



Report on the 4th Teacher Online Discussion Event

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Project Title: DESIRE

Project Number: 519113-LLP-1-2011-1-BE-KA4-KA4MP

Grant Agreement: 2011-43816/001-001

Table of Contents

1. Introduction	3
1. Statistical Analysis	4
1.1. Week 1	4
1.2. Week 2	5
1.3. Week 3	6
1.4. Week 4	7
1.5. Week 5	8
1.6. Week 6	9
2. Comments	10
3. ODE summary	11
3.1. Industry projects	11
i) Communications	11
i) Outcome	12
ii) Our direction	14
3.2. European Projects	14
i) Problems you have when it comes to EU projects	14
ii) Teaching resources	15
iii) To the colleagues	16
iv) Major and Minor Project Dissemination.....	17
v) Attractive results.....	17
3.3. School Projects.....	18
i) Social media	18
ii) Your experience	20
3.4. Research.....	21
i) Results communicated to teachers.....	21
i) Useful examples of didactic research	22
ii) Ready-to-use outcome?	23
4. Conclusion	24

1. Introduction

The primary objective of the DESIRE project is to identify how new project results of methods and practices in science education can reach teachers and schools more efficiently. The online discussion events (ODE) of DESIRE are used to facilitate the sharing of experiences between stakeholders in science and math education. The ODEs has the purpose of collecting qualitative material for the DESIRE Project.

This report is a summary of the third teacher Online Discussion Event which took place in the period 04 February to 17 March 2013, on the context of a Community of Practice (CoP) of the inGenious project. It was moderated by Carlos Cunha, teacher of Physics and Chemistry at Escola Secundária Dom Manuel Martins, in Setubal, Portugal.

During the 6 week event teachers were invited to discuss 13 different Threads placed under 4 Subjects: Industry projects; European projects; School projects and Research. The following sections contain summaries of the discussed themes from each one of the six week and the outcome of the discussions.

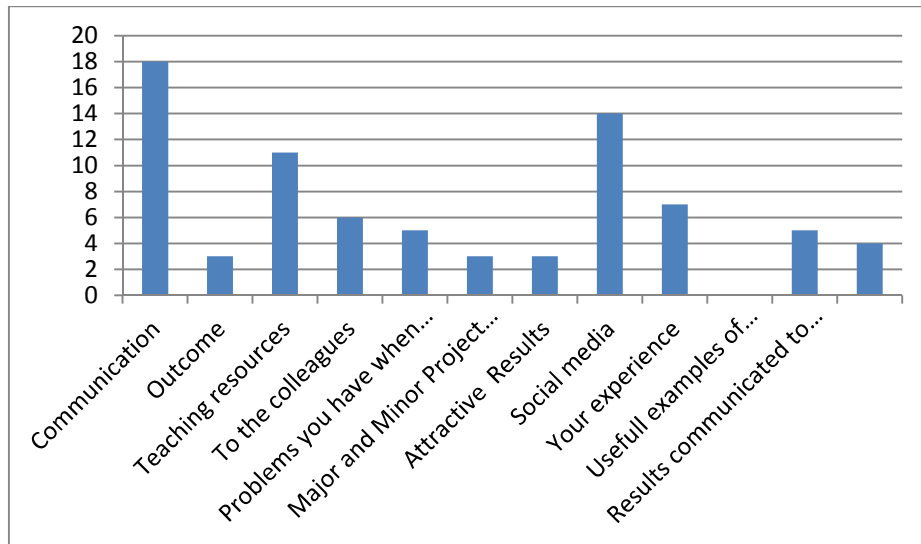
Subject	Sub-subject	Thread
Industry projects	-Industry - school collaboration	<ul style="list-style-type: none"> ○ Communications ○ Outcomes ○ Our direction
European Projects	-Dissemination strategies	<ul style="list-style-type: none"> ○ Problems you have when it comes to EU projects ○ Major and Minor Project Dissemination. ○ Teaching resources ○ To the colleagues
	-Exploitation of results	<ul style="list-style-type: none"> ○ Attractive results
School Projects	-Communicating school projects results	<ul style="list-style-type: none"> ○ Social media
	-Success stories	<ul style="list-style-type: none"> ○ Your experience
Research	-Research projects	<ul style="list-style-type: none"> ○ Useful examples of didactic research ○ Ready-to-use outcome? ○ Results communicated to teachers

Table 1: Overview of subjects, sub-subjects and threads of the CoP

1. Statistical Analysis

1.1. Week 1

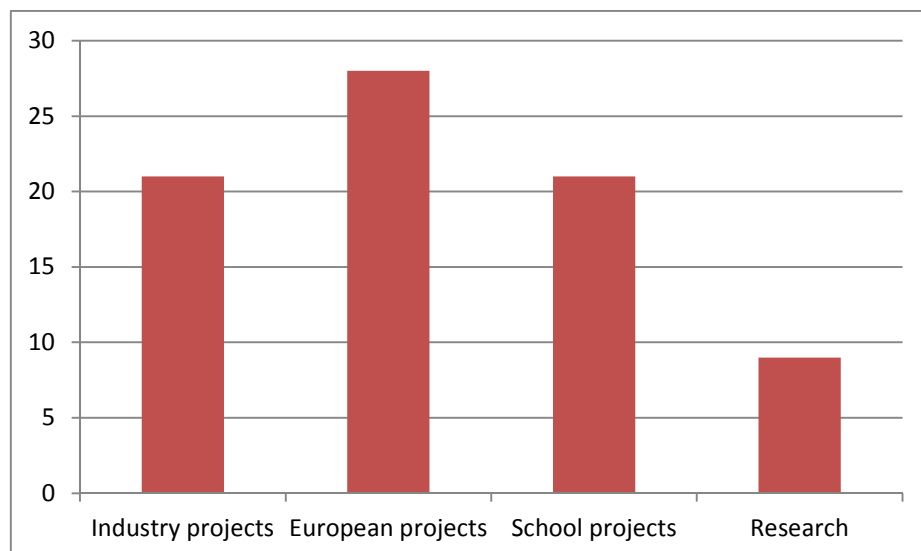
The first week, there was intense teacher participation on the several threads of the CoP. As shown on graph 1, the most popular thread was Communication that belongs to the subject Industry projects.



Graph 1: Amount of post pr. thread, 1st week

The less popular thread was “Usefull examples of didactic research”, integrated on the subject Research. The first week, the total number of posts was 79.

During the first week the most participated subject was ‘European projects:

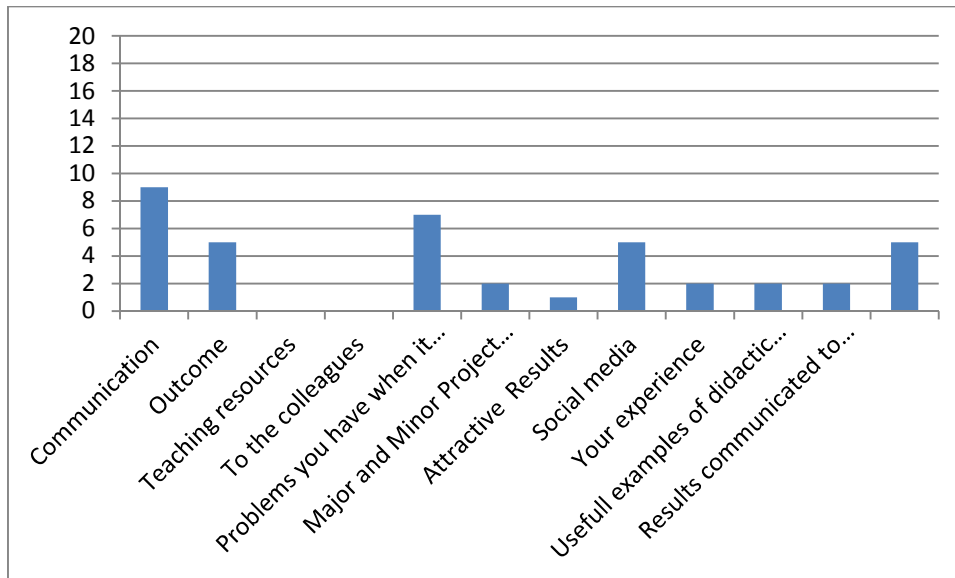


Graph 2: Subject popularity, 1st week

This was a very successful week with intense discussion and very interesting argumentation between teachers who posted on the several threads available.

