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ECB - WP 3

D3.3. REPORT ON NEEDS ANALYSIS FROM THE LEADING PILOT SCHOOLS

CONTRACT NO	266622
DATE	18/02/2013
ABSTRACT	This deliverable is a collection of the needs identified from each of the pilot schools regarding gaps and problematic issues in current school/business partnerships, from the educational point of view.
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EXECUTIVE SUMMARY

During the inGenious Summer school which was held in Istanbul in August 2012, inGenious teacher coordinators led a 45 minutes workshops with the teachers from their countries in order to discuss problematic issues when it comes to setting up collaborations with industries. The discussions were summarised by the teacher coordinators and are collected in this deliverable. The results of this national feedback serves as the first part of this deliverable, whereas the second part focuses on a more international viewpoint which was collected through questions that were posted on the inGenious portal and every inGenious teacher could answer freely. Every week for three months, a different question was posted on the main page of the teacher community. This way, every teacher who entered the portal could right away answer the question by spending less than one minute of time on it.

This deliverable is the collection of identified needs from national and international point of views concerning gaps and difficulties of school and industry collaborations, from an educational point of view. Only a very superfitial analysis is undertaken in the conclusions as the Autonomous University of Barcelona will be carrying out the full analysis as part of the national needs analysis workshop.

When looking at the main results of the national and the international teacher needs analysis, it can clearly be seen that the inGenious teachers are very motivated. They are enthusiastic about school industry collaborations and see its great benefit in improving the awareness and the interest of their students in STEM subjects and future careers. However, they often face problems when it comes to finding appropriate industries who are active in STEM in the schools' region. But even after having found an appropriate industry, the challenge still remains to agree on a project that fits the school and the industries' needs.

inGenious is thus appreciated by the teachers, as it facilitates the school-industry partnership and it gives teachers the possibility to exchange their experience through the active teacher community.

Concerning the practices offered by inGenious, teachers agreed that they are mostly relevant to their needs, the quality is good as well as the pedagogical approaches that are used, and they fit into their national curriculum most of the time. Of course, teachers often need to make small adaptations to integrate the practices into their lessons, but by putting in the extra little bit of time, teachers appear to be very satisfied with the practices and their results. Some practices, mostly the more hands-on ones such as the Electronic Dice, are very successful and are liked both by teachers and their students. The main reason for this is its straight-forwardness – receive the kit, build the electronic dice, learn about principles of electronics and every student can keep their own electronic dice to proudly show also to their families.

The results of this deliverable were the basis for the teachers participation to the national workshops and will be used for the european needs analysis.

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INTRODUCTION

This deliverable is a collection of the needs identified from each of the pilot schools regarding gaps and problematic issues in current school-industry partnerships, from an educational point of view.

The deliverable is split in two parts. The first part will collect the results of the needs analysis workshops that were held during the inGenious summer school in Istanbul. The aim of this workshop was to identify challenges teachers face when establishing collaborations with industries. Teachers were supposed to not focus on inGenious practices, but on their experiences outside of this project. All the teacher coordinators from 16 different countries prepared a summary document about their teachers' discussions, which are collected in this part of the deliverable.

The second part of the deliverable will provide the international responses by the teachers to 11 online questions which were uploaded on the inGenious portal every week between September and November 2012. As the questions do not take into consideration from which country the respondents were, the analysis of these questions will be very general and not country specific. Thus, this part of the deliverable will provide the results and international picture of the gaps and problematic issues between schools and industry collaborations from the educational point of view.

Both parts share the same questions but while the first one is answered by country, the second part is answered by teachers as a group, with no information regarding their nationality.

The detailed country needs analysis will be carried out by work package two and the results will be used for the Europen needs analysis which will focus on both the educational and the industrial point of view.

PILOT SCHOOLS NEEDS

During the inGenious Summer School which took place between 24 - 26 August 2012 all the national teacher coordinators were invited to hold a 45 minutes teacher needs analysis workshop with the teachers from their country.

Each of the 16 groups discussed about gaps and needs in the current school-industry collaboration in their countries. These workshops were carried out in their national language.

The focus of this discussion were not the practices piloted in the inGenious project, but the previous experiences of the teachers. The aim was to identify which challenges they must face when they want to establish collaborations with industries and/or design,implement and evaluate practices in co-operation with a STEM industry.

The National Teachers' Coordinators were required to summarise the outcome of the discussion and pass it on to EUN, who collected all the national reports to display them in this deliverable. The Needs Analysis workshops were led by the Teacher Coordinators, who assigned the role of "Rapporteurs" to two teachers in the group. These Rapporteurs had to assist the Teacher

Coordinator in taking notes during the discussions which would help the Teacher Coordinators to compose the summary report.

The Teacher Coordinators and the two Rapporteurs were invited to join the national workshops that have been held in the autumn with representatives from industry and the ministries[2].

Before the start of the workshop, each Teacher Coordinator also received the following draft schedule, which should help them structure and time their workshop.

5’	Introduction of workshop and aim of this workshop
5’	Start with points to be discussed: 1) What are the motivating factors and expected benefits for the schools?
10’	2) What are the main challenges found in: Initiating & maintaining school-industry collaborations Designing good practices in collaboration with industry Implementing & Assessing school-industry practices
10’	3) What are the preferred practices regarding: Performed activities Addressed target group Venue and location Industry profile
5’	4) Are there any other relevant issues to mention?
10’	Final 10 minutes for all teachers to fill in the online questionnaire

NEEDS ANALYSIS OF THE LEADING PILOT SCHOOLS

Here we present the 16 collected reports. While an attempt to improve the English and the clarity of the information obtained has been made, the layout and overall content provided by the teachers has been respected. Furthermore, not all groups managed to go through all the questions and therefore some reports are less complete than others.

[2] National workshops will be organized in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Israel, Italy, Netherland, Portugal, Slovakia, Spain, Sweden, United Kingdom.

1. Austria

Rapporteur Teacher 1: Hermann Morgenbesser
Rapporteur Teacher 2: Helmuth Peer
Teacher Coordinator: Axel Zahlut
Participants: 3

1) What are the motivating factors and expected benefits for the schools?
First of all, a cooperation with industry companies brings real life content into the school and ensures a regional embedment of local companies into the school culture to show pupils future opportunites at very early age. Furthermore, inquiry-based learning will be supported with already existing content which makes lessons all the more interesting and less abstract.

2) What are the main challenges found in:

a) Initiating and maintaining school industry collaborations

Beginning and maintaining a school industry collaboration is primarily about drawing the line of influence for both the school and the industry company. The intentions on both sides need to be clear right away, making sure that the pedagogical framework has to be delivered by the school teacher and materials from the industry should support the pedagogical approach. Working with real life content, it would be useful to know from the start how far the information policy of the industry company would go. That means the involved teacher needs to be sure of the level of support as far as additional material is concerned. Working out a project, a material or a solution in class, an important issue is the property right of the elaborations. Is it owned by the school or the industry? That is going to decide whether or not elaborated materials could be used again, which would be a large benefit for the school expecially when having a virtual learning environment. Although any fears are understandable, copy right issues by the companies should not be a problem in schools.

b) Designing good practices in collaboration with industry

The basic knowledge about the cooperation‘s content should be worked out before the project in the regular lessons to ensure the basic understanding of what is going to happen. After working with experimental project material which should be provided by the partner company, students should write a review or an entry on the respective virtual learning platform such as the LMS in Austria. After that, the initial start of the cooperation should be done by an expert‘s visit on a specific challenge provided by the teacher for his/her students. Prior to that visit, the students could learn about the company and the topic suggested by the teacher and therefore prepare themselves to ask questions and get the most out of the visit.

c) Implementing & Assessing school-industry practices

As far as the implementation is concerned, all major stakeholders, teachers, students, parents and school principals, are normally in favour of bringing external elements to the ordinary classroom interaction. The challenge for any teacher would be to work out a way to integrate the school-industry practices in the curriculum, which should not be a major problem in most of the cases as long as the imagination goes beyond the regular school book. Assessing school-industry practices are just as challenging as implementing them. First and foremost, the teacher needs to test the knowledge gained by his/her students with conventional methods. Given the curriculum fit, that

should not represent a major challenge. The long term effects are much more difficult to measure. Usually the partnering company strives for a return on invest. It is important to state that any actions taken in school need at least three to five years to really evaluate them and therefore any school-industry cooperation should be set out to be a long-term commitment.

3) What activities are the most successful regarding:

a) Performed activities (what kind of?)

What we discovered to be the most successful approach is a four-step approach: One, the curriculum embedment needs to be clear or worked on and the theory for a specific topic needs to be taught. Two, the pedagogical approach needs to be stated right away in order to provide the teacher with full picture - for instance a clear assignment for the students. Three, a simulation either on the web or provided by a program provokes the students' curiosity. Four, the actual experiment in or outside the school. Combining all those elements are an effective way to ensure the success of any activity. Therefore the electronic dice practice provided by Philips is a good example and extremely popular among both our teachers and students. Interestingly, also girls which eliminates all known stereotypes. To make it easier to organise it, the theory part could be done during the school year and the hands-on experience at the end of the school year in order to ensure the sustainability.

a) Addressed target groups

In Austria it is very useful to undertake such actions at the age of 14 and 17 bearing in mind that the relevance for job skills is given. Those practices could and should be integrated at any age level but at this age, it seems to be very important.

b) Venue and location

Since it is easier for the teacher to cope with the parents, the school principals and infrastructural issues, it is always preferred that any given expert would come to school rather than the pupils visiting the company. That way the schools is able to make sure that any actions by the company are not going to be advertising events, which parents really disapprove. If the expert is too far away, electronic means such as Skype could really help.

c) Industry profile

Eco-friendly or very local and innovative companies are the first choice.

