The Joy of Learning
Enhancing Learning Experience - Improving Learning Quality
Proceedings of the European Distance and E-Learning Network 2013 Annual Conference
Oslo, 12-15 June, 2013
ISBN 978-963-89559-3-7

THE SCIENTIX OBSERVATORY: ONLINE COMMUNICATION CHANNELS WITH TEACHERS AND STUDENTS – BENEFITS, PROBLEMS AND RECOMMENDATIONS

Agueda Gras-Velazquez, Barbara Schwarzenbacher, Evita Tasiopoulou, Maite Debry, Mathilde Bargoin, European Schoolnet – EUN, Belgium, Irina Kudenko, Myscience, United Kingdom, Maria Isabel Hernández Rodríguez, Centre for Research in Science and Mathematics Education – Autonomus University of Barcelona, Spain

Abstract

Scientix, the European Commission's DG Research and Innovation's community for science education in Europe includes since January 2013 the Scientix Observatory which aims to provide short overviews on a number of topics related to Science education projects. This paper concentrates on the format, benefits and problems encountered in communities of practice (CoP) and chats carried out by four projects: inGenious, Xperimania V, DESIRE and FuturEnergia. While inGenious' CoP last six weeks, DESIRE's CoP are only three days long. When looking for answers to specific questions, the DESIRE format works better but requires the information to be completed by shorter events or face to face workshops. When tackling general topics, longer CoP open all the time and facilitated by teachers, ensure the participation of teachers. inGenious and Xperimania V chats have experts replying via audio, while the FuturEnergia answers from the experts provided in writing, are better for schools with older technical equipment. The most efficient chats are carried out with a maximum of two experts, address up to 20 classes (400 pupils) and the chats have associated either an additional activity (like a competition) or the transcript which furthermore serves as an additional teaching resource.

Introduction

Scientix, the community for science education in Europe, was created to facilitate regular dissemination and sharing of know-how and best practices in science education across the European Union. Scientix is open for teachers, researchers, policy makers, parents and anyone interested in science education. Scientix collects teaching materials and research reports from European science education projects financed by the European Union under the 6th and 7th Framework Programmes for Research and Technological Development (Directorate General Research), the Lifelong Learning Programme (Directorate General Education and Culture)

and various national initiatives (http://scientix.eu). Through a number of online and off-line services Scientix promotes a lively community for its users.

In order to help the development and dissemination of different science education projects Scientix has set up the Scientix observatory which provides on a regular basis short overviews on the state of play of different topics related to science education. These projects vary in duration, scope, audience and methodology, yet all of them include elements of e-learning and utilise various online technologies for education, communication, data collection and dissemination. This could provide a valuable insight into what e-learning methods work best and what conditions make them more likely to succeed in supporting science education in Europe.

We discuss here a sample of projects within the Scientix observatory, which despite their differences all use online communication as part of their educational activities with teachers (communities of practice) and/or students (chats). Since the projects differ in purpose, audience and structure, the online activities that they employ may also have very different themes, formats, timelines, participants and rules of engagement. We present here a few cases and draw some initial conclusions outlining the benefits and drawbacks associated with such online activities in each of the cases. A number of recommendations conclude the paper.

Sample projects

Four projects have been selected for this paper: inGenious, DESIRE, Xperimania V and FuturEnergia. We provide first an introduction to the projects and the chats / online events planned by each project.

inGenious

inGenious is the European Coordinating Body (ECB) in Science, Technology, Engineering and Mathematics (STEM) Education. It is a joint initiative launched by European Schoolnet and the European Roundtable of Industrialists (ERT) aiming to reinforce young European's interest in science education and careers and thus address anticipated future skills gaps within the European Union. Through a strategic partnership between major industries and Ministries of Education, inGenious has the objective of increasing the links between science education and careers, by involving up to 1,000 classrooms throughout Europe. With a grant of €8 million from the European Commission's 7th Framework Programme over a 3-year period, and the support of over 40 partners from 15 countries, inGenious is one of the largest and most strategic projects in science education undertaken in Europe (http://ingenious-science.eu).

ISBN 978-963-89559-3-7

The inGenious project provides multi-faceted support to school educators of STEM subjects, which includes face-to-face and online activities. Teachers have access to various classroom practices in STEM education that were developed in cooperation with European business partners, including 10 online chats. Teachers can also participate in 18 Communities of Practices that help them improve the quality of teaching and learning STEM in their schools

DESIRE

The European project DESIRE (Disseminating Educational Science, Innovation and Research in Europe) aims to develop models of diffusion and exploitation to improve the dissemination of science education projects results to teachers. The DESIRE project (http://desire.eun.org) is carried out by European Schoolnet together with INDIRE (Agenzia Nazionale per lo Sviluppo dell'Autonomia Scolastica), Universitat Autònoma de Barcelona, Dansk Naturvidenskabsformidling and Ecsite (The European Network of Science Centres and Museums) and is funded under the European Commission's Lifelong Learning Programme (DG Education and Culture).