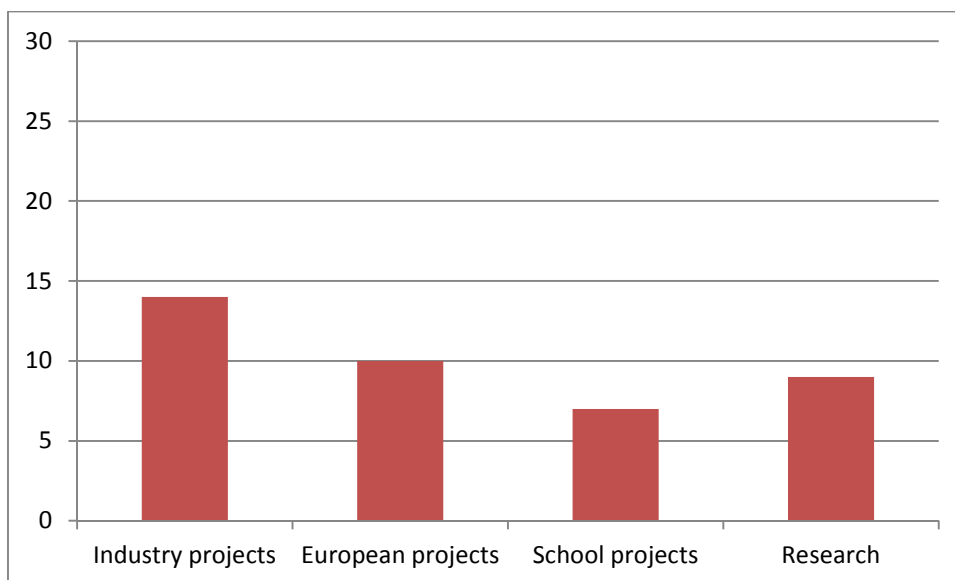
1.2. Week 2

Participation was lower during the second week, with a total amount of 40 posts in the forum. Two of the threads of the Industry projects had no post at all.



Graph 3: Amount of post pr. thread, 2nd week

During the third week the most popular subject was 'Industry projects', with the double amount of posts than the less popular subject that was 'School projects'.

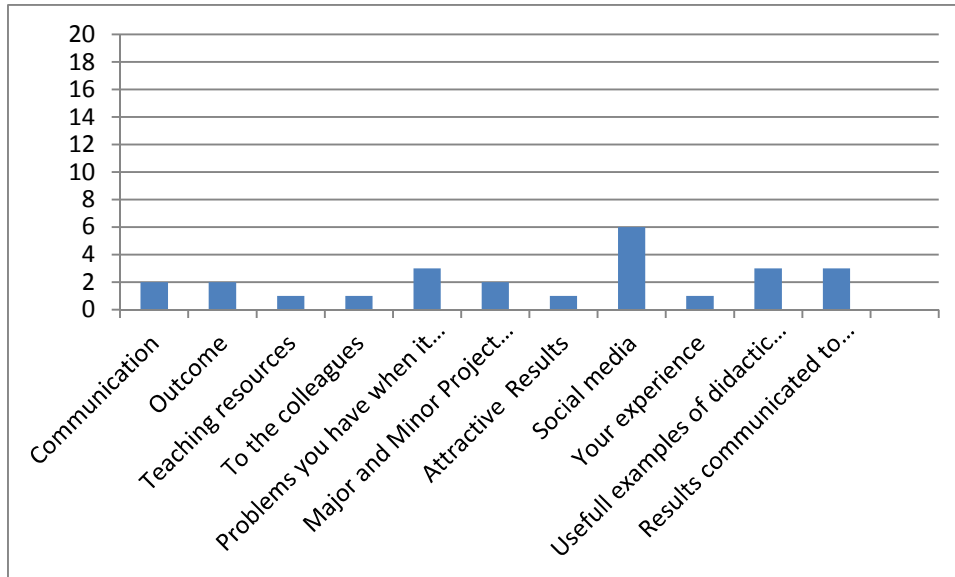


Graph 4: Subject popularity, 2nd week

The low participation might be due to the fact that in some European countries it was the week of Carnival, for which schools were closed and teachers had some days off.

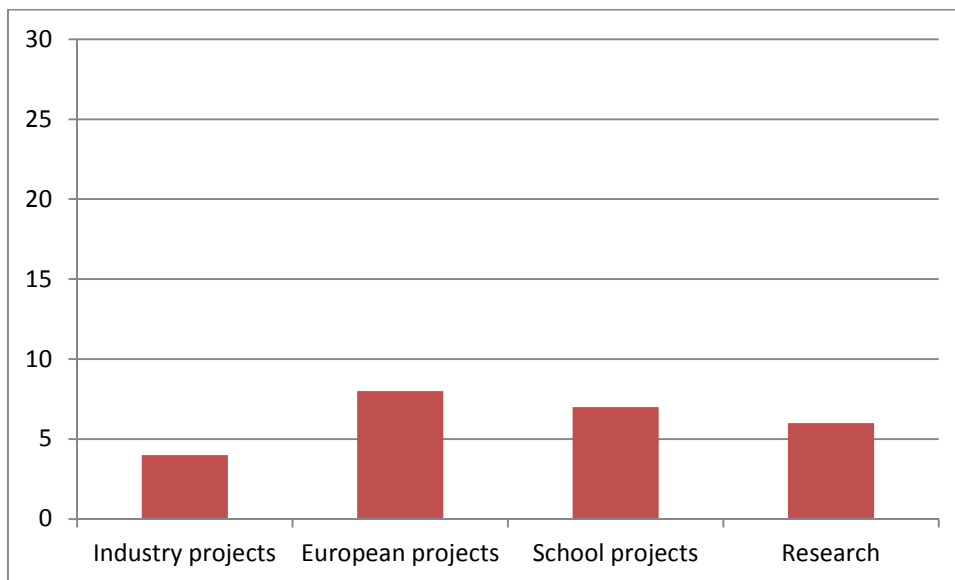
1.3. Week 3

The fourth week participation was even lower then during week 2. Nevertheless, the most popular thread was 'Social media' that belonged to the 'School projects' subject.



Graph 5: Amount of post pr. thread, 3rd week

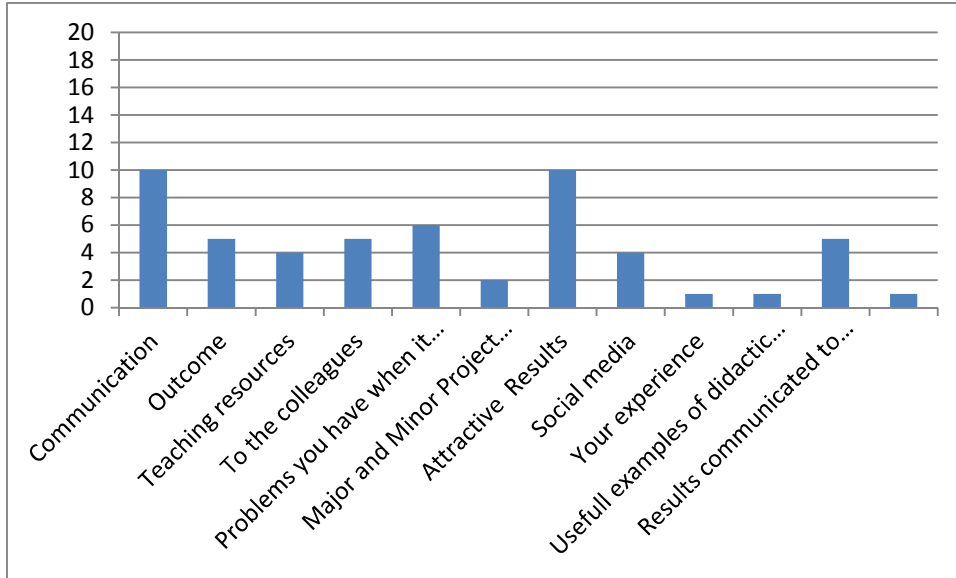
The most popular subject during week 3 was 'European projects', followed by the 'School projects' subject.



