

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

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 today 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 very 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. In particular, we place emphasis on finding talent in remote, marginalized communities like small villages fighting for the survival of their schools in the face of low funding for local education, or like country towns without a mentoring help from a nearby university.

Project Description:

Activities include weekly or bi-weekly **meetings of science clubs** in middle schools, including scientists, students and scientists 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. In the model for these clubs, nearly half of these topics are covered by researchers, scientist, a littlebit less but similar number of topics is presented and discussed by students while teachers talk rarely, only at about 10-15 % of the time, based on current experience. 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. It is important is that the selection of the topics and the preparation of the talks can be based on recent news from popular science news portals, books, recent stories or events related to science and to common interest. The speakers prepare the topic for discussion using modern internet based resources and mentoring help from scientists and teachers, or they speak on a novel science related topic, or other relevant topic of their significant experience gained outside normal school hours. Teacher patrons have a very important role here to select those topics that are relevant to a science club meeting and encourage students dealing with these, while

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

other personalities who like to display ego should be discouraged. This can be achieved also by the inclusion of some discussions of recent interesting solutions to difficult math or physics problems or interesting logical puzzles in the warm-up, introductory 10-15 minutes of such a club meeting. Such sessions also call attention to such problem-solving contests that have very solid and great traditions in Hungary but whose popularity is on the decline unfortunately. These short presentations will also provide a forum for those who participate in these contests and who had a positive experience or high ranking in these competitions. So these students may share some of their problem-solving insights this way with others, after the competition or the deadline for solving the problem is over. Successful participants in national math and physics competitions may transmit some of the beauty of science this way to fellow students.

At the time of finalizing this proposal, for example, currently interesting and important topics for a Science Club student presentation could be the scientific background of an earthquake and that of the tsunami that devastated coast-lines in Japan and shocked the world. Such science clubs may discuss nuclear power plant safety and operation in the context of the Fukushima nuclear power plant accident. These topics could be covered by a volunteering student but also by a volunteering teacher or by one of the mentoring scientists at the Science Club, collecting information from the Internet and from experts, the preparation can be based on advice from the network of the participating scientists. So it is important these activities at such science clubs relate to **self-education**, based on **volunteering and partnering** participation by **scientists, students and teachers** and if possible parents too. They will encourage critical, and **educated thinking about topics of current interest**, creating a local community including scientists, teachers and possibly parents including talented and motivated students of the age group of 14-18 years old.

We will **encourage students** to take advantage of the tremendous number of resources that are available today **to explore science** on their own – a wealth of internet sites covering a myriad of topics, lots of youtube videos on funny but interesting scientific experiments for example, and many more interactive science museums that were around just a decade ago. We will call their attention to research opportunities available for their age group also but most importantly we plan to create a local community in their schools where the science topics of their interest and choice can be discussed and where they see several great examples and get mentoring help from their best teachers or scientists and where can start to develop their own contacts and small projects related to science. We also will encourage the archiving and disseminating their results for example by creating video channels where they can upload their own contributions and share these experiences with other science clubs around the country or with any interested person in the world. From time to time we also plan to invite notable individuals from arts, humanities, law or other areas of human endeavor to broaden the view of the Science Club members and to avoid a too narrow, specialist approach. Notably membership in these Clubs is expected to be free but based on merit and work.

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

This **project timeline** actually is continuous, current activity includes preparation of new science club locations, introductory meetings with students and teachers at new locations, and preparation for the summer camp of the Berze Science Club. The proposed funding cycle will start from September 2011 and lasts till August 2012, covering the academic year and the follow-up activities in Summer Camps. However, the activity of the science clubs is desired to be sustainable and continuous, so we are looking for several ways to make it possible. One is to base the clubs on volunteerism, especially given that 2011 is designated as the European Year of Volunteering. Second, we will make every effort to keep the expenses as low as possible. Third, we will carefully generate web-based archives of the talks and the presentations, which will be useful for education as well as for project monitoring and transparency. Fourth, we will develop a good relationship with local news and media and will inform them about significant events. Fifth, we aim to include parents as much as possible, and, if possible, we plan to form public/private partnerships, in order to make these clubs sustainable.

