, and some are developing new kind of LABS that will be the "home" for Engineering.

Figure 8 - The Danish Engineer program for general public in Israel

Figure 9- The English Engineer programme for general public during the Christmas in Netherlands

Teachers´ trainers

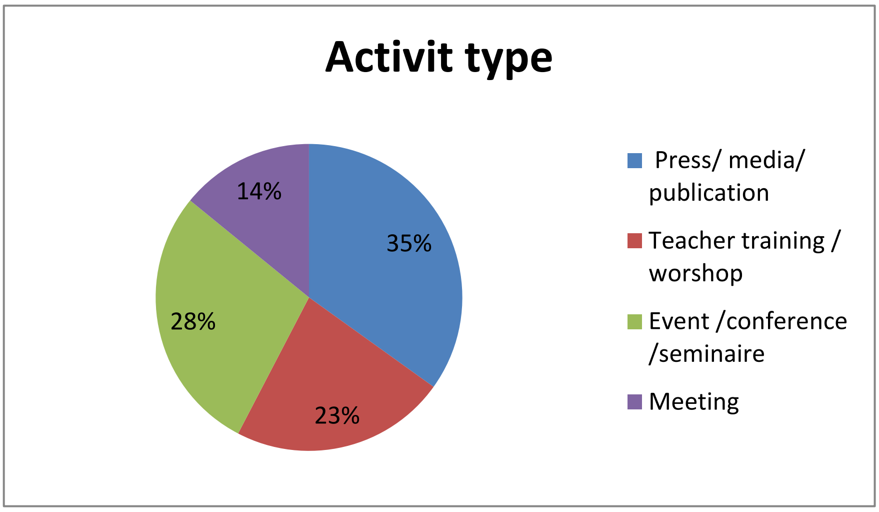
During the project, over 100 teachers were trained to train other teachers to use the ENGINEER material and methods. Over 300 other teachers were trained during the outreach year, and there will be more training in the future. Some countries now have networks with teachers´ trainers that can discuss teaching of engineering in schools, and some countries have teachers´ trainers from the ministry of education that have planned to continue to use the ENGINEER material in trainings.

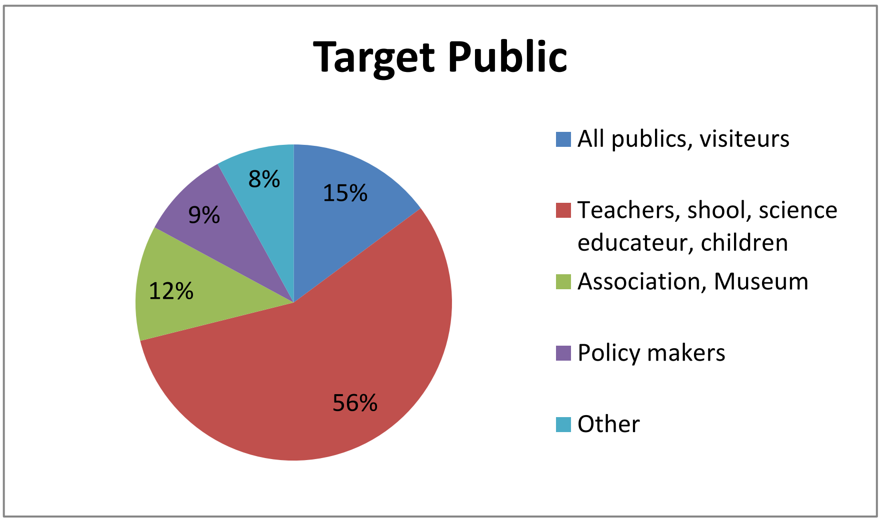
Pre service training

Several museum partners have trained students in teaching colleges to use the ENGINEER material, so in coming years, or maybe already now, these students will be out working in schools and have the confidence and knowledge to use the ENGINEER materials.