To collect information on different dissemination methods used in public funded projects and assess their effectiveness, DESIRE invites a broad range of stakeholders to share their experiences via five Communities of Practice. The participants of these online activities include science teachers, STEM professionals, science project planners, policy-makers, organisers of science events and organisers of activities and expositions in museums.

Xperimania V

Concentrating on chemistry and physics, Xperimania aims to boost young people's interest in science, which is a priority for Europe to remain a knowledge-based economy fostering innovation. Xperimania helps students in secondary school classes (pupils aged 10-20) and their teachers to understand the wide variety of applications of chemistry, and to learn how this fascinating science has contributed to the development of many day-to-day items. By participating in different activities students receive a unique opportunity to stimulate their scientific and analytical skills (http://xperimania.net).

In the context of Xperimania V "TALK2US", financed by Appe (The Association of Petrochemicals Producers in Europe – Appe) and EPCA (the European Petrochemical Association), four online chats and mini competitions are being organized between October 2012 and May 2013 featuring a number of topics and experts.

ISBN 978-963-89559-3-7

FuturEnergia

Financed by Plastics Europe, FuturEnergia (http://www.futurenergia.org) is an educational initiative that aims to provide a neutral platform for discussion and debate on the benefits, pros and cons of materials that contribute towards energy efficiency.

FuturEnergia's programme includes hosting a number of online debates, calling out to high level experts and schools to discuss energy education by addressing issues such as energy savings, sustainable development, science education, environment, and innovation.

Communities of practice or Online Discussion Events

Both inGenious and DESIRE mentioned Communities of Practices (CoPs) in their programme of activities. CoPs are usually defined as a group of people who share a common interest and through the process of sharing information and experiences within the group, members learn from each other. Wegner (1998, 2006) explains that the topic or focus of interest of Communities are continually renegotiated by its members, implying a commitment to the domain, and are practitioners who develop a shared repertoire of resources.

The online events in projects like inGenious or DESIRE are rather "top-down" approaches with a pre-defined specific topic in which most participants have limited experience and thus, the relationships of mutual engagement in these events are not so common. Furthermore, the aim is to encourage the learning of all members of the community and not only to collect data (an aim stated by DESIRE, for example). For these reasons the CoP activities within the DESIRE project were re-named Online Discussion Events (ODEs) as the actual implementation of the activity did not correspond to a CoP from a theoretical point of view.

This terminology should have been used also in inGenious. Nevertheless, for sake of simplicity we will refer here to CoPs or ODEs depending on the project's choice of terminology.

CoP or ODE have the following characteristics in inGenious and DESIRE events.

inGenious

In the framework of the inGenious project the CoP were initially organized as online events lasting around six weeks each and based on collaboration between school and industry. Each CoP was led by an invited expert in the field, with a specific timetable for discussion over the 6 week period. The discussions were structured and led by the expert in forum format, and resulted in a report describing the conclusions of the CoP. The participants in the CoPs were teachers, teacher trainers, policy makers and other relevant stakeholders.

Each week of an inGenious CoP a different topic was introduced connected to the CoP's general theme. Every Monday and Thursday a specific subtopic and associated questions were revealed and served to guide the discussions. Every Sunday, the previous weeks' discussion

ISBN 978-963-89559-3-7

forums were closed as to recap the participation to the week's topics. The blunt of the moderation fell on the expert.

Two main problems were encountered:

1. experts not having enough time to answer all the participants' questions or knowledge on how to keep online discussions flowing;
2. reduced participation overall as it took a while for the CoP to be known to the teachers and by the time they joined the first weeks were closed and new visitors felt unsure about joining straight into weeks three or four, for example.

After 5 CoP following the structure described, the following changes were implemented for the new CoP:

1. The topics of weeks one to four were revealed from day one and left open throughout the six weeks.
2. No new topics were introduced during the last two weeks.
3. Two teachers were appointed as moderators / facilitators for each CoP.

The number of teachers that actively participated in the inGenious CoPs by the 4th of February 2013, the number of posts per CoP and visits received are presented in Table 1.

Table 1: Number of teachers participating actively in the inGenious CoP, posts and visits received.