2. Croatia

Rapporteur Teacher 1: Sandra Bešker
Rapporteur Teacher 2: Tea Borković
Teacher Coordinator: Ana Bedalov
Participants: 8

1) What are the motivating factors and expected benefits for the schools?

Motivating Factors for schools (teachers and students) is to have closer overview of carriers in industry and possible direct contact with role models. Expected benefits from schools are possible collaboration on individual or group projects between industry representatives and students or

groups in school. Additional expected benefits come from the public perception that the industry has money to invest in such projects.

2) What are the main challenges found in:

a) Initiating & maintaining school-industry collaborations

The main challenge in initiating school-industry collaboration in Croatia is the lack of "nearby" high tech industries and the fact that even when a company has a good and interesting profile, most of the teachers would not know about it. At the same time, alsofor companies it is hard to know which school is interested in a collaboration.

b) Designing good practices in collaboration with industry

Challenges usually lie on fact that industry does not invest time/money in education but only promotion of their products. This leads to obstacles while creating practices. The school wants to have different examples from the same field to compare and make proper scientific inquiry on proposed practices.

c) Implementing & Assessing school-industry practices

During the implementation, teachers who manage to make collaboration with industry faced many obstacles in school/state regulations trying to protect students from commercials. Additionally, very often parents have to be asked for approval for any additional activities not predicted within the state public curriculum.

3) What practices are most successful regarding:

a) Performed activities (what kind of activities, eg. online games, kits, etc.)

Most successful activities are those that offer kits. The reason is that schools in Croatia still have a huge lack of didactical materials in classes. 90% of the schools are public. Possession of those materials strongly depends on the school principals ability to secure extra funding, besides those guaranteed from ministry.

b) Addressed target group (which age of students? specific type of school?)

Student from age 12 to 18/19 are most suitable for the implementation of practices with industry collaboration because at the age of 12 they start with classes in natural sciences and technology. In Croatia students from the age 12-14/15 are in general higher primary school, and students age 14/15 to 18/19 are in higher school (vocational or gymnasium)

c) Venue and location (can the practice be carried out in the classroom? In the computer room? Need to travel to the industry? etc.)

Most of the practises should be carried out in the classrooms and some of them in computer room. Travel to the industry could be organized maybe once per year. It would be more desirable to Industry representatives to come to classrooms.

d) Industry profile (eco-friendly industry, multi-national industry, small/big industry, etc.)

Most successful, specially because of administrative problems with implementation with school/state regulations, would be national companies and those eco-friendly industry.

4) Are there any other relevant issues to mention?

Most of the teachers engaged in school-industry collaborations are young teachers. They usually do not enjoy support form elder teachers population because of a huge misunderstanding and different opinions on what schooling is and what it should be.

3. Czech Republic

Rapporteur Teacher 1: Petra Bohackova
Rapporteur Teacher 2: Eva Hola
Teacher Coordinator: Barbora Grecnerova
Participants: 11

1) What are the motivating factors and expected benefits for the schools?

School-industry partnership

- connects school education with the real life
- makes pupils understand why they actually learn and go to school
- pupils get to know professions they do not know from their own lives (for example process engineer or chemistry engineer, not only professions as doctors and teachers they already know since the early childhood) and can choose this professional direction in the future
- motivates teachers to innovate their teaching methods so that the learning outcomes correspond to the needs of the professional world

2) What are the main challenges found in:

a) Initiating & maintaining school-industry collaborations

- schools in the Czech Republic do not feel that the industry is interested enough in the cooperation
- industry is afraid that schools want only financial support and does not understand that the cooperation can be e.g. in the form of sending an expert to school to hold a lecture
- industry is afraid to reveal trade secrets
- the partnership must be initiated by the school head, not by a single teacher
- schools face time and management problems: curricula is a priority and must be fulfilled, an excursion to industry causes many organizational problems (change of time table, finding a replacement for the teacher who is out of the school for the excursion etc.)
- schools face financial problems – parents can not/ do not want to pay for the excursions
- the partnerships has to be build already at primary schools so that the youngest pupils get used to industry environment
- big international companies (as SHELL, BOSCH) should run their educational programmes in all European countries, not only few selected countries
- direct contacts with industry in the region are needed

b) Designing good practices in collaboration with industry

- the presented 10 schools have almost no cooperation with industry so they do not have any particular experience with designing good practices with industry

c) Implementing & Assessing school-industry practices

- the presented 10 schools have almost no cooperation with industry so they do not have any particular experience with implementing the practices
- practices must be hands-on so that pupils "touch" something real

3) What practices are most successful regarding:

Performed activities (what kind of activities, eg. online games, kits, etc.)

- Hands-on activities rather than on-line games and activities (pupils nowadays very seldom make things with their hands and are overfeed by on-line games they play at home)
- Addressed target group (which age of students? specific type of school?)
- all age group but begin already at primary school, all types of schools (collaboration with industry corresponding to the type of the school)
- Venue and location (can the practice be carried out in the classroom? In the computer room? Need to travel to the industry? etc.)
- both, go to the industry – see, make an experiment, go back to school, evaluate, make f.ex. report based on the findings and discuss the report with an industry expert
- Industry profile (eco-friendly industry, multi-national industry, small/big industry, etc.)
- regional and according to the type of the school

4. Denmark

Rapporteur Teacher 1: Rene Bjerre
Rapporteur Teacher 2: Mette Lundsteen
Teacher Coordinator: Jesper Rud Christoffersen
Participants: 5

1) What are the motivating factors and expected benefits for the schools?

- Motivated and interested pupils. Authentic practices.
- Another aproach to education creates excitement. And there could be rolemodels, that gives another kind of inspiration. It gives a more genuine learningoutcome, and you learn about working life.
- It qualifies the teachers. and inriches workers in industry.

2) What are the main challenges found in:

a) Initiating and maintaining school-industry collaboration?

The geography can be an issue – distances are to long. If there are any costs connected to the collaboration it can be a problem to the school.

A guideline ”How to start a collaboration” could be helpful – like how to find a company and how do you create the contact? It can also be difficult to be aware wich companies have a line within science.

b) Designing good practices in collaboration with industry

It is difficult to make two different ”worlds” talk together. Often you need a high level of abstraktion. It can be hard to let hand on activities be the main activity.

c) Implementing and Assessing school-industry practicies

Time is essential

3) What practicies are most succesful regarding:

- Practices run over a longer period of time
- Both ”worlds” have to be clear to the pupils
- The industry brings the expertice and the teachers garantie the didactics, and it is important that the pupils experience the ”real” world. Further more the practice can be contained in the curicculum.
- It is also important, that it covers more than just STEM.
- Engagement from both parties.

5. Estonia

Rapporteur Teacher 1: Aiki Jõgeva
Rapporteur Teacher 2: Edmund Laugasson
Teacher Coordinator: Maarja Kask
Participants: 7

1) Motivating factors and expected benefits for the schools

- Possibility to motivate pupils by varied teaching: visiting companies, lectures from companies;
- Tools for practices provided by companies;
- Pupils’ possibility to learn, what are the demands of the companies to their employees.

2) Main challenges

We don’t have widespread traditions of school-industry cooperation in Estonia. Only two from our group of teachers (plus a teachers’ coordinator as third) have school-industry cooperation experience.

It seems that the challenge of making contacts with firms is a problem for individual teachers. Of course – it isn’t so in vocational schools, where school-industry cooperation contracts are made. Probably there are some schools in Estonia having good contacts with industry, but those are publicly not well known.

Some contacts are established on career days, but only quite randomly. Therefore our teachers propose to create a database of contacts of schools and enterprises, who are interested in school-industry cooperation. Database owner could be Tiger Leap Foundation, maybe?

Estonian teachers are interested in cooperation on international level – for example it would be nice to visit Volvo. In the Rotterdam workshop we were told that there are some big companies inGenious teachers could visit with their students, if they lived in the same country in which the company is located.

One of the challenges is: how to increase companies' interest in cooperation? School-industry cooperation contracts might be helpful, also companies might inform schools of what topics should be included in the curriculum, so that companies could get qualified and interested workers in the future. Students could make and disseminate brochures about their industrial partner.

3) What practices are most successful regarding ...

- **Electronic Dice** is very good – it is compatible with the curriculum (mathematics in the III and IV school levels) and links mathematics and physics with manual activities and real life. Getting Electronic Dice to the school inspired teachers to buy more tools for practical works.

  There could be programmable chips so that pupils could practice programming.

  Kits are very good.

- **Xperimania I, II** are good, but there should be more background information: why something happens, what is described in the mentioned practices. There could be some information about concrete European factories, where the described processes are actually used in the production.

4) Other relevant issues

- Chats were overloaded – registration and previous information is needed.
- Technical problems – for example, DeforestACTION – there was no video nor audio.
- Friday, especially after midday, is not a suitable time for chats.
- More content and background knowledge's in practices, more examples', where processes (of practices) are used in the industry.

6. Finland

Rapporteur Teacher 1: Jukka Rahkonen
Rapporteur Teacher 2: Niina Srbinoska
Teacher Coordinator: Mirja Rosenberg
Participants: 7

1) What are the motivating factors and expected benefits for the schools?