Dissemination activities

During the project ENGINEER partners have lead more than 300 activities and reached more than 36,030 teachers, students and visitors (all according to targets fixed by the consortium). Different kinds of activities have been arranged, such as as workshops (teachers could test and realise ENGINEER activities during teachers' trainings and/or workshop for museum visitors), presentations or conferences when partners have presented the content and the aim of the project etc. Many partners have published information about the project in museum newsletters and articles. Media has also been invited to interview partners and disseminate about the project.





Evaluation

UWE has gathered a wealth of data relating to teacher and pupil engagement with science, technology and engineering education in primary schools across the EU. These data sets are published in the final ENGINEER report and have the potential to influence policy, curricular and pedagogy positively if disseminated successfully. For example, the evaluation data present a strong case for the role of design and build activities as a vehicle for learning science and the evaluation points strongly towards ENGINEER materials as useful drivers to engage girls in all fields of engineering. Data gathered by the evaluation team clearly indicate that programmes of study at primary school have the potential to increase young peoples' interest in engineering which could result in increased numbers of school leavers choosing STEM subjects at higher education and then entering careers in related fields.

The impact of museums working with primary schools has the potential to encourage visits from the wider public, for example parents visiting with their children to undertake ENGINEER activities. In addition, it has provided opportunities for museums to work with children from diverse socio – economic backgrounds,

including those children who might not normally visit museums. Thus there are opportunities for widening participation and access to museums for children from more disadvantaged backgrounds.
The involvement of professional engineers in developing materials with some partners/ supporting some partners has the potential to encourage pupils to see the value of studying science/ engineering at school.
The implications of more girls accessing and showing interest in engineering fields at primary school are potentially far reaching from a societal point of view.

The potential impact

The potential impact of the ENGINEER school units is wide-ranging, with impact at individual, institutional and group levels:

- **At the individual level**, the pedagogical approach taken in the ENGINEER school units is designed to make science more engaging for pupils and ultimately raise performance and enhance attitudes to science. It emphasises a ‘hands on’ approach which supports the development of understanding in context. It also emphasises science in use, embedding it in technology and problem-solving. Exposure to the units can have an impact on pupils’ learning styles, achievements and subsequent motivation in both science and other school subjects. Similar impact can be expected from the museum activities, which emphasise problem solving in real world contexts and raise engagement with science concepts.
- **At the group level**, the school units were designed to be inclusive with respect to gender, class and ethnicity, emphasising collaborative working, discussion and presentation skills, and non-competitive working. The inquiry-based focus on planning, doing, evaluating and improving meant that pupils who might be more likely to see themselves (and be seen) as unable were given time and space to contribute to the work. The emphasis on reflection on improvement rather than right/wrong answers supports this approach, as does the inclusion of ‘soft skills’ of presentation and discussion.
- **At the institutional level**, the pedagogical approach taken in the ENGINEER school units has the potential for impact on school practices, introducing and supporting inquiry-based learning for those schools where inquiry has been absent or difficult to sustain. In terms of curriculum, it also supports science teaching in schools, enabling teachers to present science concepts with more clarity and confidence. It also has the potential to support cross-disciplinary teaching and sustained project work. In addition, the units have the potential to raise the profile of engineering in schools, and to enable them to support pupil career aspirations by creating clear links between the formal curriculum and real world applications and jobs.

The wider societal impact of the project may be seen in its long-term consequences in terms of engaging a larger number of pupils from different backgrounds in STEM learning and raising aspirations to STEM careers. The content of the units themselves have the potential to widen interest in engineering and STEM in general, introducing engineering topics and contexts which departed from the stereotypical ‘male domain’ view of mechanical engineering within competitive and narrow contexts (e.g. creating faster cars/building bridges). The inclusivity supported by this range of topics is complemented by the inclusion on all units of material on engineering careers which include both men and women. These benefits are also reflected in the museum activities. Similarly, long-term impact on school practices in general may lead to a greater emphasis on problem-solving approaches and cross-disciplinary teaching. Integration of the units into national curricula is a strong possibility, already demonstrated in the case of Israel.