Graph 6: Subject popularity, 3rd week

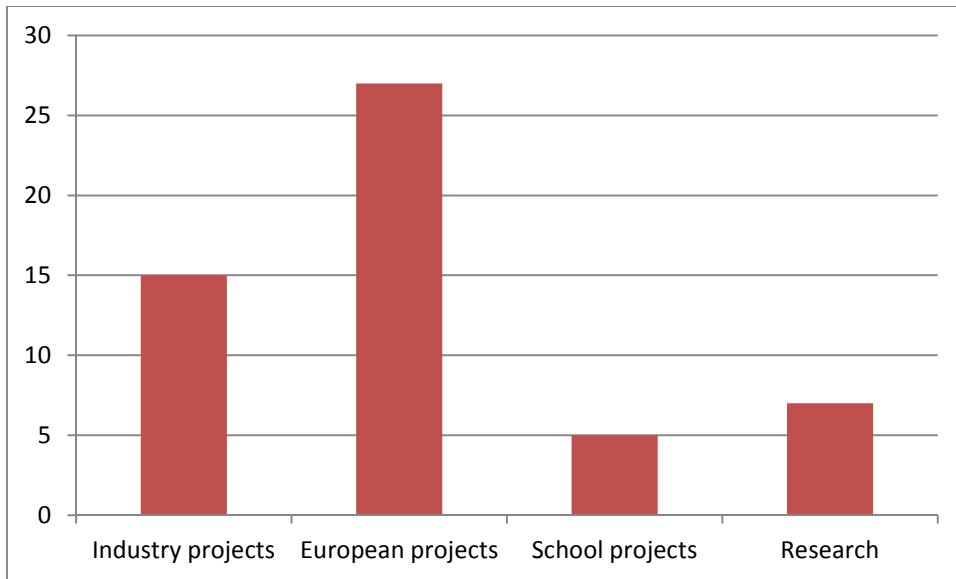
1.4. Week 4

During the fourth week participation increased again. Discussions in some threads were intense and the number of posts was higher than weeks 2 and 3.



Graph 7: Y Amount of post pr. thread, 4th week

The most popular subject was again ‘European projects’, as we can see on graph 8:

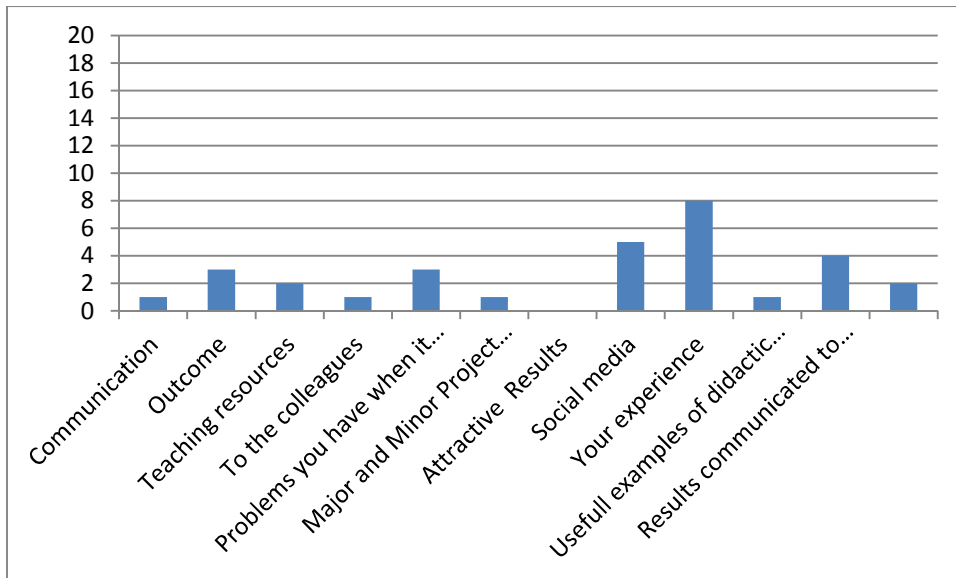


Graph 8: Subject popularity, 4th week

It was interesting to see that teachers did not participate as expected on the ‘School projects’ subject.

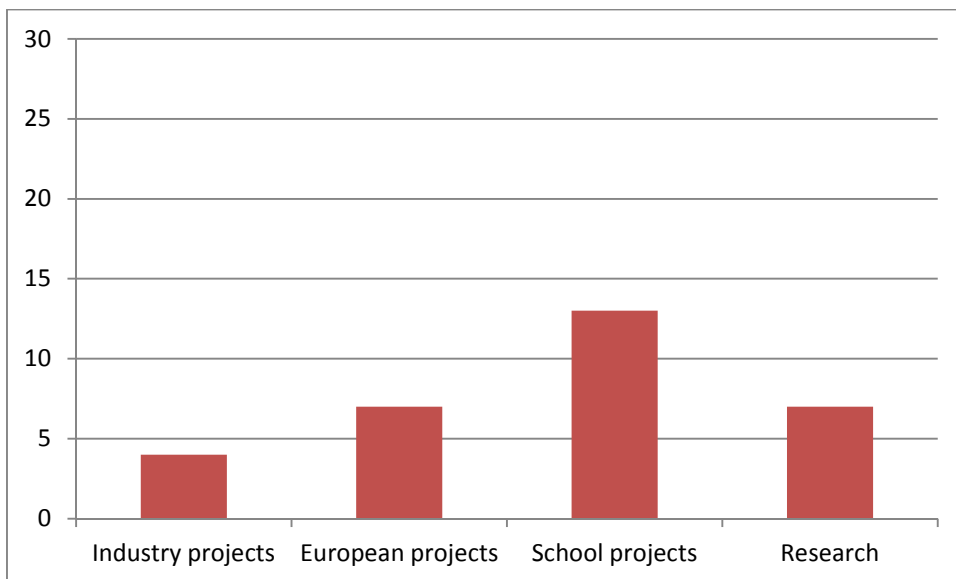
1.5. Week 5

The 5th week participation decrease again. Most threads had low participation or none at all.



Graph 9: Amount of post pr. thread, 5th week

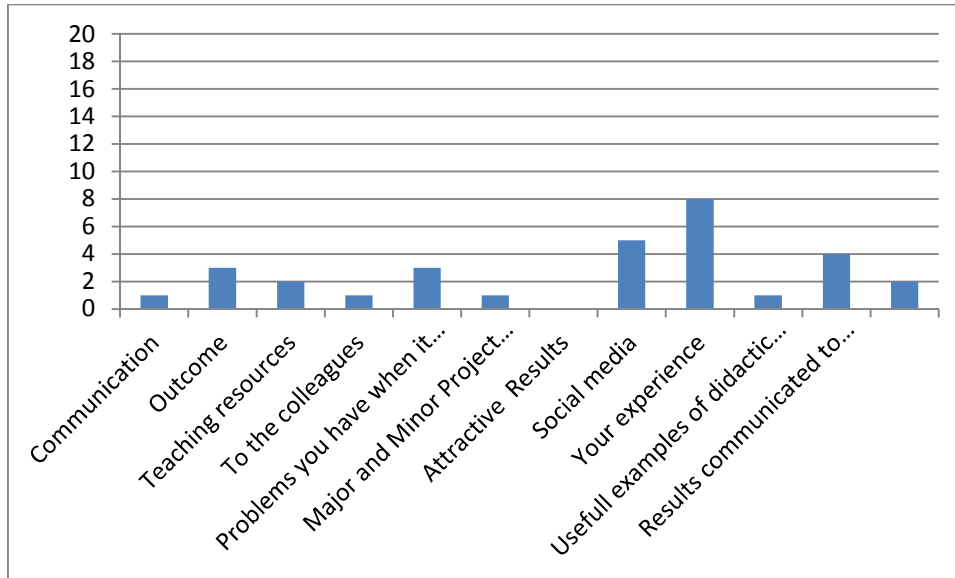
Still the 5th week revealed an increased interested in the 'School projects' subject, specially the thread about 'Your experience'.