STEM is Easy, Fun and Important – **EFI**! (This slogan was made by the Finnish teachers.)

In Finland STEM subjects are considered *important and fun*. School-Industry relationships are relevant and encouraging for the students to take part in. Students need to be able to use these skills in every day life now, not just in the future. For Finnish schools school-industry collaboration also shows how international the STEM subject related professions are.

In Finland the driver for collaboration is not additional funds. Teachers may benefit from resources they get from their industrial partner, but the real motivating aspect is the subject itself and the added variety to normal schoolwork. The teacher may also get the students that normally are not interested in their subject to pay more attention during extra activities.

In smaller communities the link to industry is natural, because the key persons have dual roles as parents and industry professionals. Both the teacher and the industry host get additional motivational boost from each other.

2) What are the main challenges found in:

a) Initiating & maintaining school-industry collaborations

The teacher needs to have personal friend or former connections to industrial partners in order to start a new co-operation. It is not easy to succeed in getting in touch with new Industrial partners just by trying to contact them by phone. Sometimes a teacher is also too low on the hierarchical level to be able to get industrial partners interested in co-operation. This will however vary between schools and areas. In our group it was easier for teachers from smaller towns to get partners whereas it was quite difficult in bigger cities. It might be a good idea to foster school-industry collaboration so that the STEM teacher would not be so alone with his or her wishes. Once a company has started a school cooperation program, it is quite easy to maintain the good relations. One known problem for school industry cooperation (namely visits to factories) is the strict quidelines. There are not many factories where minors are allowed to enter.

In Finland (especially the capital area) a company called Fazer is known for taking good care of students' visits for years.

Industry visits and practices are easiest combined with voluntary lessons or courses. Schools in Finland are also very independent compared to other nations as far as we know. Although the available budget is not huge, the principal is very often capable to allow a teacher to get a class outside the school to a industry visit. The main challenge with traveling money is solved usually by choosing a partner within walking distance or by getting the free buss ride from the company visited. Also in Finland there is some variety inside schools and the hierarchy may cause some teacher a problem in starting on their own.

Some schools in Finland are called as "industry godchild schools". This means that a company will interact with this specific school and staff members may spend more time preparing activities for them.

b) Designing good practices in collaboration with industry

The teacher needs to define what is needed and wanted from industries. If the teacher is unable to clarify what kind if cooperation is needed the other part will not be inspired and will not invest time in it. Also if the teacher is unable to focus on relevant topics the cooperation soon dies out, because neither party will benefit from it. The importance of timing is also crucial. The cooperation needs to be taken in to the local curriculum and the teacher needs to be able to talk about it early with the school principal. Industries usually favor classes that have a bias in STEM subjects. This makes it also easier for teachers of voluntary / free courses in the STEM subjects.

c) Implementing & Assessing school-industry practices

The best cooperation happens with a teacher and a motivated industry partner. Good relations are usually results of several years cooperation and stable economical conditions both with the industry and the school county. One important tool to implement school-industry practices is a national list of the existing collaborations and contact persons. The challenge with this tool is that industry people may change jobs quite often.

3) What are the preferred practices regarding

a) Performed activities

A real challenge / problem given to students before the visit. The activity will get a lot of more attention if the students have been working with the topic earlier. Also the company will benefit if the students are able to ask relevant questions and interact with real projects.

Motivation of students will get on a high level if the company offers real projects to deal with. It also makes the work of the teacher much easier.

Best activities are usually the ones performed in the factories /company laboratories. Also some activities can be taken back to school with a company staff member. Science center collaboration is also a good way to implement activities.

b) Addressed target group

Best target group is 8th or 9th grade (13 to 14 years). On the other hand our group would like to start the school-industry collaboration as early as possible. Then the suitable age starts on 5th grade (11 years).

c) Venue and location

Teachers hope that they could bring their students to industrial laboratories when ever possible. Distances vary and in many cases the long distance to the partner is actually the biggest barrier for co-operation. The cost of travel is then an issue. In Finland there is "energiapäivät" ie "energy days" that is provided by energy companies and is quite good for schools.

It is not easy to get staff to give lectures in schools. These are usually possible by old friends and ex-colleagues, but new faces are seldom seen in schools.

During the session we got an idea of using university connections as a third party that makes school-industry collaboration easier. The money and the time issues might be easier to solve and the quality of the co-operation would still be on a high level

d) Industry profile

We agreed that the companies must take care of responsibility both on ethical and environmental issues. Expample: biofuels. Children are very aware of the ethical issues and will focus on these things being ignored or faked soon. The leading edge research and high R & D is normally important for the teacher.

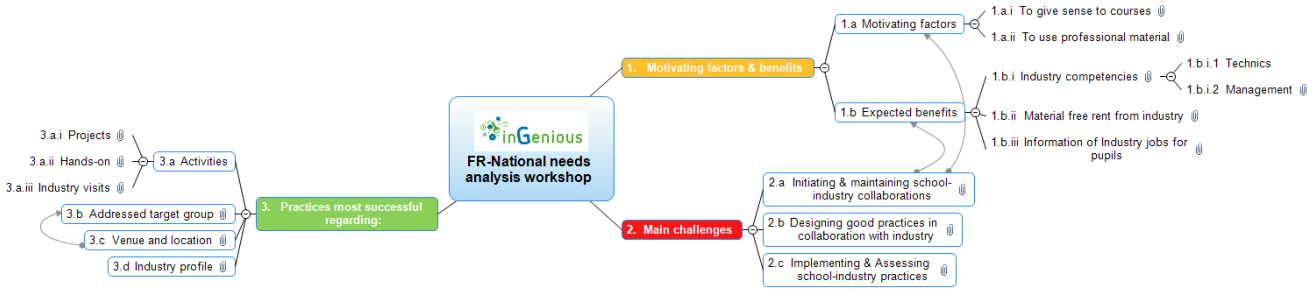
4) Are there any other relevant issues to mention?

It is best to have one on one connections to industrial partners. Schools usually do not need any third party authorities to solve their school-industrial collaborations. However there are good actors in this field to help teachers. See: **TAT** http://www.tat.fi/in-english/ Director Liisa Tenhunen-Ruotsalainen, **LUMA**, http://www.helsinki.fi/luma/english/contact, and the **teacher associations** in Finland for different STEM subjects MAOL, BMOL, etc

7.France

Rapporteur Teacher 1: Françoise Fouquet
Teacher Coordinator: Frederic Xerri
Participants: 2

The results of the French teachers needs analysis workshop are summarized in the following diagram:



1) Motivating factors & benefits

Motivating factors

- To give sense to courses
- Seeing what we do in class is the same that what Industry does in factories.
- To use professional material
- Give more importance to students work
- It seems more serious

Expected benefits

- Keeping contact with practices and innovation: lifelong learning for teachers , therefore for students.
- Maintaining a high level of scientific and technical skills.
- Project management (not practiced enough by teachers)
- Industrial procedures (but not to hard)
- Material free rent from industry
- Having access to (often expensive) professional material.
- Information of Industry jobs for pupils
- In France, there is a lack of applications for industrial jobs (technicians, scientists, ingeneers)

2) Main challenges

- Initiating & maintaining school-industry collaborations
- See the Motivating factors & expected benefits.

Some comments:

- It's easier to contact small industry but it's often difficult for them to keep the contact due to a lack of time and people available.
- For a big industry, it's difficult to contact them, if they have some educational program we must have contacts with Ministry of Education first.

Regarding designing good practices in collaboration with industry, time is needed to define the collaboration after presenting expectations of each part (school and industry)
The implementation and assessment of school-industry practices needs to be defined with industry.

3) Most successful practices

Activities:

- Projects
- Create a robot
- Create a game or an application.
- Create a car or another system (small size)

a) Hands-on

Building from a kit
Physical experiments
Analysing and interacting with technological systems

b) Industry visits

Going to factories
Welcoming experts presenting their jobs

c) Addressed target group

For 12-15: building a technical system.
For 15-18: building a technical system, creating a phone application, a game,...

Before 12: Experiments and building a system

Comment:
In France, Industry prefers to work with students involved in their skills area so often after 16 years old and in technical schools. Rarely before.

d) Venue and location

Hands-on should be carried out in the classroom if possible by each pupil.
The same for a computer practice (can be a problem for a 25-30 students class or divided in several groups).

e) Industry profile

From small (local) to multi-national industry.

8. Germany

Rapporteur Teacher 1: Vito Susca
Rapporteur Teacher 2: Eva Nicolin-Sroka
Teacher Coordinator: Wolfgang Roland Schiele
Participants: 8

1) Motivating factors and expected benefits for the schools?

- To enthuse pupils, students and young people of all age groups in school with the fields of mathematics, natural sciences and technics/engineering (in Germany MINT-subjects / in Europe STEM-subjects {Science, Technology, Engineering, Maths}).
- Cooperation with multi-national corporations.
- To enhance enthusiasm through experts in the field of research & development.
- The latest insights/knowledge in engineering, natural sciences and mathematics realised in practical application.
- Insights in respective professions and fields of activity.
- Scientific support.

2) Main challenges

Schools assumed that they would have more flexibility in their actions. The focus was on the cooperation with corporations. This cooperation is well-established in Germany. Hence, possibilities emerge to adapt and implement the contents of educational plans.

The cooperation and its contents are documented. It is important to illustrate the “message“, so that it acts as a ‘best practice‘ and motivation for other schools. Nationally, in Germany, a form will be developed for its illustration. This form clearly presents all relevant fields and subjects.