Who is involved in this project?:

Please list the alumni groups or individuals who will carry out the project (the implementers), those who will be affected by the project (the audience), and also any supporting individuals or organizations (partners). Indicate how the various parties will be involved. All projects must involve teams of at least 10 alumni of U.S. government-funded exchange programs by the closing of the submission period. Please list those names here; you can add members throughout the submission period which ends on March 13. (If a team member is under 18 years of age, please only list his/her first name and

The **project leader will be Tamás Csörgő**, a physicist, and a recipient of a Fulbright Advanced Research Award, a Fulbright Alumni Initiative Award and a Senior Leaders and Scholars Fellowship from the Hungarian American Enterprise Scholarship Fund. He volunteered to re-organized and mentor such a circle for self-education in science in his former middle school starting from 2006/2007, and based on the international recognition that some of the results of this project achieved, he proposes to spread this model now to several other locations in Hungary. He is the principal investigator of the PHENIX –Hungary team, which achieved landmark discoveries in hadron collider science, in a collaboration with Brookhaven National Laboratory, NY, US. He lives in a small village in Hungary where his former, excellent primary school fights for daily survival and funding, and his former middle school, where this science club idea was introduced, has difficulties to find resources for quality training. The manpower and the inspiration to run the science club is given, and since several years, excellence in science education has benefited from the volunteering of dedicated teachers and some help from scientists.

The core team consists of a mixture of scientists, professors, middle school teachers and students from middle school, currently involving 30 persons: 19 former US state alumni and 11 volunteering partners : scientists, students and teachers who are enthusiastic about this project. We expect that further alumni and also volunteering scientists and teachers will join this project as it grows, based on the first reactions to the proposals and contacts of the team leader. The project is already supported by four organizations, but their number is expected to increase as the project grows.

As requested, we list the team members in three groups: US alumni, and additional supporting individuals and organizations.

The following **US alumni individuals** will carry out this project:

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

country.)

- Cs. Bagyinka, biophysicist, Dr.Sci, Institute for Biophysics, Biological Research Center of the Hungarian Academy of Sciences, Szeged, Hungary
- F. Borondics, chemist, Ph.D, Research Institute for Solid State Physics and Optics of the Hungarian Academy of Sciences, Budapest, Hungary (Currently Staff Scientist at the Canadian Light Source, Adjunct Professor at the University of Saskatchewan)
- M. Csanád, physicist, Ph.D, Department of Atomic Physics, ELTE University, Budapest, Hungary
- A. Csótó, physicist, Ph.D, Dr. Sci, Department of Atomic Physics, ELTE University, Budapest, Hungary
- I. Fórizs, isotope geochemist, Ph.D, Institute for Geochemical Research, Hungarian Academy of Sciences, Budapest, Hungary
- Á. Gali, engineer, physicist, PhD, Research Institute for Solid State Physics and Optics of the Hungarian Academy of Sciences, Budapest, Hungary
- D. Karátson, volcanologist, Ph.D, Dr. Sci, Head, Department of Physical Geography, ELTE University, Budapest, Hungary
- A. Kecskeméti, freelance marketing specialist at Q&A Consulting, Budapest, Hungary
- E. Kirs, Ph.D, Dept. of International Law, Miskolc University, Miskolc, Hungary and Legal assistant, International Criminal Tribunal for the former Yugoslavia, ICTY, The Hague, The Netherlands
- Gy. Kovács, senior lecturer in law, Pázmány Péter Catholic University, Budapest, Hungary
- J. Kubassek, geographer, Ph.D, director, Hungarian Museum of Geography, Érd, Hungary
- P. Gyarmati, computer scientist, mathematician, Ph.D, Szentendre, Hungary
- Gy. Jordán, geologist, Ph.D, Institute for Geology, Hungarian Academy of Sciences, Budapest, Hungary
- K. Nagy, dentist, Ph.D, Dr. Sci, dean, Faculty for Dentistry, University of Szeged, Szeged, Hungary
- L. Nánai, Ph.D, Head, JGYPK Department of Physics, Szeged, Hungary
- Attila Nováki, environmental engineer, COWI Hungary Consulting and Planning Ltd., Budapest, Hungary
- E. Márton, architect and designer, guest lecturer, Moholy-Nagy University of Arts, currently not Hungarian resident, but regular visitor to Hungary
- P. G. Szalay, chemist, Ph.D., Dr. Sci, Department of Chemistry, ELTE University, Budapest, currently in Gainesville, FL, US as a HAESF Senior Leader and Scholar Fellow
- R. Vértesi, M.Sc. in physics, PhD student, University of Debrecen, researcher at KFKI Research Institute for Particle and Nuclear Physics of the Hungarian Academy of Sciences, Budapest, Hungary.
- Á. Zsigmond, chemist, Ph.D, Dr. Sci, University of Szeged, Szeged, Hungary

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

The following **supporting individuals** - who are, at present, not US alumni – will participate and contribute to carrying out this project:

- P. Ábrahám, PhD, Dr. Sci, astronomer and physicist, Director, Konkoly Observatory, Hungarian Academy of Sciences, Budapest, Hungary
- András Cs., student co-president, BerzeTÖK Science Club, Berze Middle School, Gyöngyös, Hungary
- G. G. Barnaföldi, physicist, Ph.D, KFKI Research Institute for Particle and Nuclear Physics, Hungarian Academy of Sciences, Budapest, Hungary
- J. Csörgő, former student president, BerzeTÖK Science Club, currently B.Sc. student at ELTE University, Budapest, Hungary
- Cs. E. Kissné, teacher of physics and mathematics, winner of Ericsson prize, teacher patron of BerzeTÖK Science Club, Berze Middle School, Gyöngyös, Hungary
- M. Kiss, teacher of physics, mathematics and informatics, winner of Ericsson prize, teacher patron of BerzeTÖK Science Club, Gyöngyös, Hungary
- Martin B., student co-president, BerzeTÖK Science Club, Berze Middle School, Gyöngyös, Hungary
- A. Nézőné Kormos, teacher of mathematics and physics, Dobó Middle School, Eger, Hungary
- P. Ódor, biologist, Ph.D, Institute of Ecology and Botany, Hungarian Academy of Sciences, Vácrátót, Hungary
- A. Ósi, geologist, paleontologist, PhD, Hungarian Museum of Science, head, research group on paleontology
- K. Kopasz, teacher of physics and methodology, Department of Physics, University of Szeged, Szeged, Hungary and teacher of physics, Ságvári Middle School, Szeged, Hungary
- M. Vargyas, M.Sc. student of physics, ELTE University, Budapest, Hungary
- T. Solymosi, M.D., freelance medical doctor, Budapest and Gyöngyös, Hungary
- I. Scheuring, PhD in physics, Dr. Sci in biology, Department of Taxonomy and Ecology of ELTE University, Budapest, Hungary
- I. Pálinkás, teacher of English, Dobó Middle School, Eger, Hungary

Supporting organizations include the following:

Hungarian Association for Innovation (dr. László Antos, representative)

Berze Middle School, Gyöngyös, (this is the model of the Science Clubs)

Dobó Middle School, Eger (confirmed location for a new Science Club)

Ságvári Middle School, Szeged, (confirmed for a new Science Club)

Other organizations are being contacted and will be added as the project develops, including further science clubs e.g from Békéscsaba, Budapest, Hódmezővásárhely

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

and Kiskunhalas. We also will contact all the schools that hosted a lecture of the “Meet the Scientist” program, a joint activity of the Hungarian Association for Innovation, the Hungarian Fulbright Association and the US Embassy to Hungary.

Who will be affected by this project?

Our goal is to improve science education in Hungary by using the power of good examples for other schools, students and teachers and also by providing motivation and goals to access as well as to create on-line learning materials and networking possibilities. At present, we will try to move from one science club to five, but we hope to generate many more in the long term.

Directly affected will be the members of these science clubs, including estimated number of at least 250 talented students who will be exposed to regular, weekly or bi-weekly talks from scientists, by their fellow students, and/or from their teachers. Basically, this is an exploration of how well the method that worked in one location successfully can be transplanted and applied at other locations.

If successful, the method can be utilized on the Hungarian national level in middle and primary schools, spreading not only the culture of science but also the culture of self-determination and volunteerism, and if its improved version will work on the Hungarian scale it is likely that it can be also a model internationally for finding, inspiring and mentoring students who are talented in sciences.

(This part has a maximum of 3500 characters, has to be shortened – but for now I keep it here as it can be useful in the second round of the evaluation.)

Region: Europe

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

Innovation: The project 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, and utilizes web-based tools like archiving best presentations on youtube videos and talks in .ppt and .pdf files so that they can be used again by other science circle talks at different schools. These new educational channels will provide a local community that is inspired by, educated in, and embedded in modern science. The tools and archives will be useful for students at more remote locations too.

For high level reports on one of the outcomes of the model BerzeTÖK Science Club, see:

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

Subatomic Shuffle, 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 of Brookhaven National Laboratory, January 4, 2011:

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

Travel of scientists inside Hungary to science clubs: 4,000 USD

(We will make an effort to find scientists as close to these Science clubs as possible to reduce travel expenses)

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

(3000 USD/camp, 1 summer camp/club, 5 clubs).

Estimated Expenses: This estimate is 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 further if we pass on to the second round of evaluation.

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. 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. We will also encourage merit based primary school/middle school/private sector partnerships to support quality education initiatives in marginalized Hungarian communities.

Total Funding
Requested:

35,000 USD