Graph 10: Subject popularity, 5th week

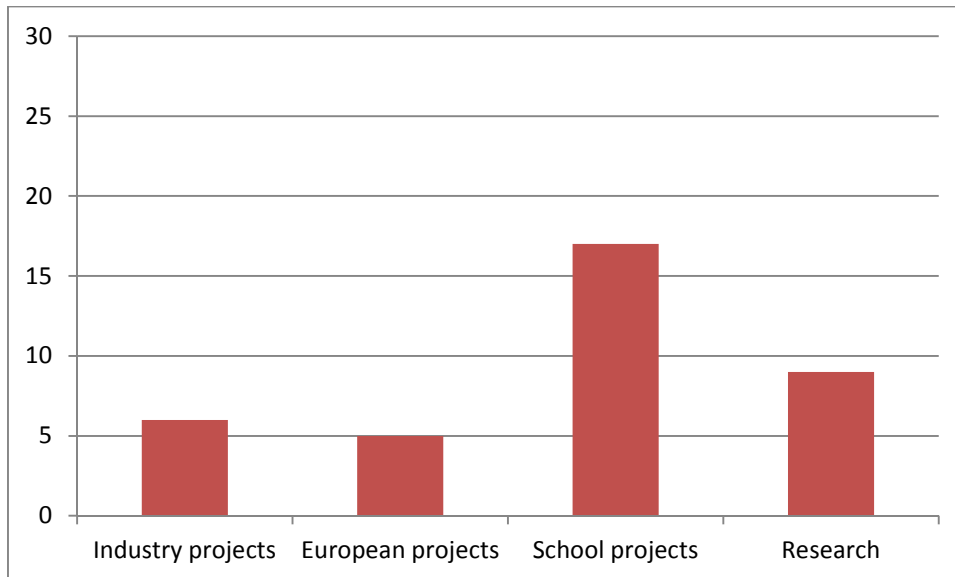
1.6. Week 6

The last week of the ODE/COP there was a slight increase in the participation, especially on the ‘School projects’ subject.



Graph 11: Amount of post pr. thread, 6th week

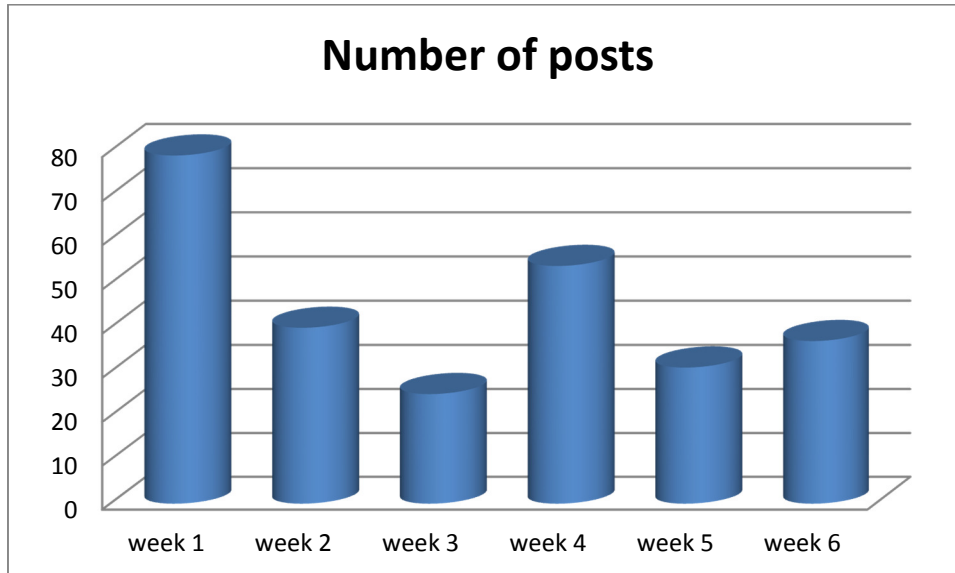
This was the best week for the ‘School projects’ subject and it also lead to increased participation on the ‘Research’ subject.



Graph 12: Subject popularity, 6th week

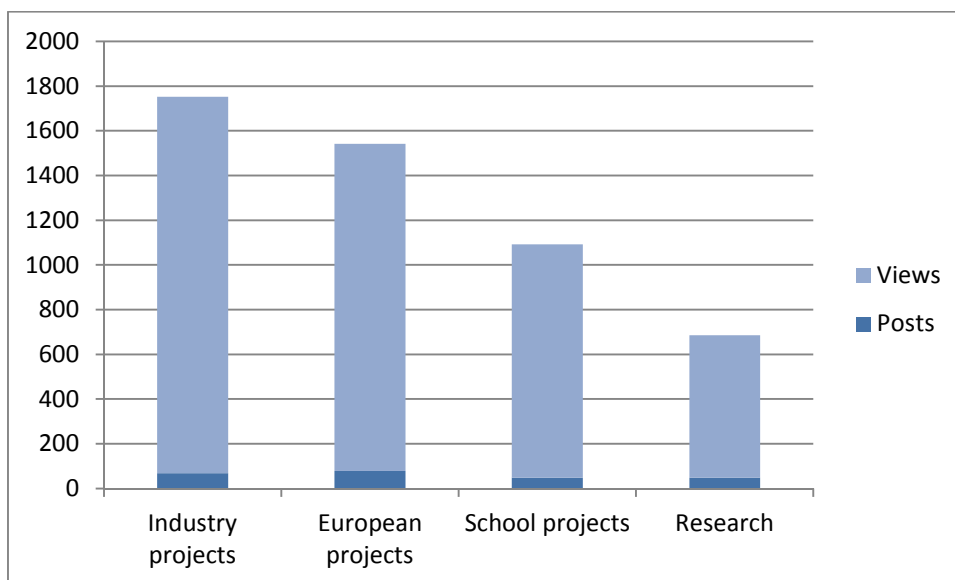
2. Comments

When comparing the amount of posts pr. week, we can see that participation was not constant and it was highest on the first week.



Graph 13: Total amount of posts pr. week

The number of silent views was numerous, if compared with the number of posts, it shows that the event had great interest from teachers but that they lack in taking active participation.



Graph 14: Total amount of silent views pr. subject

However, we have to mention that those teachers, who participated and wrote posts on the several threads, provided very fruitful opinions and information relevant to each of the subjects.

3. ODE summary

3.1. Industry projects

In the subject 'Industry projects', teachers discussed how they communicate with the industry and what kind of collaboration they usually have with them. We had a sub-subject 'Industry – school collaboration' which had three threads and are described below.

i) Communications

In the thread called 'Communications', the general opinion was that teachers often visit factories but the effort to find industries, maintain contacts and make the visits relevant for the curriculum often lays on the shoulder of the single teacher:

For example Aiki Jõgeva stated “[..] *collaboration needs active teachers who want to teach in a bit different way*” and Harri Lehtonen conformed this by saying “*I agree also that it is just the teacher and hers/his enthusiastic view of taking kids to visit companies.*”. But still it is not always just a question of finding industry partners to collaborate with as Jürgen Schneider pointed out: “*we can find partners easily, but sometimes it is hard keeping the partnership alive. It's all about communication; we need to talk to each other very frankly and honestly and we must always be aware of not being able to fulfill all wishes - mutually*”. Also Urbain Boeykens confirmed this thought, but suggested a solution for this: “*I agree that keeping the partnerships alive is much too often a question of one dedicated teacher investing his free time in pre-visits and talks with industry representatives. Part of the solution would be to have one person at least partially class-free to entertain these relations.*”

But the availability of the industries is sometimes also a problem. Caroline Neuberg wrote that she “*often found that it is really time consuming/difficult to find a place where students would be welcome*”, what means that in some countries there is still a lot of work that has to be done to reach real and long-term collaborations.