The present standards are too rigid for the current status in Germany: Expansion on the individual focus areas of schools required.

3) What practices are most successful

All practical examples are more or less limited in their aptitude for German educational plans. There are similar or better teaching examples. Therefore other examples are chosen and developed (e.g. LEGO, academic/scientific work with universities, engineering-academies). More flexibility is required.
The main target group was the secondary education group I (Age 11/12-16/17). Additional offers for primary schools (Age 6-10/12) and the secondary education group II (Age 16-20) are required.
The implementation requires specific venues/rooms, like technical rooms, workshops, scientific rooms, laboratories, outdoor projects and in other schools with specialised rooms.

In the cooperation with the industry it is important that all corporations and companies can be allowed and considered. The students deal/work with all industry profiles.

4) Other relevant issues:

More communication on a national level required, e.g. through the creation of a platform for all ingenious-schools.
Stronger collaboration with ministries, associations and those responsible politically.

Legal questions related to the implementation.

9.Italy

Rapporteur Teacher 1: Tullia Urschitz
Rapporteur Teacher 2: Laura Polenta
Teacher Coordinator: Cristina Isabel Pavisic
Participants: 8

After the introduction of the workshop and after the identification of the aims of the workshop the participants had answered the questions of the schedule.

1) What are the motivating factors and expected benefits for the schools?

Counselling for the students, economic resources, staff with better competences, sponsorship and visibility.

2) What are the main challenges found in:

a) Initiating & maintaining school-industry collaborations

Usually in Italy initiating and maintaining school industry collaborations depends on individual efforts of a teacher and not on the school as organisation. To develop school industry collaboration it is necessary to have better human and economic resources.

b) Designing good practices in collaboration with industry

To design good practices in collaboration with industry the most important thing is to know more about good results achieved by other schools, industries in the same or in

other countries. Dissemination of results. Data base with available industries in different countries.

c) Implementing & Assessing school-industry practices

There are in some secondary schools (VET Schools) work-related learning, it is included in the national curriculum.

3) What practices are most successful regarding:

a) Performed activities (what kind of activities)

Festival of Science, activities in museums, demo-kits, iterative activities.

b) Addressed target group (which age of students? Specific type of school?)

From primary school to secondary school, until 18 years old. The complexity has to be related to the students age.

c) Venue and location (can the practice be carried out in the classroom? In the computer room? Need to travel to the industry?

It depends on the kind of practice and on the issue that is developed. The most important thing is a good background information about the practices, after that it depends on the kind of practice, it can be done in the classroom, in the computer room, with videoconference or visiting the industry.

d) Industry profile (eco-friendly industry, multi-national industry, small/big industry,etc.)

Eco-friendly and social- friendly are good examples for the students. Most of the industries in Italy are small-medium industries, so this kind of industries are easily to find and they give sense of local reality. Possibility for the students of a work placement in an industry is very important for a better learning.

4) Are there any other relevant issues to mention?

The biggest problem in Italy is that the national curriculums are very rigid.

10. Netherlands

Rapporteur Teacher 1: Paul Oosterlaak
Rapporteur Teacher 2: Arie Wels
Teacher Coordinator: Paul Robeerst
Participants: 6

Our Needs Analysis took a surprising turn and started off with an interesting discussion about the position and experience of The Netherlands regarding Industry-school collaboration. This discussion is summarized first and will be followed with the Needs Analyses summarized in the table.

The Netherlands has over 10 years of experience concerning organized Industry-School collaboration. Therefore, a Needs Analysis about gaps and needs in the current school-industry

collaboration is, in the eyes of the Dutch inG members present, at this point in time not that relevant for the Netherlands. Challenges faced when establishing collaborations with STEM industries in the Netherlands are already quite crystallized. All the Dutch inG members present express the wish to share the accomplishments and experience of the Netherlands to other European countries in order to accelerate their transition to successful School-Industry collaboration.

We hope that we will be offered the opportunity to use the available resources within inGenious to do this. A first step in this might be Jet-Net's 10-year anniversary's book about all the achievements in the Netherlands concerning school-industry collaboration, which will be presented in November 2012. We are now deciding how Dutch inGenious teachers could add a small contribution to this book.

With school-industry collaboration firmly settled in the Netherlands, the discussion progressed to other reasons and problems concerning the still existing low interest of student for STEM industry in the Netherlands;

- The first question raised was how we could analyze what students need in order to feel and be challenged in STEM subjects and to which purpose?
- Do we (Dutch teacher and students in particular) still all have the same purpose? Does the Netherlands still want to be part of the top of the STEM industry?
- In the Netherlands the students have a very organized and pleasant life. There is not enough initiative (and need) to let students discuss or experience the use and need for technology.
- Students haven't got an idea of what and how they can contribute to research and development in STEM industry.
- Teachers in primary schools don't share a passion for STEM and often are not good at it. Primary school students, at a young age, are intimidated by these subjects and often perceive them as very difficult.

These and many more topics are concerning both schools and STEM industry and should be tackled together in the future. We hope that inGenious could be used as a platform to have these discussions (e.g. in CoP's or Workshops) in which we like to contribute.

11. Portugal

Rapporteur Teacher 1: Manuela Costa
Teacher Coordinator: Carlos Cachado
Participants: 7

School context
Portuguese pilot schools are mainly located near industrial areas;
Some contacts have been made with local companies (e.g. Bosh, Toyota, OGMA, IBM and Sagres).

1) What are the motivating factors and expected benefits for the schools?
Motivation factors:

- Kind of activities: we consider that practical and hands-on approach activities could motivate both teachers and students;
- Access to new methodologies and resources;
- Opportunities to vocational training;
- Connect the learning process with the real life situations

Benefits for the school:

- Technical support and different learning resources;
- New opportunities for vocational training in the companies
- Innovative and creativity learning processes
- Better school image in the community
- Lower the number of students that leave the school
- Discover students abilities that we didn't notice in the classroom

2) What are the main challenges found in:

Initiating & maintaining school-industry collaborations:

- EUN Support for initiating the first contact (e.g. official document)
- Both the school and the companies should get benefits from the collaborations (publicity)
- Keep an open approach and keep it simple
- We must discover the right person in the company to start the process
- Designing good practices in collaboration with industry
- Support materials to the visit, guided report
- The experimental activities should feet the curricula and the company interests
- Implementing & Assessing school-industry practices
- We should make a sketch for the project and a schedule
- We should have the feed-back from students
- We should share the resources with other teachers
- We should agree and discuss the evaluation of the school-industry

3) What practicies are most successful regarding:

a) Performed activities
   Hands-on activities, chat online, study visits, simulators, and some activities where students can imediatly acess the results (e.g. Deforestation)

b) Addressed target group
   From lower secondary school to secondary school

c) Venue and location
   Both at school and at companies.

d) Industry profile
   All

4) Are there any other relevant issues to mention?

- All the activities should be translated to national languages in order to be used by all partners

- Students should have a certificate of attendance to the activities
- School teams should be implemented
- Headmasters should be more involved

12. Slovakia

Rapporteur Teacher 1: Lydia Cziriova
Rapporteur Teacher 2: Zuzana Christozova
Teacher Coordinator: Zuzana Mészárosová
Participants: 8

1) What are the motivating factors and expected benefits for the schools?
Motivating factors:

- Schools and teachers aspire to bridge the institutional gap between education and industry
- To work together with the industry creating an interest in and inspiring elementary and high school students to engage in a life sciences study.
- To mobilize schools to be more actively involved in innovation and entrepreneurship activities in cooperation with industrial companies.
- To provide for better school equipment, laboratories by cooperation with the industrial companies

Expected benefits:

- Innovative ways of knowledge transfer between schools and industry
- Implementation of innovations in the content of education, modernizing of the curriculum
- To execute innovative solutions, students practice active learning and build a platform for their future professional career (creating active partnerships between schools and employers-to-be is approved and reliable way how to prepare for labour force with desired skills for the labour market and assure students´ employment in the future and their exercisableness)
- Support the schools with new technical equipment, laboratories,...
- Professional development of teachers
- Increase effectiveness of education

2) What are the main challenges found in:

a) Initiating & maintaining school-industry collaborations

- Help and support of prosperity of the region
- Promoting effectiveness of the connection between school and practice, they will better prepare students for their professional life
- Increase of competitiveness of the graduate in their future, in their future work and help to decrease the unemployment of young people in the society
- Contribute for the professionalism of young people and help to increase the living standard of the society

b) Designing good practices in collaboration with industry

- Potential mutual projects between schools and companies
- Excursions of students to the companies / firms

c) Implementing & Assessing school-industry practices
All the implemented practices must be in accordance with curriculum and should be shared with the STEM teachers who can evaluate them.

3) What practices are most successful regarding:
Performed activities – experiental learning, online games (Light bot, , Investland, Games in schools), puzzles, role plays, experiments made by students themselves (possibly made made into videofilms), ... simple simulations,

Addressed target group

- elementary school pupils (6-10 years old) - games, practical activities, technical olympiads , First Lego League, Robolabs...
- elementary school(10-15 years old) – simulations, projects devoted to environmental topics – Blue school/Green school,experiments
- secondary schools students (15-19 years old) – Science oriented virtual classrooms,, competitions, more complicated experiments, visits of scientists at schools,...
- Venue and location (can the practice be carried out in the classroom? In the computer room? Need to travel to the industry?
- Many of the practices can be carried in the classrooms- eg. role plays, simulations; experiments can be carried out in the labs; videofilms of the activities as well as the virtual classroom activities can be made in the PC rooms,...
- Industry profile (eco-friendly industry – project Green school, Blue school, multi-national industry - PC games, excursions and visits of pupils at local companies,...

