Circles of Self-Education in Science: Innovative Methods to Mentor Talents

Posted on 2011-03-11 5:44 am by Tamas from Hungary

Category: Outreach to Marginalized Communities

Background:

Science education is on the decline in Hungary in an extremely rapid and alarming fashion and is on the decline around the world as well. Hungary used to have excellent traditions in science education, which produced, among others, J. von Neumann, E.P. Wigner, and E. Teller, each of whom had a major impact on our world by providing key contributions to computer science, nuclear reactors and national defense. Based on the still-remaining traditions of science education and also on innovative applications of modern, internet based communication tools, a new form of science club: circles of self-education in sciences is proposed. The model for such small networks of self-education in sciences, or Science Clubs, has been already proven to be effective, inspiring and successful in one particular location in Hungary. There are several other locations with similar or "resonant" traditions that can be revived and revitalized in the same manner.

The main goal of this proposal is to spread the example of a proven model from the local to a national level, engaging 5 new locations across Hungary. By capturing new experience and inspiring new talents, a new kind of educational experience can be generated, pulling together scientists, students, teachers and parents in weekly or biweekly activities related to science that can be also utilized for the international mentoring of talents, and providing inspiration, motivation, training, and promotion of science talent.

Project Description: We place emphasis on finding talent in remote, marginalized communities. We will organize Camps in small villages fighting for the survival of their schools in the face of low funding for local education, and Science Clubs in country towns where mentoring from active scientists is not yet organized.

Activities include weekly or bi-weekly meetings of science clubs in middle schools during the academic year and summer mentoring camps organized for the most active and dedicated students, scientists, and teachers. The science clubs will hold an average of 30 meetings during the academic year, while at the one-week mentoring camps about 35 topics will be covered during the summer. Nearly half of these topics are forseen to be covered by researchers, scientist, similar number of topics is presented and discussed by students, while teachers talk rarely, only at about 10-15 % of the time. However the clubs have teacher patrons who are present at each occasion and who encourage the students to find a topic of their own choice and interest and provide directions and material. Such science clubs also include a scientist patron who gives more detailed direction and whose network among fellow scientists is utilized to involve them – so they are the contact points between the Science Club and the world of science. Students prepare their topic for discussion using modern internet based resources and mentoring help from scientists and teachers.

By May-June 2011 we will find the location of 4-5 new Science Clubs. The funding cycle will start from September 2011 and lasts till August 2012, covering the academic year followed by Summer Camps in 2012.

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These science clubs are desired to be sustainable, so we are looking for all means to make that possible. We will base these clubs on volunteerism - 2011 is designated as the European Year of Volunteering. We will keep the expenses as low as reasonably possible. Three additional methods may be detailed in the 2nd round of evaluation.

The project will be implemented by US Alumni and supporting individuals, including professors, researchers, teachers and students, as well as by supporting institutions.

Participating US Alumni include

professors, Doctors of Hungarian Academy of Sciences:

Cs. Bagyinka (biophysics)
A. Csótó (physics)
T. Csörgő (physics, team leader)
D. Karátson (volcanology)
J. Kubassek (geography)
P. Gyarmati (mathematics,informatics)
K. Nagy (dentristry)
L. Nánai (physics)
P. G. Szalay (chemistry), currently in US
Á. Zsigmond (chemistry)

Team Members:

Researchers (with Ph.D):

F. Borondics (chemistry, currently in Canada)
B. Botos (climate, sustainable development)
M. Csanád (physics)
I. Fórizs (isotope geochemistry)
Á. Gali (physics)
E. Kirs (international law)
Gy. Kovács (intellectual proterty law)
J. Laczkó (mathematics and biology)
Gy. Jordán (geology)

marketing specialist, engineers, consultants:

A. Kecskeméti (marketing)
A. Nováki (environmental engineering)
E. Márton (architect, designer, in the US)

Ph.D students:
R. Vértesi (physics)

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Other partners include:

- professors, or Doctors of the Hungarian Academy of Sciences

P. Ábrahám (astronomy, physics)
I. Scheuring (biology)

- researchers with PhD.

G. G. Barnaföldi (physics)
P. Ódor (biology)
A. Ősi (paleontology)
V. Müller (biology)

- PhD. students with M.Sc.