CoP	Experts	Teachers	Posts	Views[1]	Avg[2]
Cycle 1					
Technology	FutureLab	27	151	7854	5.6
How to contact companies	Jet-Net	18	95	3171	5.3
Scratch and ICT	DGE	35	224	8102	6.4
Solving companies' problems	DNF	45	140	6753	3.1
Types of school-industry collaboration	NVHUS	21	82	1539	3.9
Cycle 2					
Future inGenious Activities	EUN	60	231	6267	3.9
Practices workshop	EUN / teachers	45	214	2372	4.8
Technological knowledge in the classroom	teachers	40	250	1735	6.3
Using Astronomy as an aid to teaching STEM[3]	Blackrock Castle Observatory	57	270	3474	4.7

As it can be seen, comparing the first CoP (Cycle 1) to the CoPs after the introduction of the changes described (Cycle 2) the average number of teachers that actively participated increased by over 70% as well as the number of posts left. On the other hand, the average number of visitors decreased by about 35%. The possible explanation would be that the topics were more specific and less relevant to the general teachers. Nevertheless, Cycle 2 CoPs showed a clear increase of active teachers, and fewer passive participants.

ISBN 978-963-89559-3-7

DESIRE

The ODEs in DESIRE are used to facilitate the sharing of experiences between participants in the project and were organised in five categories corresponding to the number of target groups, namely: project managers, teachers, policy-makers, organisers of science events and organisers of activities and expositions in museums. Four separated discussion events were to be organized per target group of 3-days each.

Partners tried different formats for the ODEs and exchanged experiences on the technology/methods used. For science event planners it was found that the LinkedIn community of professional was more efficient as more members of their target group were reachable through this channel. In the case of science museums representatives, after an unsuccessful three-day ODE based on forum discussions, the ODE was re-organised as two one-hour webinar sessions using Google Hangout as this fixed timeframe seemed more adapted than an open ODE in the DESIRE website.

The ODEs for teachers and project managers were carried out online using forums and achieved somewhat more success in terms of the initial DESIRE expectations. In Table 2 we show the number of participants that contributed with posts to the ODEs and the number of posts left. The ODEs were expected to bring between 15 and 20 participants each time and provide all the information required for the research to be carried out within the project on dissemination of science education projects. In this sense the project partners decided it was necessary to complete the data needed with face to face events. On the other hand, as it can be seen in Table 2, while the number of participants is lower in DESIRE than in inGenious, the average number of comments per participant is larger (6 comments / participant compared to the average 4.9 of inGenious). One should also note that DESIRE ODEs last only three days while inGenious CoPs six weeks.

Table 2: Number of teachers participating actively and posts submitted in the fours DESIRE ODEs.

ODE	Teachers	Posts	Avg[4]
1st Teachers' ODE	13	76	5.8
2nd Teachers' ODE	12	59	4.9
1st Project Managers ODE	12	91	7.6
2nd Project Managers ODE	6	33	5.5

ISBN 978-963-89559-3-7

Online chats

Online chats with students are part of the programmes of three projects inGenious, Xperimania V and FuturEnergia. These chats have either a slightly different format as we will show for inGenious vs FuturEnergia or have different additional activities associated with them, e.g. Xperimania V.

inGenious

During the inGenious project live online chats with representatives of industry, school guidance counsellors, etc, are organized. These chats display role models in industry, discuss career development in STEM and also other topics connected with working in STEM careers and STEM education. They provide pupils a more informed image of jobs and careers in this area. These chats consist of real-time, synchronous, online discussions between an expert in a particular topic and several classes of pupils. The information on each chat made available to schools before the event will include: topic of the chat, name of expert(s) and expertise; and one page description on the topic by the expert.

Schools are invited to register to the chat of their choice and prepare questions for the experts before the chat. During the chat, while the expert uses a microphone to reply, the audience types the questions. The questions then appear on the screens of all the participants and are answered by the expert(s). After each chat, a summary of the event is written up with the key lessons on the topic discussed and the type of questions asked by the pupils. Additionally, a link to the recorded event is made available for those that were not able to attend or for the teachers to carry out follow-up work with their classes.

Xperimania V

Xperimania V chats are organized the same way as the inGenious chats. Background reading and supporting materials (e.g. video) are prepared by the experts for the teachers and students to go through a few weeks before the chat. This way, students are able to inform themselves about the topic and prepare questions for the experts beforehand. The chats are led by one to three experts and last one and a half hours. During the chats, students/classes and the expert(s) connect to the online tool and communicate through it. Students are able to type their questions to the expert(s) which are visible to all the other participants as well. The expert(s)' answers are broadcast through a webcam including audio. A transcript of the chat is made available online during the weeks following the chat.