4) Are there any other relevant issues to mention?

There are still some **obstacles** in the cooperation between industry and schools in Slovakia - lack of coordination between municipal, regional and national actions targeted at the development of School-industry partnership

Many times it is difficult to find an interesting project for both school and the company
Companies do not have enough interest, time, people, means for supporting School-industry cooperation

13. Spain

Rapporteur Teacher 1: Jose Viñas
Rapporteur Teacher 2: Carmen Diez
Teacher Coordinator: David Atzet
Participants: 6

The debate we have done as a national team during the workshop was very interesting. I would add that in this respect we would have liked to have a little more time to clarify some of the issues that appear in the text as specific answers to some of the items we encountered in the script. I

Even with this, we appreciate that this first meeting allowed us to see how the situation in the country, albeit, perhaps, from the point of view of each.

1) What are the motivating factors and expected benefits for the schools?

- Enter the reality in the classroom in a more "easy" or "real".
- Changing working methods.
- Visualize professions.
- Give prestige to the school / school enrollment increased.
- Improve knowledge management
- Professional Challenge / enthusiasm

2) What are the main challenges found in?

- Initiating & maintaining school-industry collaborations
- Designing good practices in collaboration with industry
- Implementing & Assessing school-industry practices

We did a reading and interpretation of questions and then answer together. The result of the discussion between the participants was:

- The goals by teachers and company are not the same
- Difficulties in initiating contacts
- Input channels or access to zero or nonexistent companies
- Visits with students should be made with small groups (max. 30)
- No chance of getting "open door" for the design of activities
- Time. Not ever a teacher have enough time to apply or introduce something new or different into the curriculum
- Resilience by colleagues (other teachers i teachers) from the school

3) What practices are most successful regarding:

- Activities which have been implemented
- Addressed target group
- Venue and location
- Industry profile

However, the experiences we have talked about are varied and are also very different from one another. These are neither very large nor too common. The group says that they have done activities (visits, workshops ...) with companies, but the views expressed in the previous paragraph should be understood that there is a large catalogue or description thereof, despite the difficulties to implement few of these activities.

Since we have devoted considerable time to the previous point, we have had less time for talking about the most successful practices of everyone of the assistants. The experiences also show us, in a way, a regional catalogue of practices that are done across the country. Everything and this is mentioned:

- Experience with Roche Laboratories, one of the most interesting
- Experiences with the Prat de la Riba, which have participated in several of the attendees. It consists of class participation-visit to industries which work on specific technology curriculum.
- Museos Científicos Coruñeses

- Other small activities with companies from each area (visits, workshops, fairs…)

4) Are there any other relevant issues to mention?

In this sense, and after all the talk shows, there are some points for which the group believes that teachers are relevant for school-business relationships, be it of any kind.

- The variety is what is better in this type of relationship
- Activities with universities
- That can give visibility to education, business and social aspects

14. Sweden

Rapporteur Teacher 1: Magnus Thelin
Teacher Coordinator: Kenth Darnell
Participants: 6

1) What are the motivating factors and benefits of the project for schools?

- Meeting with various colleagues at conferences.
- Contact with other teachers in other countries via Skype eg
- Get ready lesson materials that you also may adapt for their own use.

2) What are the main challenges?

- Hard to find companies that want to cooperate.
- Teachers do not think / do not have time to contact the company for someone to come and tell you about the company. Teachers are not aware of which companies fit sinundervisning / their subjects.
- Businesses do not have time to send someone to school.

3) Which exercises are preferable regarding the target groups?

- Practical problems with implementing Electronic Dice: students should not be too young, preferably in the upper secondary school.
- Hard to find a space in the course where the lab fits.
- Easy to integrate the topic of Electronic Dice with other substances.
- Manual missing for some labs. Teacher desired.
- All lectures will be in English or Swedish.

4) Are there any issues relevant to mention?

- Students at the gymn. Are not interested even though they have chosen such Nature program. The interest must be brought before for them to be interested in the gy.
- More lessons suitable for younger students.
- Secondary teachers are easier to implement lessons.

15. Turkey

Rapporteur Teacher 1: Evren Yemişen
Rapporteur Teacher 2: Derya Kalkan Koç
Teacher Coordinator: Rob Butler
Participants: 30

1) What are the motivating factors and expected benefits for the schools?

- İf contacted industry supports schools.
- They provide lab opportunities to schools.
- Enables enduring understanding.
- If students are taken to the companies which are relevant to the curriculum, they develop their vision and learn a lot about occupations.
- It helps development of curriculum.
- Students get answers to their questions and could come up with new questions.
- Project competitions help increase motivation and new projects are developed.
- Helps develop the vision of teachers.
- It brings fun to the monotounus education system.
- It help students to have a sense of different professions.
- Helps students develop socially.
- Education at school is heavily theoretical. Students have a chance to have hands on activities and this helps enduring understanding.

It helps learning by doing and helps teachers to create different activities

2) What are the main challenges found in:

a) Initiating & maintaining school-industry collaborations

- Not being able to find the person concerned
- Companies not being able to devote time
- Students not having time because of the central exam systems
- Very intensive curriculum and schools not being able to devote time for visits
- Difficulty of finding the finances for carrying on the collaboration. Unwillingness of companies to fund the projects
- Companies are not prepared and what they offer is not related to the curriculum, and what they present is way above the level of students
- If the company finds the school reliable they continue the relationship
- It is hard to find companies in every part of the country
- Belief in school-industry cooperation is very low
- If students sent to companies as interns could not meet their expectations, they do not want to continue the collaboration

b) Designing good practices in collaboration with industry

- Curriculum relevant to students level should be developed

- The schools goals may not match with the goals of the industry. This could be done in collaboration with the industry
- Schools need to have a purpose and share this with the industry during the initial contact
- We make short term plans. Longer term plans need to be done

c) Implementing & Assessing school-industry practices

Difficulties in assessment:

- Pre test – post test need to be done and we need to see what has changed in terms of student behaviour and understanding
- We need to work on assessment in collaboration with the industry not alone, not separate
- Schools should get feedback from the companies

3) What practices are most successful regarding:

- Internet and technology based activities attract students attention most
- Hands on type of work attracts students attention and helps enduring understanding
- Students are more interested in activities which they could see the results immediately
- Project competitions atract students attention. They need to be done continously
- Definitely out of the school
- Industry profile should include an aim to be Eco-friendly

16. United Kingdom

Rapporteur Teacher 1: Laura Nubel
Rapporteur Teacher 2: Caroline Pretty
Teacher Coordinator: Rob Butler
Participants: 6

What is the current situation?

In Manchester, Copley High School has well developed STEM links with:-

1) Industry
    a) Nationally: Business in the Community
    b) Regionally: Aerospace sector
    c) Locally
        i. Hyde Engineering Ltd
        ii. Falcon Engineering Ltd

2) The University of Manchester
    a) Medical School (via the Fastbleep Foundation)
    b) Visiting academics both as speakers and facilitators of experiments.
    c) The University of Manchester Outreach Department

3) Educational Trusts
    a) Smallpeice Trust (Engineering)
    b) Ogden Trust (Physics)
    c) Take off In Aerospace

4) Museum of Science and Industry (Copley High School has recently been awarded Flagship status with MOSI).

5) Civil Society
    a) Manchester Literary and Philosophical Society
    b) Manchester Astronomy Society.
    c) Royal Society for the Protection of Birds
6) EUN
    a) InGenious
    b) FuturEnergia

In London, schools use the mission statement to inspire and raise the importance of partnerships with industry in their lives. There is an emphasis on less able students and getting them involved in vocational routes to employment.

In the Primary Sector there is focus on fun and relevant learning. The concern of this sector is not with future employment but with enjoyment and creating a desire to continue learning.

There was consensus that if the STEM input was relevant and engaging then there is a positive educational and influential output. The practice of inviting Business and STEM professionals, including via the Ambassador programme, has a very positive effect, not only on pupils but also on other members of the educational community to appreciate the range of opportunities that roles within STEM offer. Teachers across the UK, (London, Manchester, Leicester and Liverpool) reported that there was a problem with the narrow view of the range of STEM based careers (essentially Medicine Dentistry and Pharmacy) and this was particularly pronounced within both the ethnic minority communities and with girls. It was recognised that there was an urgent need to educate both of these demographics about alternative STEM career opportunities.

In addition the vocational route via apprenticeships into employment was considered to have too low a profile as an alternative route for AMA students especially in view of the rise of Tuition fees to University.

It was recognised that today's students need skills to function in an ever changing world and that independent learning and a holistic approach to education was required. The constraint of book learning to a National Curriculum versus collaborative learning was highlighted by Dwayne in London with anecdotal evidence via informal longitudinal studies of the long term effectiveness in terms of employability. However this long term benefit is overshadowed by the short term imperative of examination performance which drives schools on a daily and annual basis.

Practices

In the Primary sector there was an emphasis on the need for "The WOW factor" in industry/ education collaboration and that there was a need for such collaboration to be sustainable of a long period rather than one – off spectaculars. Nick in Leeds reported a very successful Soap Box Derby competition that pitched two schools against each other in the design manufacture and racing of go carts which involved the input of materials and engineers from a local company. However the level of input from the manufacturer was unsustainable and the event has not been repeated. Similarly in the Secondary sector while one off spectaculars are useful , fun and engaging there was a need for a more strategic long term approach where STEM practices need to be embedded in the curriculum. Buy in from the teaching profession to the long term needs of employability can only be ensured when these are aligned with the short term imperatives placed upon schools and individual teachers.