M. Vargyas (physics)

- Medical Doctor:

T. Solymosi (physician)

- B.Sc student
J. Csörgő (math and chemistry)

- teachers

E. Császár, Kissné (mathematics, physics)
M. Kiss (math, physics, informatics)
A. Kormos, Nézőné (math, physics)
K. Kopasz (math, physics)
I. Pálinkás (English)
I. Szittyai (math, physics)

- middle school students
András Cs. (BerzeTÖK Science Club, Gyöngyös)
Martin B. (BerzeTÖK Science Club, Gyöngyös)

Institutions include

- Museums:

Hungarian Museum of Geography
Hungarian Museum of Natural History
- Research Institutes of the Hungarian Academy of Sciences

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Biological Research Center, Szeged
Inst. for Geochemical Research, Budapest
KFKI Research Inst. for Particle and Nuclear Physics, Budapest
Konkoly Observatory - Inst. for Astronomy
Research Inst. for Solid State Physics and Optics, Budapest

- Universities

ELTE University, Budapest (several departments and institutes)
Pázmány P. Catholic University, Budapest
Corvinus University, Budapest
University of Debrecen, Debrecen
University of Miskolc, Miskolc
University of Szeged, Szeged

- Consulting firms:

COWI Hungary Consulting and Planning Ltd, Budapest
QANDA Consuling, Budapest

- Supporting Middle Schools (secondary education institutions, for age group 14-18 years old)

Berze Middle School, Gyöngyös
Dobó Middle School, Eger
Németh László Middle and Primary School, Hódmezővásárhely
Ságvári Middle School, Szeged
Szilády Protestant Middle School, Kiskunhalas,

other middle Schools for example

and Radnóti Middle School, Szeged expressed their interest.

These discussions will be finalized in May-June 2011, new Science Clubs will start from September 2011.

Other supporting organization:

Hungarian Foundation for Innovation
(J. Pakucs, P. Závodszky)

Who will be affected :

at least 250 students, each several times!
at least 40 scientists, based on their availability 1-3 times,
5 patron scientistis several (20+ times)

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at least 10 teachers
about 5 patron teachers each about 50-60 times
About 5 middle schools (in 2011/12)

On the long run, the Hungarian middle school system may potentially be revitalized. After testing the model in Hungary we would like to explore its potential for international spreading. In particular we may relate this project to the activity of the Bill and Melynda Gates Foundation and the Harvard Think Tank on Educational Reform. This effort emphasizes the efficiency of smaller schools and merit based evaluation of the educational efforts. For reference of these activities in the US, see the interview with Bill Gates entitled "Gates seeks plans to better teachers", Wall Street Journal, March 23, 2011, p. 9 and "High-tech tools for change - Wide ranging think tank promotes educational innovation" (Harvard Gazette, April 1, 2011). As this note emphasizes, education is not just the school and we would like to include researchers and parents to the process of motivating self-education in sciences.

Region: Europe

Location: This is a country-wide project, with a pilot project going on successfully in Gyöngyös, Hungary, since 4 years. Now the goal is to strenghten it and to spread its best practices to 4-5 new locations, including middle/secondary schools in Eger, Hódmezővásárhely, Szeged and other locations.

It mixes good old traditions with modern communication tools. Trains scientists in communication with 14-18 years old students and teachers. Trains students and teachers in modern sciences and in web-based communication of science results. Utilizes web-based tools like archiving best presentations on youtube videos and talks in .ppt and .pdf files so that they could be used again by other science circle talks at different schools. These new educational channels will provide a local community that is educated and embedded to modern science and the tools and archives will useful for students at more remote locations too.

Innovation: For high level reports on one of the outcomes of the prototype science club, and its innovative nature, see the following article in the prestigeous Science Magazin and at the web-page of a US National Lab:

Science Magazin vol 331, no. 6014 p. 129 (2011)
http://www.sciencemag.org/content/331/6014/129.4.full?sid=da6b0100-5b46-45b3-a2fb-fc57aa5d4ae9

Quarks Matter at RHIC, feature story, Brookhaven National Laboratory, Upton, NY, USA, January 4, 2011:

http://www.bnl.gov/rhic/news2/news.asp?a=2175&t=today

Goals and Objectives: Some of these goals are quantitative, others are more qualitative but equally important. Quantitative objectives are:

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In every given Science Club, we plan to have about 25-30 annual meetings and a summer camp with 30-35 topical discussions. We expect that about 45 % of these topics will be presented by researchers including former State Alumni, while about 40 % of the talks and presentations will be done by students. The rest 15 % of the events will be covered by teachers or parents.

At each meeting of the Science Clubs, a list of attendants will be made, and at the end of the academic year, we will summarize how many students and teachers and researchers as well as how many parents attended these performances.