I was suggested that to make industry-school collaboration work better it should be better supported from a national policy level,

“These collaborations and cooperation should be supported by the Ministry of Education in projects with various companies, providing additional funds to increase student motivation and teacher, but at least for me at the moment is just a dream” Lidia Ristea

since the collaboration often starts on the basis of personal connections or contact of the single teacher:

“I have used my personal contacts for organizing these visits. Until now we have not done any collaboration projects, but i think it would be interesting to try.” Marika Eller

In the forum the teachers expressed that the industry visits had the purposes of supporting the curriculum:

For example Natalija Romanenkova’s school curriculum recommends visits to industry for which she “*teach chemistry and try to use visits to industry to supplement school curriculum.*” Also Harri Lehtonen

visits industries with the same purpose *"Now during the spring term I will organize a chemistry visit for all my school 8th graders to a iron casting factory. This will strengthen their studies in metals."*

And Caroline Neuberg *"I have run for several years now a trip to the local power station, as it fits nicely with the syllabus being taught here. The students suddenly realise that there is a world outside of the classroom where what is being taught is actually really applied."*

Two teachers mention the industry visit is a integrated part the students vocational training:

"mon école est une école technique et professionnelle en Belgique. Nos élèves de cinquième qualification en électromécanique travaillent en collaboration (partonariat) avec AUDI. Les élèves sont très enthousiastes. Evidemment, il y a certains arrangements à établir pour l'organisation des horaires des cours!" Tina Michetti

But some other teachers mention that the visits are made to introduce students to different kind of working fields and to give them inspiration to what they would like to study. For example Harri Lehtonen states that the collaboration with industries is *"kind of introduction to different kind of work" for students."*

Most teachers of the forum referred to industry visits in relation to older students but also some elementary teachers mentioned the elementary level could make use of industry visits to better show students the connections between real life and school:

"I work at an elementary school and our partnership with industry barely existed." Ahuva Cohen and *"Sometimes kids, especially in primary-level, don't realize the connection between schools and so called 'real-life'."* Tiina Kähärä

Finally some teachers tried to come with suggestions on how to find companies willing to collaborate with schools. Aiki Jögeva for example stated *"Maybe those companies that realize the need to attract young people as future workers could be more open and welcoming??"*. But in general several teachers mention that fairs and conventions is a good place to find future industry partners:

"I used to go very often to educational conventions for STEM teachers and instructors. There, I am exposed to several kinds of collaboration, one of them is collaboration between schools & industry." Stella Magid and *"If we visit industrial, computer or educational exhibitions we have opportunity to get new contacts with representatives of industry, science. It is very useful and fruitful[..]"* Svetlana Dotsenko

This thread had a total of 42 posts and 1474 views.

i) Outcome

In the second thread 'outcome' of the sub-subject 'Industry – school collaboration' several teachers mentioned that long term collaboration between schools and industries is better for a good outcome and a good way to establish high quality vocational schools:

"here we are a vocational and technical secondary school and school-industry collaboration is important for us. we have ICT and Electric&Electronic departments and it is important to have up-to-date education materials used in vocational education." Erdem Yavuz;

“In vocational school and colleges, school-industry collaboration is very important. Here big companies have programmes for that too, getting close to schools, finding the best suitable workers for the future. They like to engage the students early” Tiina Kähärä

And

“We are a technical school with pupils aged 14 to 18 years old. Our primary collaboration with industry is based on finding places where students go for two weeks on a practical working experience. Most companies are rather willing to provide such opportunities since our students are well trained and eager to learn the practical side.” Urbain Boeykens

It was also mentioned that vocational and technical schools collaborations with industries is easier since companies often find an interest in trying to create contact to future employers at an early stage. For example Tiina Kähärä stated that:

“The industry must see it also interesting and understand the benefits of the school collaboration. In bigger industries (In Finland) they have seen it to be important and they promote their industries at school, educational fairs etc.”

As already mentioned in the ‘Communications’ threat described above teachers also stressed that the effort to create long term and good quality school collaborations should include efforts from higher policy levels:

“I think there should be closer cooperation of Ministries of education with the industry which could ensure schools such as Grammar schools, cooperation with industries.” Zuzana Klauđíniová

and

“in my opinion, the problem is very complicated and must be approached on several levels: on ministry level (e.g. school curriculum have to suggest detailed methodical recommendations for teachers), on regional level (curriculum may be adapted to local abilities and needs, depending on local industry possibilities), on school level (support teachers-enthusiasts and find some ways to stimulate them).” Natalija Romanenkova

One teacher pointed out that school visits should not only be based on guided tour but also involve students in the industries practical management and their daily challenges:

“An industry-school collaboration project would work if it could last for a long time, not only for a short time when children can just see production in some factories, etc.. . It would be great if they could be involved into problems of industry in some way..” Ružena Minichová

Tiina Kahara mentioned it would be good if industries *“pay some interest getting to schools in primary-level too”* this statement was also supported by Martina Kupilíková:

“I think it is important to link teaching and industry in the elementary schools. Our pupils aged 15 did not know where they can work, what jobs there are, and what high school they have to choose. Our options are still very limited. Our collaboration with industry is limited to excursions - unfortunately.”

It was also mentioned that *“the best collaboration projects should go on for years and become part of teaching and learning at school”* (Aiki Jokeva). But as teachers already stated in the thread named ‘Communications’ establishing school-industry collaboration was considered hard work for teachers and that they could have more support from higher policy levels:

“We would like to put this collaboration more “in the picture” in our communications but this takes valuable time from the volunteers for the schoolwebsite and FB-page. Companies most of the time cannot spare the time and resources to send someone over for our “open school day” but we keep working on it...” Urbain Boeykens

and

“A project in collaboration with industry requires hard work, diligence over a period of time in which there is involvement of all, both in terms of quality products and to increase safety in the near future, that students can learn a such as high school job to make it easier to find a job, and companies can provide training courses to work and possibility of advancement when results are obtained leading to increased productivity.” Lidia Ristea

This thread has a total of 24 posts and 321 views.

ii) Our direction

This thread was started by a teacher, probably by mistake as an answer to the previous thread.

This thread only had 2 posts and 13 views.

3.2. European Projects

On the European projects subject there were two sub-subjects: ‘Dissemination strategies’ and ‘Exploitation of results’. The four threads of the sub-subjects ‘Dissemination strategies’ are presented first while the thread of the sub-subject ‘Exploitation of results’ is presented at the end of section 3.2.

i) Problems you have when it comes to EU projects

The most participated thread of the CoP/ODE was *“problems you have when it comes to EU projects”*. Here a good number of participants pointed out the difficulty they had to involve more teachers at their schools in participating or gain knowledge provided by EU projects. The most referred opinion was that it is very difficult to involve other teachers on the projects because they think that these projects increase their work. It was for example said that it was difficult to create interest among colleges even when you as teacher *“spent many hours on this subject... how to create awareness, show interest and activate a project”* Thomas Roche.

Many teachers expressed that it is very difficult to motivate colleagues. For example Tina Michetti, mentioned that her colleagues *“don’t desire to participate because they consider it supplementary work or they are already engaged on national projects”*. While Buican Mariana explained how she tried to involve other teachers in European projects *“But nobody is now involved because they told me that is to much more to work in an European project.”* While Karolina Damjanoska said that when she tried to involve colleagues *“They do not reject me, but always say that they have many obligations and they canceled”*. Bosiljko Derek also confirmed that *“it is always hard to start something new. My*

colleague teachers always see new job, new waste of time, new obligation... They do not see the benefits of European projects. It is just a new job for them."

Some of the justifications given by teacher colleagues that rejected the involvement in European Projects were for example *"that it is more important for students to be prepared for the exams that they will do at the end of the school year."* Teresa Salgueiro Xavier. Or in some cases the students' age is considered a problem (age 12-15). Aiki Jõgeva explained that *"I can understand you very well. I also work with students of the same age and most of them need lots of support."*

Another problem mentioned was the teachers' insufficient English level: It was said that there are a lot of teachers who don't speak or understand English for which they conclude they cannot participate in European projects.

"I think that in Estonia most of the teachers are aware of EU projects. [...] Sometimes teachers would like to start a project but their knowledge of English is not sufficient or they don't trust their ability to do it or they don't want extra work." Aiki Jõgeva.

