

# How to start and develop a nationwide research organization for high school students?

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**Abstract.** This chapter summarizes my experiences in establishing and developing the Hungarian research student organization ([www.kutdiak.hu](http://www.kutdiak.hu)) in the last ten years. The chapter lists the basic conditions, which are necessary to establish such an initiative, and details the most important steps of development. I am happy to see that similar organizations have been started in several European countries, and there are plans for the adaptation of the program outside Europe. I hope that the experiences outlined here help to avoid a few mistakes I did and suggest a few good solutions in the process.

**Keywords.** Research practice, high school students, mentors, networking

## Introduction

I have established an initiative to provide research opportunities for high school students in leading Hungarian scientific teams in 1996 ([www.kutdiak.hu](http://www.kutdiak.hu)). During the last decade the initiative grew to an international endeavor ([www.nyex.info](http://www.nyex.info)), which was awarded by the Descartes Award of the European Union, and is adapted now in a growing number of countries. This success made it necessary to pinpoint a few steps and features, which are important to establish such a movement elsewhere. The current summary is an attempt to give a “know-how” for those, who wish to mobilize the good-will of their society in this way.

### 1. Why does your country need a scientific research program for high school students?

Science education is necessary for the recruitment of further generations for scientific research, and to grow a nation’s intellectual and economical potential in the long run. In this complex process a key point is the hands-on education of high school students, who are in a very susceptible age to ask clear questions about the world around them, and to

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seek answers in a methodological way, as science does. This age, between 14 and 19 is the age of self-test, where the adolescent tries his strength and capabilities. Scientific research provides a unique and unparalleled opportunity for outstanding achievements even in this young age. Science, unlike the usual school-contests, does not have limits. Science does not know “good answers”. There is always a new question, and a better, more complex view. Moreover, research training helps the social circles surrounding these students (schoolmates, family, relatives, etc.) understand science, and breaks the alienation from scientific research in a significant part of the society. A properly organized science education project time-to-time moves the talented student out of the original environment, helps social mobility, and gives a network of important contacts to the young scientists at a very early point. Moreover, research conferences and camps give friends with equal capabilities to these unique students, who remain often lonely in their original environment. This gives a better chance to educate the students to learn team-building and leadership roles, which are necessary for later success, but are often very difficult parts of talent-enrichment projects. Students of the described scientific research training projects may be successful scientists, which helps innovations in your country. However, they may become successful businesspersons, politicians or members of the media. In all these places they will remember on the excitement of science, help it, and will use the wide contacts they established early on.

## 2. What is the essence of the project?

The project

- offers scientific research opportunities for high school students in top research teams of the country free of charge;
- builds on motivation and not on previous excellence, IQ, or results of any other tests (students may feel that by joining the project they became part of an elite, but they have to be aware that their excellence is based only on their continuous, high level work);
- offers the joy of science, but nothing else (no compensation money, etc.);
- gives a continuous support to enrolled students allowing them to present their findings in conferences, essay contests, web-site, journals, and helping them to establish a wide range of contacts and friendships;
- keeps a playful tone, builds on volunteer work, avoids any type of bureaucracy and allows multiple approaches;
- encourages and requires the self-organization of students;
- encourages the formation of teacher-student research teams in schools.

## 3. What do you need to start a high school research project?

**First: real and top science.** You need at least a few centers of real and high (international) level research work in your country. If you want to motivate talented students you can not do it with, pre-digested or second-hand science.

**Second: values.** You need at least a little circle in your society, where top level intellectual achievements are an important value. Without a support of such people, your energies might be exhausted before completing the first necessary steps. Societies, where at least a few top scientists accept the information of the public on their research as an essential part of their everyday conduct, have a major advantage to run such a project. Societies, where the best students are treated as special treasures of their high schools, and these students have special contests, programs and opportunities for their development also have a major advantage to run such a project.

**Third: starting network.** You need a critical mass of contacts to important persons in the scientific life/educational institutions of your country OR you need a couple of very good friends, who trust you and have these contacts.

**Fourth: seed money.** You need a donator (either governmental or private), who is willing to sacrifice approximately 5,000 to 20,000 USD to start the project, and to survive the first, critical year.

**Fifth: devotion.** You will need to sacrifice a lot of your time and energy to run the project for the first few years. You need a job, or a situation of your private life, where you can do this, without endangering your own existence or your family life.