The main difference with the inGenious chats, are the competitions attached to the chats. Right after each chat, a competition is opened for one month where students are invited to submit a "lessons learned" document explaining how the corresponding chat fits into their curriculum, how it broadened their horizons, what they learned from the experience and how they could implement their learned lessons in their lives. For each competition a jury selects

ISBN 978-963-89559-3-7

the three winners who receive a prize, along with their teachers. The aim of the competitions is to help get the messages of the chats across and avoid them being isolated events.

FuturEnergia

The FuturEnergia chats are online activities which involve an expert and a group of selected schools which gather in an online chat room to discuss relevant themes. The chats are based on a set of related online resources that enable them to prepare and discuss the topic in the classroom and decide what questions they wish to ask during the session. In the FuturEnergia chats experts reply to pupils' questions in writing and neither audio nor webcam are available.

The main outcome of this activity is a chat transcript that is published on the website. The transcript allows website visitors to find out more about the topic and the online discussion. It can also be used as a teaching tool to support further discussion in the classrooms.

Overall results of the chats

Between March 2011 and the end of January 2013, 14 chats were organized within the three projects mentioned. In Table 3 we have summarized the total number of chats per project, the total number of attending teachers and classes, the average number classes per chat and the average number of students per chat assuming each class consists of 20 students. It is important to note both inGenious and Xperimania V target around 20 classes to participate per chat, while FuturEnergia prefers between 8 and 15. This is justified as it is quicker to reply to questions out loud than by typing the answer like is done in FuturEnergia. All three projects make sure to reply to a minimum of one question per school during the sessions, to prevent pupils' disappointment.

Table 3: Chats organized within the inGenious project (ECB), Xperimania V (XPV) and FuturEnergia (FE)

	Number	**Teachers**	**Avg[5]**	**Students[6]**
ECB	7	144	21	411
XPV	2	43	22	430
FE	5	69	14	276
Total	14	256	n/a	1117

Qualitative feedback received indicates that:

- A preference towards fully written chats in case of schools with low technical equipment (as audio and webcam require more bandwidth and better computers).
- The optimum number of experts per chat is two, preferably with complementary knowledge in order to avoid repeated answers and to ensure a reduced response time.
- An average of 25 questions are replied to per chat, so chats work better when the number of classes participating is not larger than 20.

ISBN 978-963-89559-3-7

- The technical problems increase if the participants are allowed control over their microphones. It is better to disable this option for participants.

Conclusions

It is generally difficult to ensure active participation in online events. In the case of Communities of Practice or Online Discussion Events for teachers, it is recommended to keep them running for a limited but considerable time (around one month) and to involve other teachers as facilitators. Experts should have the topics for the whole events well prepared in advance and be ready for very different and sometimes surprising questions from teachers. A different format worked best for the themed online discussion groups when specific answers from the participants were sought. In such cases a short-term focus group of maximum 2 hours could ensure the best outcome.

For chats, between 10 and 15 participants are recommended in the case of written chats and between 15 and 20 participants in the case of chats including audio and a webcam inputs. A maximum of two experts is sufficient in both cases. If the participants are students, allowing the use microphones by the participants could be detrimental and this practice should be strongly discouraged.

Further data will be obtained as more projects with chats and CoPs or ODEs are reviewed as part of the Scientix observatory, which will complement the results reported in this communication

Acknowledgements

The authors wish to thank the teachers Jukka Rahkonen, Tullia Urschitz and Carlos Cunha for showing us how the best way to encourage the participation of teachers in online events is to have other teachers as facilitators. inGenious (ECB) and Scientix are funded with support from the European Commission under Seventh Framework Programme (FP7). DESIRE has been funded with the support from the European Commission under the Lifelong Learning Programme. This publication reflects the views only of the authors. The Commission cannot be held responsible for any use which may be made of the information contained therein.

References

1. Wenger, E. (1998). Communities of Practice: Learning as a Social System. In *Systems Thinker*, *9(5)*.
2. Wenger, E. (2006). *Communities of practice a brief introduction.* Retrieved from http://www.ewenger.com/theory/communities_of_practice_intro.htm, 02 February 2 2013.

ISBN 978-963-89559-3-7

[1] Total number of views of the posts of each Communities of Practice (i.e. times the threads were read).
[2] Avg = Average number of posts per teacher
[3] CoP with two weeks to go still at the time of writing this paper
[4] Average number of posts per teacher
[5] Avg = average number of tclasses per chat
[6] Average number of pupils per chat, assuming 20 pupils per class/teacher.

ISBN 978-963-89559-3-7