There are a plethora of industry initiatives from multinationals and industry wide organisations with significant resources being deployed. Too often these resources are of little or peripheral use to the teaching profession. For the resources to be effective they need to allow teachers to better deliver the National Curriculum tactically on a day to day basis with the development of powerful, engaging lesson resources and strategically to allow students to be excited by the STEM agenda both in their immediate life as students and to enhance their long term career decisions and opportunities

The way forward

As can be seen, by the very well developed links that have been developed between Copley High School and all the stakeholders with an interest in the STEM agenda, there is no limit to the opportunities and resources that are available. The challenge is to align the needs of the teaching profession with the resources of Industry.

The InGenious Super Benz practice was viewed as excellent for Key Stage 4 Science as it fitted into the curriculum developing both skills and knowledge. This practice should be viewed as an example of best practice and should be used as a template for School Industry collaboration. Of crucial importance was that the resources of the SuperBenz practice were developed by Teach First teachers on a short-term internship to Shell. Exciting, contemporary and useful teaching resources were created due to the synergies between the two sectors.

There is a strategic urgency to develop these STEM resources which cannot be understated. As teachers we understand the problem, can see the solution and now require the political impetus to make this happen.

INTERNATIONAL SCHOOL NEEDS

The questions displayed below, which address concrete issues in schools / industry collaboration, were posted on the inGenious portal one at a time every week between September 2012 and November 2012. They were placed in the main page of the inGenious teacher community so that teachers would immediately find them when entering the teacher community. As the questions

were only very short many teachers filled them in regularly. However, it depended on the period of time when the questions were posted, how many teachers visited the portal. Of course, during bank holidays, fewer teachers would be online. This explains the varying numbers of responses. In total there are about 860 teachers which regularly visit the portal.

inGenious teachers but also teachers from the extended network[3] of inGenious schools were encouraged to participate in the needs analysis by answering the questions.

The following section will show the data and results obtained, but like with the workshops of the previous section, the data analysis will be carried out by UAB alongside the evaluation of the national workshops.

Question I.I:

Posted on 5 September

Are you usually interested in participating in school-industry collaborations with the aim to increase the interest of students in Science, Technology, Engineering and Mathematics subjects or topics?		
Answer Options	**Response Percent**	**Response Count**
Yes	100.0%	58
No	0.0%	0
answered question		**58**

Question I.II:

Do you usually find these kinds of collaborations appropriate?		
Answer Options	**Response Percent**	**Response Count**
Yes	94.8%	55
No	5.2%	3
answered question		**58**

[3] All teachers that applied to be pilot schools and were not selected are not excluded from the inGenious activities but invited to be part of the extended network of inGenious schools. This extended network will be invited to participate in the general inGenious activities like Communities of Practice and competitions and will be able to access the project's materials.

Question II

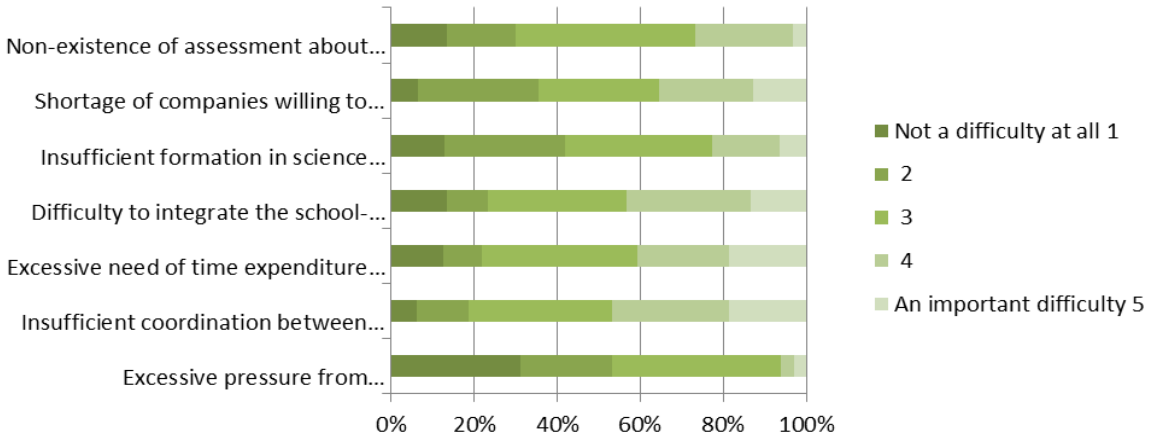
Posted on 12 September

In how many experiences (school-industry collaborations) will you participate in the present school year?		
Answer Options	**Response Percent**	**Response Count**
Less than 3	28.6%	12
Between 3 and 7	69.0%	29
More than 7	2.4%	1
answered question		**42**

Question III

Posted on 19 September

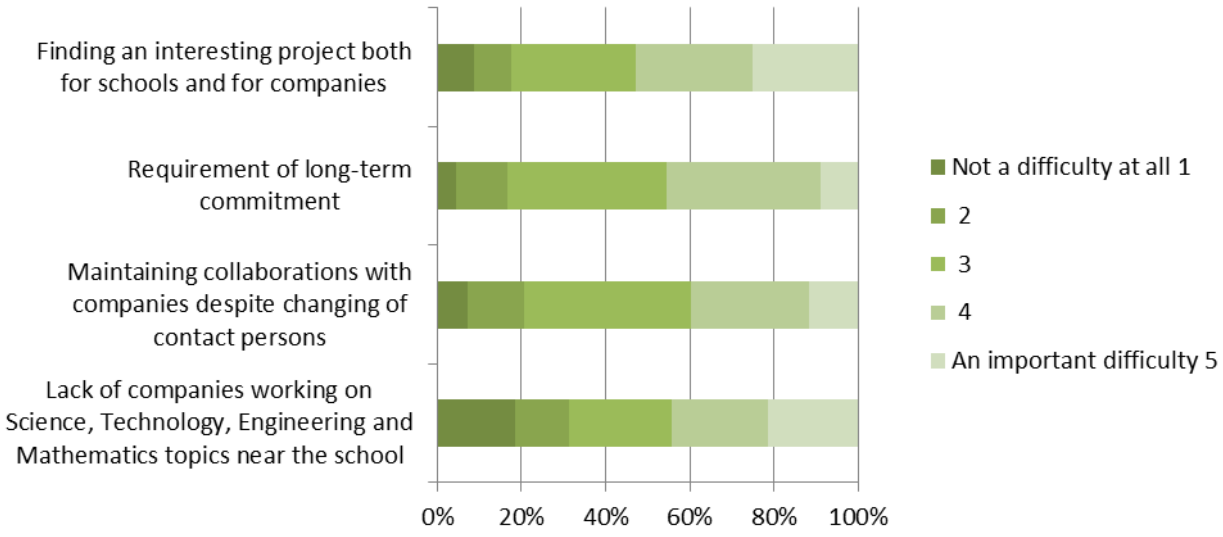
The following reasons might represent difficulties for the establishment of school-industry collaborations. Please score them from 1 (not a difficulty at all) to 5 (an important difficulty)							
Answer Options	**1**	**2**	**3**	**4**	**5**	**Average**	**Count**
Excessive pressure from educational authorities for introducing a diversity of innovations.	10	7	13	1	1	2.25	32
Insufficient coordination between different political agents.	2	4	11	9	6	3.41	32
Excessive need of time expenditure often involving extra work.	4	3	12	7	6	3.25	32
Difficulty to integrate the school-industry collaborations in school schedule / Overlapping with school calendar.	4	3	10	9	4	3.20	30
Insufficient formation in science and technology contents making teachers feel uncomfortable.	4	9	11	5	2	2.74	31
Shortage of companies willing to collaborate with educational institutions / schools.	2	9	9	7	4	3.06	31
Non-existence of assessment about the quality of practices	4	5	13	7	1	2.87	30
Other (please specify)							0
answered question							**32**



Question IV

Posted on 26 September

Regarding the procedures to establish collaborations with local companies, which of the following reasons are perceived as a problematic issue in your opinion? Please score them from 1 (not a difficulty at all) to 5 (an important difficulty).							
Answer Options	**1**	**2**	**3**	**4**	**5**	**Average**	**Count**
Lack of companies working on Science, Technology, Engineering and Mathematics topics near the school	13	9	17	16	15	3.16	70
Maintaining collaborations with companies despite changing of contact persons	5	9	27	19	8	3.24	68
Requirement of long-term commitment	3	8	25	24	6	3.33	66
Finding an interesting project both for schools and for companies	6	6	20	19	17	3.51	68
Other (please specify)							0
answered question							**70**



Question V

Posted on 3 October

In your school/country, which institution is usually the initiator of school-industry collaborations?		
Answer Options	**Response Percent**	**Response Count**
School (teacher)	95.3%	81
Companies	4.7%	4
answered question		**85**

Question VI.I

Posted on 10 October

Do you think there are more school-industry practices available for a particular age student group than for other ones?		
Answer Options	**Response Percent**	**Response Count**
Yes	79.5%	31
No	20.5%	8
answered question		**39**