#### **4. The first step: establishing the offer**

When you start the project, first you have to establish your offer to the future research students in the form of at least a few dozens of research opportunities, where top level scientists in universities, research institutions as well as top teachers in good high schools are accepting motivated and talented high school students as members of their team.

What are the properties of the initial offer of research opportunities?

- It should not be concentrated to one or a very few centers in the country, and at least a few opportunities have to be reasonably close to most schools.
- It should not be concentrated to one area of science, but should give a fairly even offer from social sciences, humanities, natural and life sciences.
- Only those mentors should be asked to contribute, who will participate as volunteers, and who are willing to accept students in their teams as members with equal rights. (Obviously mentors may establish standards to accept the newcomer high school student as member of the team. Entrance exams, apprentice periods are fully welcome and justified. However, there should be always a clear pathway to become a full member of the team regardless of the age and time spent there.)
- The opportunity should be free for the students: it should come as a gift acknowledging their special motivation and talent.

What are the first steps of network making?

- Convince a few “opinion-leaders” in the top scientific life of your country to support and to join the project. You may also want to convince a few central figures of high and unquestionable reputation (the president or king of your state, etc.) to accept patronage over the project.
- With these names already on your letter-head as supporters, ask a few dozens of scientist-friends (optimally from different areas of science and from different locations) to join as the first, founding mentors of the project by filling out a questionnaire similar to that of Table 1. Be sure to ask scientists from “both sides” whatever divides your country might have (political parties, tribal roots, different parts of the country, genders, values, etc.).
- With the first dozens of joined mentors as an initial list, make a “mass-mailing” to hundreds of top scientists in your country asking them to join. By this time you have to have a plan for the whole program, starting with the distribution-plan of the list of mentors and ending with an initial plan for regular contacts with your research students.

<p><b>Questionnaire for a database of “Research Opportunities for High School Students”</b></p>
<p><b>Name of contact person:</b> .....</p>
<p><b>Postal address, phone, fax, email, home-page:</b> .....</p>
<p><b>Research area:</b> (in 5 to 10 key words) .....</p>
<p>I agree that the above data will be published in the database of potential mentors and sent to talented high school students and their teachers as well as published at a username/password accessible form in the website &lt;www.....&gt; with the understanding, if a high school student approaches me I will either accept her/him, or direct her/him to another colleague, or to let her/him know that our team can not accept her/him at the moment.</p>
<p>(Signature)</p>
<p>*****</p>
<p>After filling the form out please send it back to:            Contact person's name: .....            Address: .....            Fax: .....            E-mail: .....@.....  <i>We would like to thank all your efforts and help!</i></p>

Table 1. Mentor questionnaire sample.

## 5. The second step: recruitment of the first students

When your offer has been established in the form of a list of at least a few dozens of mentors, you should start to recruit students to their mentors. For this first you have to assemble the list of mentors in form a book(let). With a proper introduction this will also give you an opportunity to raise money for further steps of the action. Parallel with this, you have to set up a home-page for the news of the program, and for an on-line registration of the students.

**Whom to give an access to the list of mentors?** The list of mentors should not be freely available to the public. This has three major reasons:

- First, with an open access you would loose your control to monitor the number of students and ask for more mentors, if necessary.
- Much more importantly, students have to feel that they need to do something to become a member of the project. They have to prove their self-esteem and motivation – in an easy way. We ask two simple questions from the students who wish to join: a.) Why do you feel that you are better than the average of your class? b.) Why do you want to pursue research? The first question will screen for those, who are mature enough to bear the frustrations of scientific research, and who are mature enough to accept the high standards of top science for individuality. We do not require “good answers” to these questions. All reasonable answers are accepted. If the student responded, the second screen comes. She/he gets the list of mentors and has to approach the mentor alone. We do not help. Help only comes, if the first attempt was unsuccessful, or if the student needs a mentor with an expertise, which is missing from the list. Students, who proved their motivation and talent previously by winning competitions, or by establishing their teachers’ high esteem, may be directly recruited to the project omitting the first screen. However, they also need to find their mentors alone. Parents are excluded from this process. If a mom or dad approaches us, we tell her or him: send you daughter or son.
- The recruitment process also helps to establish a database of students for future contacts. Research students should be informed approximately each second week on an interesting opportunity (research seminar, scholarship option, news on other students, etc.) by email and each half year by a traditional hard-copy mailing.