Some teachers came up with initiatives that had motivated teachers to participate in European projects. Thomas Roche invited one of the Irish MEPs to go to his school to *"start with the very basics...solid information on what Europe really is."* This was a much applauded initiative by the other teachers.

Natalija Romanenkova even suggested that it is possible to surpass language barriers at their school they *"solve it by cooperating with English teachers; we try to attract them to participate in projects."*

This thread has a total of 24 posts and 736 views.

ii) Teaching resources

The second most participated thread was "Teaching resources". Teachers posted links to resources, blogs and other internet places where useful materials for teaching can be found. The involvement in Comenius projects was mentioned by several teachers, with the participation of students. There were a number of teachers that mentioned that after starting participating in the inGenious project they had contact with a lot of European projects. Laura Polenta wrote that *"now, after indications given at the inGenious workshops, I usually navigate in Scientix to look for inspirations and ideas"*. And also Tsetsa Hristova stated that *"I participated also in the Scientix project. This is a very good platform and there is uploaded a lot of resources from different EU projects. I find very good science project and use it at my classes."* The e-twinning project was also often mentioned by teachers as a good way to get and to place resources.

But also other projects are mentioned:

"A very useful EU project is PROFILES which aims at disseminating inquiry-based science education and provides teachers with motivating and relevant science teaching modules. Teachers develop the modules themselves. I've used them in biology and chemistry lessons. <http://www.profiles-project.eu/>", Aiki Jõgeva.

It was often mentioned that schools should have ICT rooms to provide the conditions to participate in these projects with students *"Sometimes it's difficult to carry out all the practices we wish and*

disseminate these practices, because our Italian school haven't everywhere scientific laboratory and ICT.” Maria Zambrotta and Bulcan Mariana also mentioned the same: “We have not in our school access to the scientific labs (meaning one lab pr. science subject) or IT lab because there is only one for all the school“.

One teacher mentions that she felt the collaboration in European school projects gave her new ideas and inspiration: “[..] following how things are taught in different countries one can get new ideas” Tiina Kähärä.

But teachers do not only count on direct contact with European projects to gain access to new teaching materials. Most teachers also mention national portals where they can gain access to new knowledge and teaching material: “We have a network of environmental education centers all over the country owned by Environmental Board. They also do EU projects and produce all kinds of teaching materials” Aiki Jögeva. And for some it seems less complicated to use national portals since the resources are provided in their own languages: “As my English is not perfect, I use mainly Slovak resources for teaching especially mathematics and Physics which are my main subject I teach” Zuzana Klauđiniová.

This thread has a total of 21 posts and 502 views.

iii) To the colleagues

In this thread, teachers pointed out which “channels” they used in their countries to communicate projects to new teachers. Scientix project and the future Scientix2 project were mentioned as good examples of platforms online to promote information to teachers.

“SCIENTIX is a spectacular way of disseminating information in a European scale”, Carlos Cunha

It was also mentioned that conferences and teachers training programs help disseminate information. One teacher pointed out that still dissemination could be improved at local level *“I have noticed it’s always difficult to hear the outcomes of projects. Even dissemination on ongoing projects are sometimes unknown. I’m sure there are great projects in our neighboring schools we aren’t aware of”* Tiina Kähärä

One teacher mentioned that a solution to this could be to better collaborate with teacher training centers on a local level *“In Portugal, the teachers training centers should be the best way to disseminate projects outcomes and learnings, but it doesn’t work... So it depends more on the initiative of the teachers that participate on the projects to disseminate the information. The problem is that on most cases teachers don’t like to receive the information from one of is own!”* Carlos Cunha. On the other hand this solution might only be possible in some countries depending on the facilities available.

Language barriers were again mentioned as a problem for the dissemination process: *“Often the difficulty for Italian teachers is the knowledge of the English language that does not allow to develop easily the practices”* Maria Zambrotta

Finally one teacher stated that it is possible to have knowledge on European projects from national and European channels but that there are still no initiatives on how to gain information and teaching resources from national projects in other Europe countries: *“Our national agency of Lifelong Learning programme introduce better school collaboration projects on their web page but it's only briefly. At*

least who wants to know what's going on in our country can get some information. It's much more difficult to get this kind of information about other countries" Aiki Jõgeva.

This thread has a total of 14 posts and 152 views.

iv) Major and Minor Project Dissemination

Thomas Roche started this thread to show how to disseminate a major and a minor local project.

He described how he in the big project (www.outlab.ie) based the dissemination strategy on the development of a website, establishment of a forum, development of illustrations of the equipment and finally also a teacher training course.

In the small project (<http://knockaclariggpsmathsgeog.blogspot.ie>) that ran over a very short period the dissemination was based on a blog.

The conclusion was that both dissemination strategies were successful. But he mentions that also other initiatives can create interest among stakeholders – which can ensure participation in European projects. For example teacher could invite an national MEP and integrate their project activities in e-twinning projects

This thread has a total of 10 posts and 94 views.

v) Attractive results

Under the sub-category 'Exploitation of results', the thread 'Attractive results' teachers try to answer the motivation question: how to make the results of projects attractive for the use of other teachers? The essence of the answers is that teaching materials are good when they motivate students as stated by Mirta Levin:

"I think that good projects are those that include different topics very connected to real life. I'm a math teacher in the middle and high school in Israel and I realized that students become involved in projects when they "speak" their "language". I mean that they like activities that use ICT in all forms: computers games, cell phones, etc and the most important is that they got a feedback at the end."

Also Eli Netzer underpinned this thought *"As a math teacher, from my short experience, connecting Math study to real world implication of math can be very inspiring and motivating for students."*

Suggestions on how to make results of projects attractive where in brief that they should be easy to find, related to the curricula of the students, easy to adapt to the reality of the student's and using ICT and cell phones. But still one teacher mentions that using new technologies might still be a bigger challenge for teachers than for students: *"[...] students are interested in everything that is well connected with their own life and interests. I wish I could use a cellphone as well as they can and make use of it in teaching and learning!"* Aiki Jõgeva

One teacher mentioned that long term school collaborations can lead to new knowledge: *"We started a Comenius project in 2000 and we are still actively working together with our partners from Germany and Finland. [...] There can be other good (material) results - teaching materials etc [...]"* Aiki Jõgeva

Finally one teacher mentioned that exhibitions is a good way to inspire other teachers to use new materials *"The productions (technical systems for us) can be shown in exhibitions and in a website [..]. Then some teachers can think:" they made it ; it's possible; so I can make it too !".* Frédéric XERRI

This thread has a total of 19 posts and 114 views.

3.3. School Projects

The subject 'School projects', had two sub-subjects 'Communicating school project results' and 'Success stories' with each only on thread presented below.

i) Social media

The thread of the sub-subject 'Communicating school project results' was called 'Social media' and was the most participated thread of this category. Teachers around Europe seems to use a lot of social networks to communicate, however the teachers have very different options about how useful and safe Facebook is for formal teaching and communication purposes .