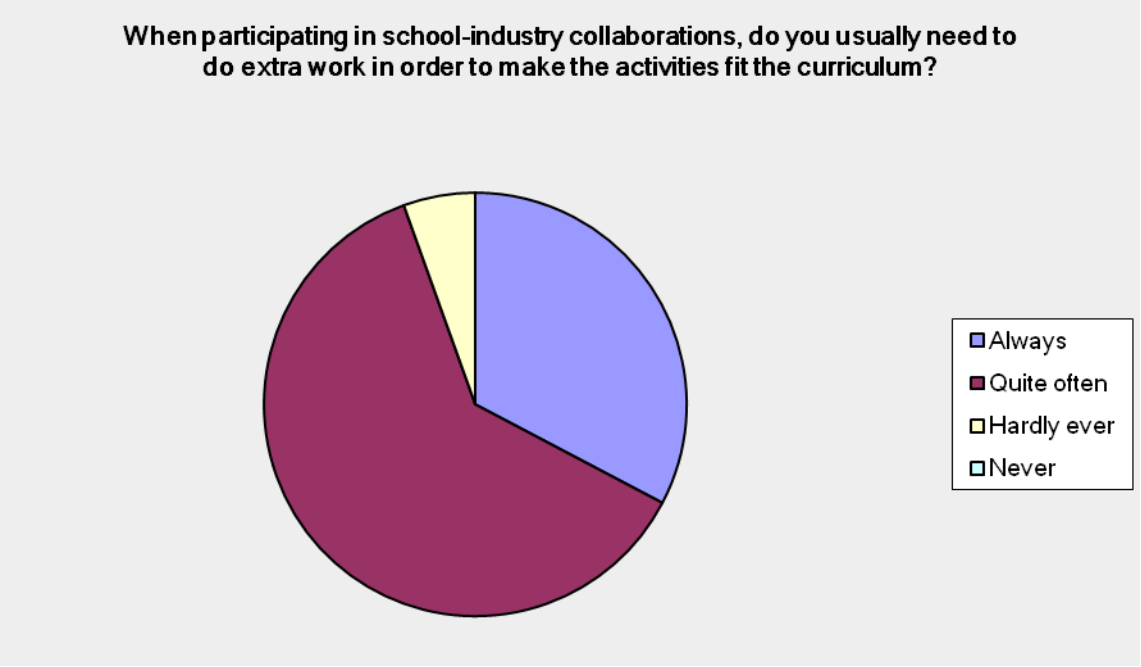
Question VI.II

If so, which is the group with a higher offer of practices?		
Answer Options	**Response Percent**	**Response Count**
Primary pupils (5-11 years old)	15.4%	6
Secondary (11-16 years old)	48.7%	19
Students aged 17 and above	35.9%	14
answered question		**39**

Question VII

Posted on 17 October

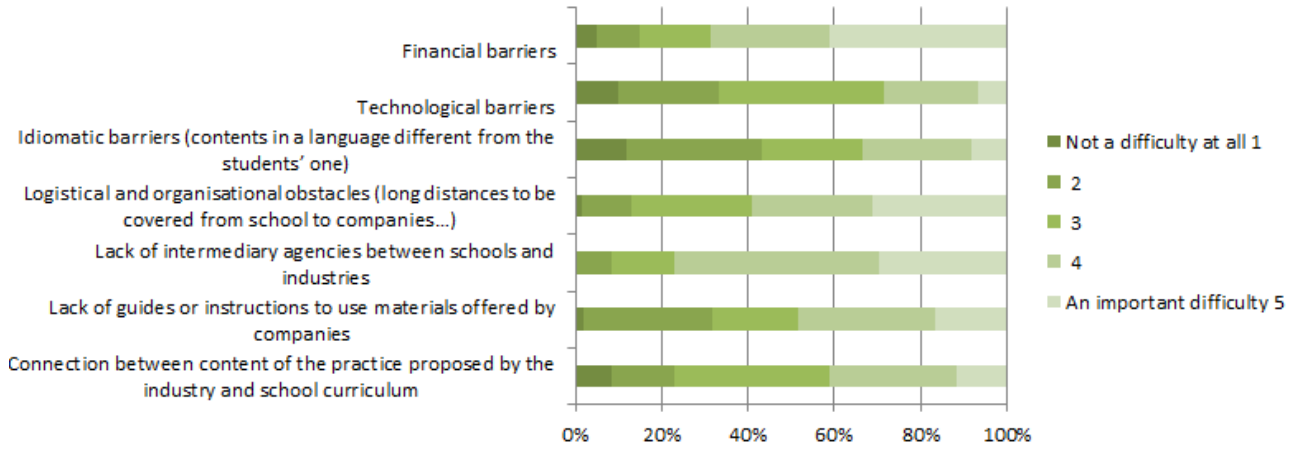
When participating in school-industry collaborations, do you usually need to do extra work in order to make the activities fit the curriculum?		
Answer Options	**Response Percent**	**Response Count**
Always	32.7%	18
When participating in school-industry collaborations, do you usually need to do extra work in order to make the activities fit the curriculum?		
Quite often	61.8%	34
Hardly ever	5.5%	3
Never	0.0%	0
answered question		**55**



Question VIII

Posted on 24 October

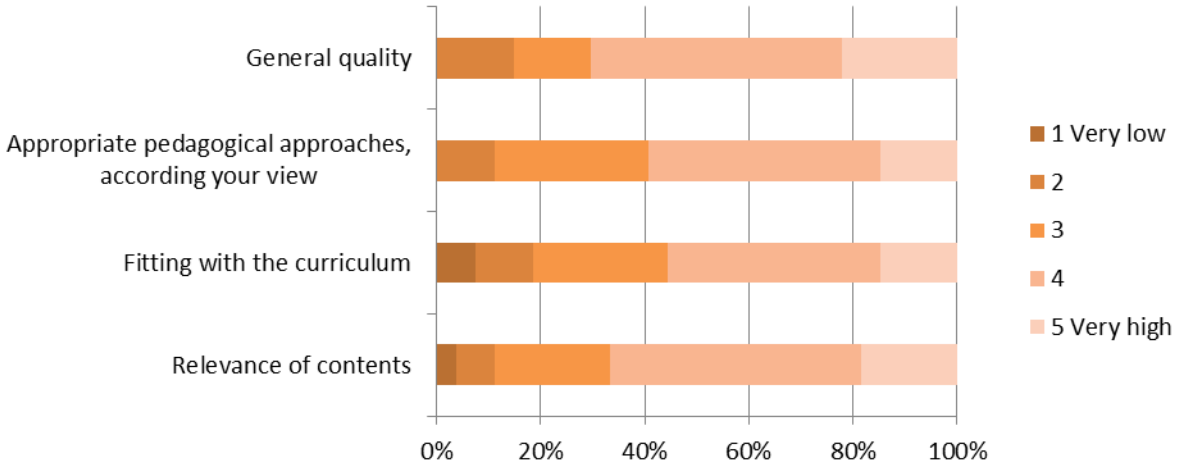
From your experience, which of the following aspects represent a difficulty when it comes to implementing school-industry practices? Please score them from 1 (not a difficulty at all) to 5 (an important difficulty):							
Answer Options	**1**	**2**	**3**	**4**	**5**	**Average**	**Count**
Connection between content of the practice proposed by the industry and school curriculum	5	9	22	18	7	3.21	61
Lack of guides or instructions to use materials offered by companies	1	18	12	19	10	3.32	60
Lack of intermediary agencies between schools and industries	0	5	9	29	18	3.98	61
Logistical and organisational obstacles (long distances to be covered from school to companies…)	1	7	17	17	19	3.75	61
Idiomatic barriers (contents in a language different from the students' one)	7	19	14	15		2.87	60
Technological barriers	6	14	23	13	4	2.92	60
Financial barriers	3	6	10	17	25	3.90	61
Other (please specify)							3
answered question							**61**



Question IX

Posted on 31 October

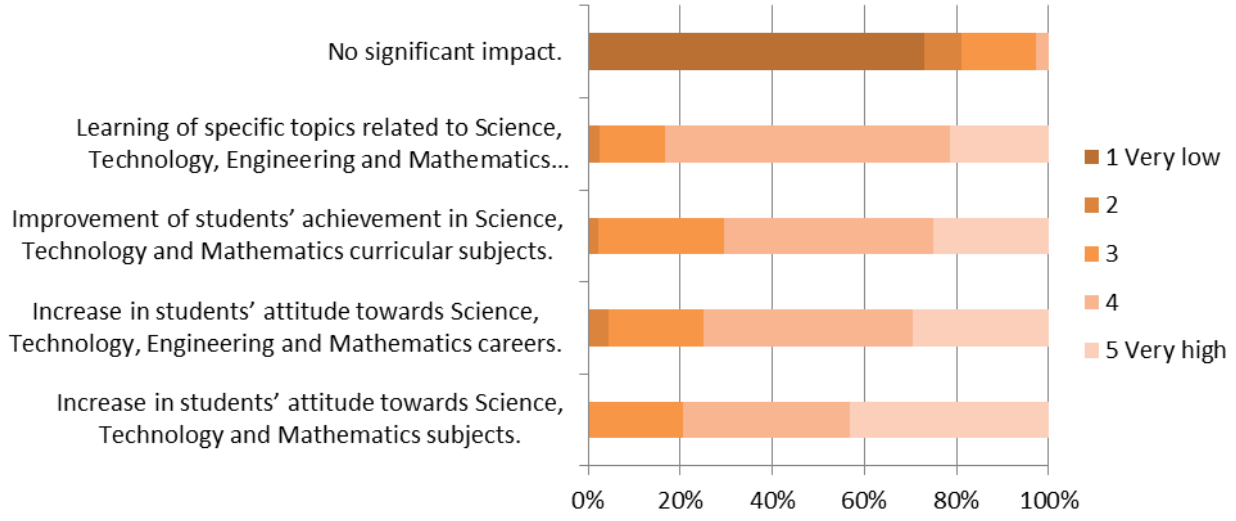
According to your experience, please give your viewpoint scoring the practices of school-industry collaboration in which you have participated regarding the following aspects (1 very low– 5 very high):							
Answer Options	**1**	**2**	**3**	**4**	**5**	**Average**	**Count**
Relevance of contents	1	2	6	13	5	3.70	27
Fitting with the curriculum	2	3	7	11	4	3.44	27
Appropriate pedagogical approaches, according your view	0	3	8	12	4	3.63	27
General quality	0	4	4	13	6	3.78	27
Other (please specify)						3	
answered question						**27**	