The project and especially the teacher trainings made teachers broaden their view on engineering. This leads to a different approach of teachers about engineering in class. It has started to change. Engineering has started to shift form just being a school subject that was often even barely taught to a subject that is important for the future of our society and can help pupils to explore their talents like for example problem solving skills.
By delivering ten good qualities engineering design challenges that are available in ten languages and still be found through Scientix and/or the websites of the different museums the potential impact is great. A great part of the teachers are used to look for new teaching materials for in class.

The structure of the engineering design challenges that was developed in this project could be used to develop more engineering design challenges on other subject and/or to expand the ranges there is now to junior high students and pupils younger than 8 years old.
The engineering design challenge can be used to teach more maths in class and to give more meaning to math.
The good cooperation in this project has led to a network between schools, universities, institutions and museum. The collaboration between the schools and the museums has the impact of strengthen the cooperation between schools and the informal science learning institutions (the museums) in all the partners countries, collaboration that continue to develop after the project ended.

Advocacy efforts

ENGINEER advocacy efforts have been crucial to move from the introduction of engineering in schools and museums involved in the project to a more comprehensive introduction of engineering into formal and informal science education throughout Europe. The advocacy activities of ENGINEER were focused on lobbying efforts aiming at persuading decision-makers to support the widespread introduction of engineering into schools and museums.

The advocacy activities of the ENGINEER project aimed at:

- Persuading European decision-makers to support the introduction of engineering in formal and informal education.
- Promoting ENGINEER as a practical and proven way of teaching science.
- Inviting large corporations in playing a key role in advocacy efforts.

The efforts of the ENGINEER advocacy campaign have focused on targets identified in the strategic advocacy plan of the project. The initial targets groups of the campaign were: National policy makers, Ministers of Education, EU level policy makers, Science Centre directors and senior staff, Academic representatives, Education community and Representatives of industry and large corporations.

Advocacy requires extensive efforts and time, not only in organising activities but also in preparation and planning. However, given the time available in the project for these activities the project obtained very good results, especially in some countries (see below) were Ministries of Education got interested and involved. The involvement of the Ministry of Education is crucial for the possibility of extending the impact of the project.

In the Netherlands in 2014 it was decided that Science and Technology education becomes mandatory in primary schools by 2020. Therefore more attention was given for S&T education and teacher training in the field of science, technology and engineering. This led to multiple opportunities for NEMO to disseminate and advocate the ENGINEER project.

In Israel, the Ministry of Education supported the project from an early stage. Shoshy Cohen, the Director of Science unit and the Chief Inspector of S&T instructions in the Administration of S&T at the Ministry of Education (MoE) has been convinced of the interest of ENGINEER and got involved actively in advocacy activities for the project. She supports the project in the ENGINEER video as well as in the booklet. She also participated as a guest speaker at the high level event organised in The Hague with 55 attendees. With this strong and close relation with the Ministry of Education, the BMSJ is now working towards the introduction of ENGINEER units in Israeli school curricula in elementary and junior high schools and providing professional development in engineering to the MoE teachers training national programmes.

In some other countries, approaching the Ministry of Education and bringing it on board was much more difficult. In Italy for example a main challenge was the support of the Ministry of Education.. The ambition of changing the curriculum and culture requires time and some stakeholders did not find a clear strategy to achieve this goal. Stakeholders appreciated the ENGINEER activities in the project but asked a more demanding work from the museum, after the end of the project in order to get support to go on the project.

Several advocacy activities will go on after the end of the project, essentially towards schools and education systems. Museums will organise more training for teachers and spread the methods of ENGINEER in new schools. The involvement of the Ministry of Education is crucial for this purpose, and boosts the possibility of extending the project impact after its end. However, as described above reaching the Ministry of Educations is not as easy in some countries as in others. In addition, changing the culture and further, the curricula is another step forward that takes a lot of time in a majority of cases.