On the negative side teachers stated that:

"In Denmark it's very unusual for schools to have Facebook profiles. Using social media to communicate is probably a good idea, I just think you have to choose what media wisely." Tim Kjaer

and

"You have to think twice before start to use a social media for a school project. Here in Sweden a lot of teachers (not only STEM) have a blogg where the students can see homework and other things and use Facebook for the same purpose. But there have been problems with this.[..]" Katarina Ericsson

But despite this teachers seem to have positive experience with using Facebook for general dissemination of school activities:

"Our school has a Facebook page, and nothing unpleasant has ever occurred. Contributors are teachers, students, alumni and parents. It is most useful for disseminating activities and events in school life, projects and so on." Rina Vasilescu;

"I know many teachers who are using the Facebook succesfully." Tiina Kähärä;

"My school (in Portugal) has a facebook page where projects are published. After a few hours the word are spread around the community ... is almost viral!" Fátima Pais;

and

"We have for some years used Facebook, Ning, blogger, we did not have problems with students in virtual space, only very correct behavior." Svetlana Dotsenko;

Even though many teachers mentioned Facebook as a good communication channel – they still didn't consider it suitable for teaching purposes:

"In our school we made a Facebook account for all our students and we share there all quick information. But I agree with You that Facebook in not for teaching." Enela Kase-Tonna;

"I use facebook for communication with my students, but this is not for teaching. Other very useful Social media are YouTube, Flickr, Twitter, Viadeo, MySpace, LinkedIn, Google+, wikis. Blogs and Wordpress are very good for teaching. We used it during projects and for communications with students and for students comments." Tsetsa Hristova

and

"Our school has a Facebook account and also the school radio has its own facebook page where students can post their wishes and recommendations." Alli Kaarama

Also other social media platforms were mentioned. For example the e-twinning platform, blog editors, youtube, Flickr, Twitter, etc. were mentioned as ways to communicate with the school community:

"[...] In particular we are going to pilot the use of Twitter in a project. There is a very negative perception of it from staff and governors, and they are very anxious about the safety and security. I'm hoping that the pilot will demonstrate that it can be used safely and it will be a really important tool in sharing and developing learning." Nick Styles;

"Some teachers use also MOODLE. It is an Internet environment where teachers can upload materials and tests so students can take their tests online in limited time. If the time is up then tests are closed and students cant solv them anymore. Students can also upload their homework to MOODLE." Alli Kaarama

and

"We have platform Opit. There we STEM teachers can share materials (tests, works and so on) and discuss about important issues. Last autumn we got new home page for our school. There is yeat, nothing about our projects, maybe in autumn." Suvi Pelkonen

Even though locally established and safe platforms are mentioned as useful dissemination tools, one teacher still mentions that it has some limits when wanting to communicate more globally:

"I have a smartschool in my school. It's a comfortable platform, which has mail, forums, space for virtual classes...teachers also can manage all their teaching proccess through this platform.....but, if we want to communicate on the projects with students from different contry...it's better to use open & famous network like facebook or google blogs." Stella Magid

Another way to communicate project results for outside the school is to use the local press.

"Yes, we can't forget the traditional media. Local newspaper is a good channel to tell people about interesting events in schools. In our local regional newspaper there is a special page once a week dedicated to local municipalities. Very often schools publish information there. It's also a good way to tell shortly about ongoing projects. There are lots of parents and especially grandparents who don't use computers but they read the newspaper." Aiki Jõgeva

And

“My school has build a network with local newspapers and television to publish the school projects and events. It has been an excellent way of promoting the image of the school to the parents of our students. It is a way of facilitating the access to the local companies support for our projects, because they like to see their name associated to social interventions. [...]” Carlos Cunha

One teacher states that a good dissemination plan is maybe to combine both traditional and mass communication channels to reach out to other teachers on project results more efficiently:

“If to social media you add mass media, our results will be much better.” Svetlana Dotsenko

This thread has a total of 48 posts and 1049 views.

ii) Your experience

The thread ‘Success stories’ only had one sub-category, namely ‘Your experience’. Here teachers commented on how they disseminated the projects they are engaged in. The activates counted participation in fairs:

“At the end of the process we have a science fair in school. The teachers and the other students choose the most interesting projects. The chosen projects represent the school in the regional science fair and later in the national science fair.” Irma Ben Moshe;

Also theme days for local schools were mentioned:

“About the dissemination, we organize every year the so called "Let's do physics day" in which we invite the primary schools to our laboratory, and we have had invitations from many local schools to carry out our experiments.” Laura Polenta;

And the creation of a Facebook pages:

“We made a facebook page for project inGenious and a page with an associated group for Nanochannels .For Nanoyou we made a yahoo group with 12 schools from our area. Also we told about our project when we went in a visit in Bulgaria, Svisthov city at Dimitar Blagoev Secondary School.” Buican Mariana;

But also competitions to motivate teachers to do extraordinary school projects were suggested:

“In our town (this year) teachers could apply for a "reward" when they were doing projects like that, I think that's also nice way to encourage teachers to try something extra. Project I did with my colleague was teaching Math in specific groups and themes and involving expertees and we even were in local newspaper. So for all that we got some extra "paycheck" that was nice reward among other benefits, like children enjoying and learning by doing.” Tiina Kähärä

Finally also the establishment of a council with the specific purpose of making the sharing of knowledge and experience happen between teachers was mentioned as a good solution:

“Several times a year, science teachers in Croatia have councils where we share our experiences as examples of good practice. InGenious and this CoP is also a good start to communicate...” Željka Ninčević

This thread has a total of 24 posts and 360 views.

3.4. Research

The Research subject had three threads: ‘Useful examples of didactic research’, ‘Results communicated to teachers’ and ‘Ready-to-use outcome?’

i) Results communicated to teachers

The less participated thread of this category was the ‘Results communicated to teachers’.

Maria Isabel Hernandez made a post contextualizing the way that results of research are communicated to teachers, based on the DESIRE questionnaire responses of teachers. As a result, teachers often refer that professional associations of teachers and science societies have an important role on disseminating research results among teachers.

Teachers highlighted that it is very important for teachers learn about research projects results but at the same time teachers feel it is time-consuming to access and understand the project results. Teachers don’t want to lose too much time looking for information, because as mentioned by Kim Kjaer *“Time is an enemy”* or as Aiki Jõgeva states *“I think teachers would like to know more but they don't have enough time to read scientific journals. There must be easier ways to get informed. Maybe special websites?”*. Still it is not the lack of information that constrains from using new resources since *“The amount of new information is sometimes just terrifying.”* as Aiki Jõgeva later stated. This is also confirmed by Irma Ben Moshe *“[...] time is a very crucial parameter in teachers work. The daily routine don't always allow us to get updated and read professional materials.”*. It could therefore seem important that the teachers find ways to filter good and useful information quickly.

Teachers suggested different solutions to this:

“Another focus of science dissemination are the live science centres that organise meetings with scientists both Portuguese and from abroad. Science museums promote the dissemination of knowledge with teachers and students.” Carlos Cunha

And

“In our town we have science center Heureka. [...] Every school has a contact teacher for this science center as well and she/he will be informed about their new exhibitions and research and courses. Their exhibitions are very interesting and they also have labs and workshops where pupils can act and discover.” Tiina Kähärä

At the same time, teachers mentioned that science communities, teacher communities and a lot of web-sites promote good research results to teachers:

“[...]the teachers of our town are organized into sections according to their subjects. We meet regularly, usually once a month, with chemistry teachers. We organize student competitions, visit local enterprises and couple of times a year we invite lecturers to speak about some research topic. These activities are payed by local government. I find these lectures very useful.” Marika Eller

And

“We also have a web site for all science teachers supported by the Weizmann institute of Science, which is a well known worldwide science institute. In this web site teachers can find a lot of scientific and

pedagogical materials ready to use. Teachers can also ask questions in the forums and get answers.”

Irma Ben Moshe

Otherwise teachers get access to research results through the participation in congresses, conventions, training programs, seminars, etc. But more creative organised approaches are available in some countries like for examples radio and tv programmes for STEM teachers:

“In Estonia we have a special radio programme called Laboratory where scientists are invited to speak about their scientific research. There are also science news from all over the world. This programme is very informative and not too complicated. It can be re-listened later on the Internet so it's even possible to use parts of it in the class.” Aiki Jõgeva

“Teacher of Informatics in Estonia have a page in Facebook, where they share useful information and discuss results of researches also. Sometimes Tiger leap Foundation publishes results of research, which were ordered in Tallinn University by Tiger leap Foundation.” Svetlana Dotsenko

Using national communication channels:

“In Portugal, on the mathematics of basic education, there is the Association of Mathematics Teachers that provide workshops called "late afternoon" whose members communicate their results. Also, the Portuguese Society of Math makes a programe TV called "Isto é matemática" <http://www.youtube.com/user/istoematematica>” Teresa Salgueiro Xavier

It was referred that good materials and results of those projects are most of the times hard to find. Teachers shared links for scientific web pages with interesting materials. The most important conclusion is that each teacher appears to have 1-2 science channels the follow regularly to keep being updated on new research in general and new teaching materials from local, national or European level.