Spreading the news of the project:

- You should have an access to a complete mailing list of all high schools in our country. Preferably with names of the directors, or librarians. (Interestingly, librarians are often much better targets than directors: they do not throw a book to the trash...) You may put a simple, xeroxed poster besides the letter to the teachers telling them the essence of the project asking them to hang the poster at the school notice-boards. You may ask teachers to show the book to their students and ask the students to get back to us for their own copy. You may enclose a response-card with names and contact details of teachers, who accept to be a contact person for this opportunity at the school.
- You should collect as many lists of excellent students (contest winners, etc.) as possible and send them the list of mentors directly.
- You have to manage to put links to the web-site of the program to many science- and

- high-school related, popular web-sites of the country.
- You should make the growing student and teacher database interactive, asking students to send you names and contact addresses of proper teachers, and teachers to send you names and addresses of proper students in their neighborhood.
- Whoever approaches you, teacher or student, has to receive a prompt and encouraging response.

## 6. The third step: continuous support

After you received the contact details of more than a hundred students, you may start to ask them, if they wish to show the results of their research work. If more than a dozen responds with a “Yes!”, it is time to organize the first student conference of your movement. This may be in the form of a scientific conference, but may also happen as a part of a research camp. If a longer research camp is established, besides student lectures, you should give ample time for

- discussions with eminent scientists on their science, life and values (you may extend this circle to artists, priests, businesspersons, politicians, or media personalities being extremely cautious that our sample should be a morally unquestionable, unbiased, and top quality sample in each direction);
- discussions of the students with each other organizing many opportunities to get them together;
- to show the talents of participants other than science (sports, arts, etc.);
- to give a chance to discuss their personal problems with members of the camp with bigger experience (e.g. with young psychologists).

In all these events you have to keep a very delicate balance between a real scientific conference and a contest. This age will not tolerate a pure scientific meeting without any competition and excitement. On the other hand, too much emphasis on the contest part, strict evaluations, points, ranks will destroy the joy of science. You should give much time for discussions of the results, their faults and the future work.

Other – later – elements of continuous support may be:

- if the number of students grows, you may start to make a pyramid of conferences, starting with a regional conference, where the first one third goes to the national level, where the first third gets to the above research camp;
- you may initiate essay contests for those, who are not good in oral presentations;
- you may ask your mentors to organize scientific seminars either in their own place or by going to schools announcing the possibility to join to their team or other teams of the initiative;
- you may seek publication, and media opportunities for your best students;
- you may seek contacts with foreign research camps and conferences (see [www.nyex.info](http://www.nyex.info) for a list);
- you may encourage to form teacher-student research teams in schools;
- you may start a research student club to discuss the personal matters of students in a

regular way (this may be initiated by a Forum at the web-site).

### **7. The fourth step: the financial background**

If you reached the first student conference, you already have a regular flow of money transactions. This obviously can not be done from your pocket. The best way to solve the problem is to establish a foundation to support the action. This will also give an opportunity to ask financial support from the private sector, and to apply for local and international funds. In our case this step was necessary in the third year of the action.

### **8. The fifth step: the self-organization of the students**

After approximately five hundred to a thousand students the movement can not be maintained as a “hobby”. It needs a professional office as well as a democratic leadership. By this time you have enough students to initiate the establishment of a National Research Student Organization. Members of the organization should be only those research students, who made a significant research work, e.g. they already won at least some recognition in our research conferences. An appropriate place to ask the students to elect their leaders is the end of the research camp, when the best (in our case 80) students were together for a whole week, and got to know each other well enough to make a proper choice. We had extremely good experiences with the self-organization of our research students. They are fully responsible for the financial matters of the movement, and put an enormous volunteer work to establish the programs.

The maintenance of an office with a paid coordinator requires a magnitude higher amount of money than the initial sum (for us in Hungary 5000 students, 800 mentors and 800 teachers could be handled with a single coordinator and with 100,000 USD/year).

### **9. Closing Remarks**

After establishing the National Research Student Organization you may start to establish a similar organization for your research teachers. This is the time when you became big (and if things go well: rich) enough to maintain a wide range of international contacts (for help, please look for the web-site of the Network of Youth Excellence, [www.nyex.info](http://www.nyex.info)). Finally, you may also want to help our students to utilize their scientific findings and/or innovations by setting up an advisory service for patent applications and business contacts. With this I reached the point, where the Hungarian movement stands after ten years. For any questions please write to [csermelypeter@yahoo.com](mailto:csermelypeter@yahoo.com) Good luck in starting your own network!