Question X

Posted on 7 November

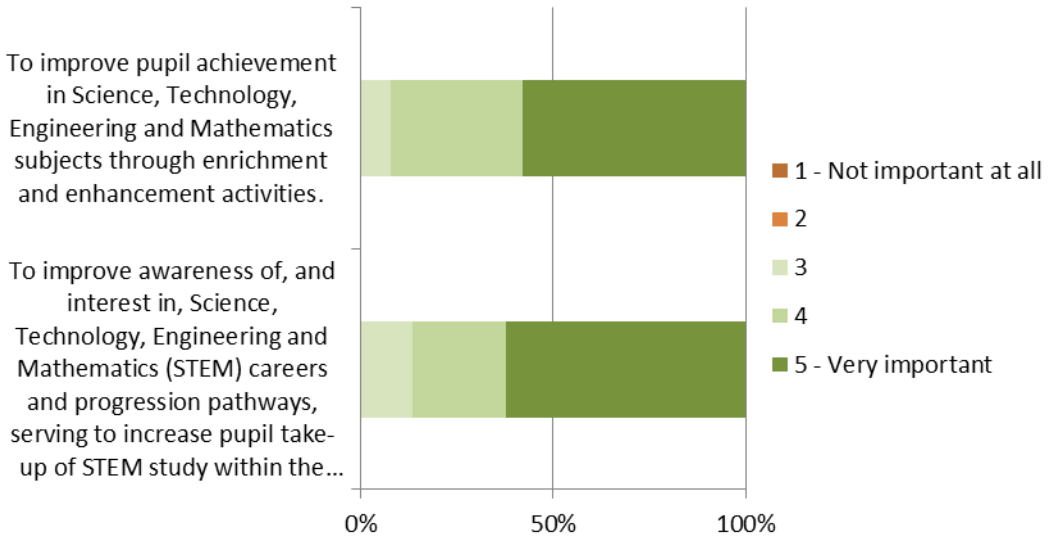
In general, which is the main impact of the practices in which you participate? Please score each option from 1 (very low) to 5 (very high):							
Answer Options	**1**	**2**	**3**	**4**	**5**	**Average**	**Count**
Increase in students' attitude towards Science, Technology and Mathematics subjects.	0	0	9	16	19	4.23	44
Increase in students' attitude towards Science, Technology, Engineering and Mathematics careers.	0	2	9	20	13	4.00	44
Improvement of students' achievement in Science, Technology and Mathematics curricular subjects.	0	1	12	20	11	3.93	44
Learning of specific topics related to Science, Technology, Engineering and Mathematics industry.	0	1	6	26	9	4.02	42
No significant impact.	27	3	6	1	0	1.49	37
Other (please specify)							1
answered question							**44**



Question XI

Posted on 14 November

Please give us your view according the importance of school-industry-collaboration related to these two foci (scoring from 1 –not importantat all– to 5 –very important):							
Answer Options	**1**	**2**	**3**	**4**	**5**	**Average**	**Count**
To improve awareness of, and interest in, Science, Technology, Engineering and Mathematics (STEM) careers and progression pathways, serving to increase pupil take-up of STEM study within the education system.	0	0	5	9	23	4.49	37
To improve pupil achievement in Science, Technology, Engineering and Mathematics subjects through enrichment and enhancement activities.	0	0	3	13	22	4.50	38
Other (please specify)							1
answered question							**38**



CONCLUSION

The first part of this deliverable focuses on the teacher needs concerning school-industry collaborations in the different countries. During the inGenious summer school, which took place in August 2012 in Istanbul, the 16 inGenious teacher coordinators held 45 minutes workshops with teachers from their own countries in order to discuss problematic issues and gaps in school-industry partnerships from an **educational point of view**. In total about 130 teachers participated in these workshops. Teacher coordinators followed a set of questions that they were given in advance which should lead the discussions of each national workshop. This way, the results of the discussions can be compared and for this purpose they are collected in this deliverable.

A more in-depth analysis of both the results of the teachers workshops and the online questions will be carried out by UAB alongside the results from the national workshops. Here we present some initial conclusions.

One of the main ideas which emerged from the different national reports is that an important motivating factor for teachers to enjoy such collaborations is the connection of students to real life; students often learn about career opportunities in STEM that were unknown to them, which in many cases has a positive effect on the students' interest in STEM. Furthermore, teachers are often interested in starting school-industry partnerships as they get to innovate their teaching methods so that the learning outcomes correspond to the needs of the professional world (see CZ). However, it is also worth noting that often it is more the young teachers who are motivated to start projects with industries and as the Croatian teacher team discussed, the elder teachers often do not support such collaborations due to varying opinions on what schooling is and what it should be.

When looking at the benefits of such collaborations for the schools, it is noticeable that many countries talk about the financial benefits or the resources they might get from their industrial partner. Often schools have a lack of didactical material (see HR) and thus they often welcome resources from industries. However, not all schools are driven by the expectation to get additional funds. In Finland for example the added variety to the normal schoolwork for students and teachers is benefit enough, especially when students who are usually not very interested in school, gain more interest and motivation.

The main challenge found in initiating school-industry collaborations for most of the countries is to find industries that are available and interested in such a collaboration, who on top of that are not based too distant from the location of the schools. Once an industry is found, the challenge is to agree on a project together and on each of the parties' role. The Austrian teachers mentioned that they believe that often partnerships do not succeed because the intentions on both sides have not been agreed on from the beginning. They further state that teachers need to be sure of the level of support that they receive from the school and from the industry from the start. Estonian teachers highlighted their interest in cooperating with Industries on an international level and not only with Estonian industries, as they believe that the learning factor might be more elevated. Furthermore, another challenge that could be identified when it comes to creating sustainable collaborations is the lack of time on both sides, the schools and the industry.

A consent between the different teachers can be detected concerning the type of practices that were most successful; hands-on and interactive activities were the preferred practices, such as the

Electronic Dice practice. They further mentioned that good practices are also activities that are easily transposable between the different countries, age of students and languages.

The second part of the deliverable displays the results of the answers to the needs analysis questions which have been put on the inGenious portal every week between September and November 2012.

The number of respondants per question varies between 27 (Q IX) and 85 (Q V) teachers, probably depending on the period of when the question was posted on the portal. For example the question which received the lowest number of responses was online during the week of the All Saints bank holidays, thus fewer teachers visited the online portal. In total about 800 teachers were members of the teacher community during September and November 2012.

In general, the answers to the questions show that the teachers who are part of the inGenious teacher community are very motivated. The first question (Q I.I) asks them whether they are usually interested in participating in school-industry collaborations and all the 58 teachers who answered this question said that they were interested. From question II we can see that most of them will participate to between three and seven school industry collaborations during the upcoming school year. According to the responses to question V 95% of the schools initiate such collaborations. It is only very rarely the industry which contacts a school with the aim of setting up collaboration.

As much as the teachers are motivated to collaborate with industry, they do face a number of problems before managing to create a sustainable collaboration. First of all, they feel that there is a lack of companies working on Science, Technology, Engeneering and Mathematics topics. Thus, they do not have a big number of industries to chose from (see Q IV). Secondly, it is not easy to combine the schools and the industries' needs and finding an appropriate project that fits both parties. This might be due to the restricted school curriculum, the non-experienced industry or the tight school schedule. Furthermore, teachers also find that there should be an assessment of the quality of the practices proposed by the industry, as they are not always easily implementable in the school reality (see Q III).

When the teachers were asked about the usefulness of the practices offered in inGenious the responses were allover positive. From the answers to question IX it can be understood that the content of the practices was mostly relevant to their needs, it fitted quite well into their curriculum, the quality was good and they approved the pedagogical approaches that were used. However, the answers to question VII clearly indicate that in most cases teachers need to adapt their practices to their curricum, teaching style and their students. Thus, it is often difficult to take a practice and implement it in a class without having made adaptations to fit the context and the level and age of the students.

The biggest problems that the teachers have when it comes to implementing the inGenious practices are linked to logistical and organisational obstacles and financial barriers. In some cases teachers also signalled a lack of instructions of the offered materials. On the other hand, there seem to be only minor difficulties linked to idiomatic barriers (see Q VIII).

To conclude on a positive note, in question X the teachers were asked about the impact which the practices that they tested had on the students. From the answers it can be understood that the

impact was allover an encouraging one. The attitude of the students towards STEM increased, as well as their attitude towards careers in STEM. Furthermore, the teachers had the impression that the practices had an impact on the learning of specific topics related to STEM.