We will call attention to other forms of self-education in Science for example problem solving in the KöMaL or KöKéL journals for mathematics, physics and chemistry and we will give visibility in the Science Clubs for those students who are active. We also will monitor the number of students who attends the Science Club meetings. Out of the most important presentations, we will create youtube videos or other shared video contents and will create a database of these presentations. We will also monitor how many middle school students enroll to Universities on Science or Technology related subject. We also will monitor attendance in Summer Camp and participation in science contests at the appropriate age groups. However we will not monitor qualitative features that would require e.g. involvement of paid personnel like psychologists or so – the results should speak for themselves.

Outcomes: Outcomes also include coverage of this Clubs for Self-Education in Sciences in the media in local, national and global level. We will create a web-page where media reports are summarized. This will be done also based on voluntarism but also we may seek assistance from other supporting organizations to perform this task better.

A very important outcome is qualitative: namely we plant the culture of voluntarism and self-determination as well as readiness to absorb most modern scientific results to the Hungarian middle school system. Also we plan to create a friendly competition among the schools (who has the best program, who was the most active during the academic year, who had the best summer camp, who had the best student talk? Best researcher talk? Best teacher presentation? Best contribution from parents? Who has prepared the best home-page for the Science Club? Who contributed with the best on-line materials ? Etc etc. We actively involve each participant in the self-evaluation of the program at the end of the academic year.

We find a very strong and enthusiastic reaction from among the US Alumni community as well as from among the researchers and also the middle school teachers. We will determine at the end the share of each researcher /alumni participants i.e. the contribution to the generated merits.

Quantitative outcomes include the number of lectures, number of topics, number of attendants, number of new science clubs etc etc. However one of the most important Outcome will be the relative increase of students who start University in a science engineering, or technology related orientation, and also the increased participation

of students in science or engineering related competions and community activities.

We will also summarize how many times we have been covererd by the media, and if available the number of hits to the web-pages related to the topics of Science Clubs.

Timeline and activities:

No major change as compared to the first round of applications.
Preparations start in this academic year, BerzeTÖK Science Club goes on with the programs and its started youtube broadcasting programs and will have a summer camp in July 2011. Interested teachers /students are invited on their own, minimalized expense estimated about 10-15 kHUF/week, in order to get the feeling.
Funded activity will start from September 2011 if we pass the final selection,
If not we continue on our own resources.

Detailed Budget:

Here all in-kind contributions (rent for rooms, USD equivalent for the teaching expenses, offer of office space use of equipment etc) has to be quantified, it is in progress but not yet ready.

More ideas are still needed about public-private partnerships and possible involvement of parents.

Estimated Expenses:

In-country travel of scientists to science clubs:

4,000 USD

Operation of science clubs, compensation for teacher patrons:

15,000 USD

(30 meetings/club/year, 2 hours/meeting, 2 teachers/meeting, 25 USD/hour, 5 science clubs/country)

Science club summer camps:

15,000 USD

(3,000 USD/camp, 1 summer camp/club, 5 clubs.)

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This is an estimate, based on the experience that the summer camps provide about the same number of lectures and mentoring opportunities as do the annual weekly-biweekly meetings during the academic year, but this will be refined if we pass on to the second round of evaluation. Details are as follows:

About 60 participants (students + mentors) can be expected to show up at these camps, a support of 50 USD/participant corresponds to 3000 USD support request per camp. Students will be expected to contribute, too, at a rate of about 50 USD/student, to cover expenses related to their meals and basic accommodation as well as for the travel of their mentors, this is an important cost-sharing model working towards the sustainability of the project. These summer camps are recommended to be organized in small villages in a rural area, close to a small school that has a good reputation but fights for its survival. One of the goals is to give mentoring help and moral support to these schools, to their students as well as to their teachers. This arrangement also helps in keeping costs down. We will also encourage merit based primary school/middle school/private sector partnerships to support quality education initiatives in marginalized Hungarian communities.

Administration, web based management:

1,000 USD

Cost sharing is forseen to work as follows:

Supporting museums, research institutions and universities provide the salary for the professors and researchers who volunteer to visit Science Clubs.

The grant covers their travel expenses only.

Supporting middle schools provide the facilities and meeting places for the Science Clubs. The grant covers the extra time for participating teachers from those Schools.

Other supporting organizations assist in publicity and outreach to media and general public, in disseminating the results. The grant covers necessary project related administration costs for each item, in particular if bookkeeping of the expenses cannot be organized on a voluntary basis. Experience indicates that bookkeeping costs about 10% of the itemized costs above and is at present included in each itemized expense.

Students are expected to contribute to about 50% of the minimized costs of the summer camps.

Total Funding Requested: 35,000 USD

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