This thread has a total of 25 posts and 383 views.

i) Useful examples of didactic research

This thread asked to the results or ready-made materials teachers had made use of in their everyday work. Most teachers shared links to websites that they consider contains useful didactic research:

“I can give one example where teachers and researchers in universities work together to make good inquiry based teaching modules. I know because I'm involved in this project. On this web page you can find newsletters with more information: <http://www.profiles-project.eu/> [...] All European Academies has a working group of scientists for science education <http://www.allea.org/Pages/ALL/19/243.bGFuZz1FTkc.html>” Aiki Jõgeva;

One example from Finland:

“Here´s an example on Finnish eMagazine for children, it´s about STEM subjects, material, quizzes etc it´s quite fun, in Finnish tough. <http://www.ejippo.fi/>” Tiina Kähärä

And three from Portugal:

“An example from Portugal: <http://www.gazetadefisica.spf.pt/> and a very interesting European project: <http://www.compass-project.eu/>” Carlos Cunha

and

“in the discipline of mathematics exist, since the new math program of basic education 2007, materials to implement the tasks in the classroom. http://area.dgidc.min-edu.pt/materiais_NPMEB/home.htm”

Teresa Salgueiro Xavier

This thread has a total of 9 posts and 72 views.

ii) Ready-to-use outcome?

The outcome of research on education was mentioned as important for teachers but, often the outcomes are not ready-to-use why teachers have to spend time on adapting it to their classes. However, good examples were mentioned like the participation of scientists in seminars at schools:

“I try hard to bring to my class young researchers from the academy. For example few months ago we had a STEM teacher conference sponsored by the Jerusalem science museum. In this conference young scientists presented their research topics [...] I contacted these young scientists and they came to my class voluntarily and told the students about their projects and their relevance to daily life.” Irma Ben Moshe

and

“I think that researchers could come to school implement activities directly with our students. So they can improve them. In Portugal universities have an open day for students to carry out activities [...]”

Teresa Salgueiro Xavier

It was agreed by most teachers that didactic research is important and relevant since they *“are more connected with our everyday work at school”* Aiki Jõgeva. And it was stated by most teachers that it was important to base their practice on STEM education researches:

“I think that it will be good if teachers will base their practice on STEM education researches. [...] I did STEM educational research for M.sc degree when I was full- time teacher. It helps me both: teaching experience helps me in research field and reseach proccess helps me understand better teaching-learning process of STEM education. First, I want to advise for teachers to be participants in someone else researches and if they will like the process they can do the research by themself. Everybody will have benefits: students, teachers and academy.” Stella Magid

But still some teachers found it difficult to integrate didactic research materials in their classes since they are sometimes based on the use of IT:

“It is difficult to integrate new modern methods, at least in theory, the problem is the materials, the material base of modern IT components in implementing these methods, because the budget for education has always been low.” Lidia Ristea

One teacher mentions that evidence based teaching was essential to her and that it is not always necessary to invent or introduce sophisticated teaching materials to teach students about scientific methods:

“For me it is more important, that my students learn how research works. They learn this much easier in the example of "older" (also historical) findings, because this does not need that much basic

knowledge. So students can "relive" the process of getting the findings and so they really understand. For me, this is meant by evidence based teaching. In my opinion, this is much more sustainable than to try to explain them current scientific research." Daniela Schwarz

This thread has a total of 15 posts and 191 views.

4. Conclusion

The third online event was more participated than the previous events. The association between the DESIRE 3rd ODE and the inGenious CoP prove to be a good idea to promote teacher participation and involvement. On the six weeks of the event there were 275 posts and a total of 4826 views. However, not all questions were discussed into details. Some were more popular than others. It is difficult to identify if this situation indicates that the unpopular questions were (1) irrelevant for the teachers or (2) that they have just been overseen by coincidence. We could maybe have insisted more on taking up the ignored questions for discussion.

In the DESIRE project both a three days event and six week events format has been tested, maybe the next test could be something on the middle: 3 weeklong events. It is longer than 3 days, this means that teachers will have less stress with participating; it is shorter than 6 weeks and might help preventing demotivation and demobilization among teachers.

Under the subject 'Industry projects', teachers discussed how they communicate with the industry and what kind of collaboration they usually have with them. Teachers mentioned that they often visited factories but the effort and success mainly depended on the single teacher. Also the availability of the industries was mentioned as a problem. And it was suggested that to make industry-school collaboration work better it should be supported from a national policy level. The industry visits had the purposes of supporting the curriculum or the students' vocational training. While other teachers mentioned the visits are made to introduce students to different kinds of working fields.

Most teachers of the forum referred to industry visits in relation to older students but also some elementary teachers mentioned the importance of including elementary level to better show young students the connections between real life and school.

Several teachers mentioned that long term collaboration between schools and industries is better for a good outcome and a good way to establish high quality vocational schools. It was also mentioned that vocational and technical schools collaborations with industries is easier since companies often find an interest in trying to create contact to future employers at an early stage.

Finally some teachers suggested fairs and conventions as good places to find future industry partners.

In the 'European projects' category a good number of participants pointed out the difficulty they had to involve more teachers at their schools in participating or gain knowledge provided by EU projects. The most referred opinion was that it is very difficult to involve other teachers on the projects because they think that these projects increase their work. Some of the justifications given by teacher colleagues that rejected the involvement in European Projects were that it is more important for students to be prepared for exams or that students of sustain ages need more attention (12-15).

Another problem mentioned was that some teachers would not participate in European project because they felt they had an insufficient English level. One teacher suggested that it is possible to surpass language barriers by collaborating with English teachers.

Teachers posted links to resources, blogs and other internet places where useful materials for teaching can be found. The involvement in inGenious, e-twinning was mentioned by teachers as a good way to get knowledge on new projects. Many teachers mentioned Scientix as a good example of platforms online to promote information to teachers.

It was mentioned that schools should have ICT rooms to ensure their participation in European projects with students and that conferences and teachers training programs help disseminate information. One teacher stated that there are still no initiatives on how to gain information and teaching resources from national projects in other Europe countries.

Also teachers expressed that teaching materials are good when they motivate students. Suggestions on how to make results of projects attractive were in brief that they should be easy to find, related to the curricula of the students, easy to adapt to the reality of the student's and using ICT and cell phones.

The subject 'School projects', showed how teachers around Europe seems to use a lot of social networks to communicate, however the teachers have very different options about how useful and safe Facebook is for formal teaching and communication purposes . On the negative side teachers express concern for safety and refer to problems they have heard about when using Facebook for school purposes. But despite this most teachers seem to have positive experience with using Facebook for general dissemination of school activities but still it is not consider suitable for teaching purposes.

Also other social media platforms were mentioned as ways to communicate with the school community, for example the e-twinning platform, blog editors, youtube, Flickr, Twitter, etc.

Many teachers mention locally established and safe platforms as useful dissemination tools, one teacher still mentions that it has some limits when wanting to communicate to teachers outside the local community.

One teacher stated that a good dissemination plan is maybe to combine both traditional and mass communication channels.

When teachers commented on how they disseminated the projects they are engaged in the activates counted participation in fairs, theme days in local schools, creation of a Facebook pages, competitions to motivate teachers to do extraordinary school projects and the establishment of a council with the specific purpose of making the sharing of knowledge and experience happen between teachers.

The Research subject teachers highlighted that it is very important for teachers to learn about research projects results but at the same time teachers feel it is time-consuming to access and understand the project results. The problem is not lack of information but rather that it takes time to filter good and useful information quickly.

At the same time, teachers mentioned that science communities, teacher communities and a lot of web-sites promote good research results to teachers. Otherwise teachers get access to research results through the participation in congresses, conventions, training programs, seminars, etc. But

more creative organised approaches are available in some countries like for examples radio and tv programmes for STEM teachers.

Often the research and project results on education were not considered ready-to-use why teachers had to spend time on adapting it to their classes. However, good examples on how to learn to use new methods and materials were mentioned like the participation of scientists in seminars at schools.

Most teachers stated that it was important to base their practice on STEM education researches. Still some teachers found it difficult to integrate didactic research materials in their classes since they are sometimes based on the use of IT and this they find difficult to use.