Other advocacy activities will continue to be developed towards industries after the end of the project to get their support in the implementation phase. The advocacy involving companies already started during the project with contacts made and meetings organised. Such efforts will be continuing in most countries involved in the ENGINEER project. Indeed, partners are looking for funds that would allow them to continue the project after its end and extend the activities.

Following the multiplicity of events where ENGINEER has been presented within the lifetime of the project, the project became well known and popular amongst science communication and education stakeholders in Europe. As a consequence, ENGINEER partners were invited to five European conferences in Europe in autumn 2014 to represent the project.[2] In particular ENGINEER members were invited to major events in science education, where influent stakeholders in education at national or European level take part. At ECSITE Annual Conference 2015, another pre-conference workshop will take place to share experiences and to discuss the opportunities to create a thematic group of science museums, as a respond to the large interest from many science museums in the ENGINEER project.

Thanks to these activities, the project will go on reaching new audiences and will be exposed to new supporters and believers in ENGINEER. We can expect that the impact of the project in schools and museums in Europe will go on in the coming years.

Conclusion

ENGINEER aimed to transform the teaching of science education in primary schools in Europe by introducing engineering as a discipline that is inherently inquiry-based and problem-focused, and yet usually overlooked in the teaching of sciences. In some countries, like in Israel and the Netherlands, the change has already started to happen. In other countries such as in France and Italy, contacts were more difficult to make with the Ministry of Education. But with many schools involved and probably more to come, the impact of the project will continue to grow and change mentalities at bigger scales.

A major ambition of the project is the action towards Europe, reaching people beyond the ones already involved as project's partners. The modules, teacher trainings, and other distinctive elements of ENGINEER can be easily translated into all European languages. Ten languages are already available and translations can be asked through the Scientix portal. Indeed, only three interests for a translation are enough for the Scientix team to translate the material. Also, as piloted in ENGINEER, the units are very easily adaptable to different countries.

The many international events where Engineer was presented and the positive feedback received from different institutions which participated, suggest that ENGINEER became highly popular within science communication and science education communities within Europe. The real impact of these international advocacy activities are difficult to measure as museums and schools are free to use the ENGINEER material also after the end of the project. In addition, as the ENGINEER material is available on different online portals, and even if numbers in terms of downloading material can be gathered, we will not know exactly how many museums and schools will use ENGINEER units. The most important impact for the project here is that regarding the high level stakeholders in education and science communication reached during the project, **Engineer contributed to make the E of STEM bigger.**

[2] Scientix networking event in Brussels in September, RRI seminar on Science Education in Paris in September, Scientix conference in Brussels in October, Emerit conference in Zurich in November, SIS-RRI Conference in Rome in November

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Project logo

Contractors involved in the project

Museums

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Fondazione Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci (MUST)

Stichting Nationaal Centrum voor Wetenschap en Technologie (NEMO)

Stiftelsen Teknikens Hus (TH)

Techmania Science Center o.p.s (TSC)

Center for formidling af naturvidenskab og moderne teknologi – Experimentarium (EXP)

IDRYMA EVGENIDOU (EF)

Conservatoire National des Arts et Métiers (CNAM)

THE OXFORD TRUST COMPANY LIMITED BYGUARANTEE (SCIOX)

Deutsches Museum von Meisterwerken der Naturwissenschaft und Technik (DM)

MUSEUM OF SCIENCE CORPORATION (BMOS)

Schools

Modiin Macabim Reut (MMR)

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GENTOFTE KOMMUNE (Magle)

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Oxfordshire County Council (PPS)

CITY OF BONN (KGSD)

Academy

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University of the West of England (UWE)

SME

Association Européenne des Expositions Scientifiques, Techniques et Industrielles (ECSITE)

International Council of Associations for Science Education (ICASE)

ARTTIC (ART)