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## **Mathematical Talent Support in Transylvania**

### **1. Introduction. Historic overview**

The processes of the last 20 years must be described briefly in order to present the talent support activities taking place in Transylvania and to build a wider approach and more accurate understanding.

There are long traditions of mathematics and mathematical talent support in secondary schools in Romania. The journal *Gazeta Matematică*<sup>1</sup>, designed for secondary school students, was founded in 1895 and has been edited by internationally recognised mathematicians for a long time. The *International Mathematical Olympiad*<sup>2</sup> was also established in 1959 based on initiatives from Romania (it was held in Romania in the first two years). Consequently, there was a rather strict admission system at the universities for a few years before and after the systemic change. That is why many Transylvanian secondary schools focused primarily on providing opportunities to their students for further studies. In that situation no special attention could be paid to competitions and in general talent development, although a small top team has always been organised around the Mathematics Gazette.

Since the systemic change, several initiatives were launched in talent support: individual clubs, regional newspapers and competitions were introduced with little or more success. After a few years, some of them have managed to become stable (still active) talent support workshops, whereas others ceased to exist or slowly disappeared.

### **2. Civil initiatives and their tests**

#### **2.1. Role of foundations and association assisting talent support**

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<sup>1</sup> *Gazeta Matematică* (Mathematics Gazette), edited by Societatea de Științe Matematice din România (Mathematics Society of Romania) and published in Bucharest, was the second mathematical journal after KöMaL (*Secondary School Mathematics and Physics Gazette*). (KöMaL was founded by Dániel Arany in 1893.)

<sup>2</sup> *International Mathematical Olympiad* (IMO)

At the beginning of the 1990s, numerous enterprises were launched with relatively low costs and low wages. Despite that, the enterprises assisted talent support in several small towns, as e.g., Heuréka Foundation<sup>3</sup> at Odorheiu Secuiesc (Székelyudvarhely) received lots of support, and therefore it had organised various clubs on a regular basis for several years. When the clubs organised by Heuréka Foundation in grammar schools stopped, the teachers of Tamási Áron Grammar School of Odorheiu Secuiesc (Székelyudvarhely) managed to continue the talent support activities with the support of local companies. In that environment there was no need for any organisation or organised talent support, because clubs could be operated and competitions could be organised locally very smoothly, due to personal relations.

Around the turn of the millennium, the economic situation was suitable for the establishment of various organisations by teachers involved in mathematical talent support. That is how the SimpleX Association<sup>4</sup> was founded by secondary school teachers of mathematics who had excelled in mathematical talent support for years. The members of the association teach in secondary schools of Miercurea Ciuc (Csíkszereda), Odorheiu Secuiesc (Székelyudvarhely), Tirgu Mures (Marosvásárhely) and Cluj (Kolozsvár) and are regularly involved in the organisation and implementation of various competitions and summer camps. The Farkas Gyula Association for Mathematics and Informatics<sup>5</sup> was established in Cluj under similar circumstances, as it was originally formed from the tutors of the Faculty of Mathematics and Informatics of Babeş-Bolyai University of Sciences.

## **2.2. Beginning and development of mathematics competitions**

Mathematics competitions have been organised for Hungarian students regularly since 1991. The *Székes Mikó competition* was organised in Sfantu Gheorghe (Sepsiszentgyörgy) in 1991, followed by *Márton Áron mathematics competition in Miercurea Ciuc (Csíkszereda)* in 1992

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<sup>3</sup> It began its mathematics talent support activities in Odorheiu Secuiesc (Székelyudvarhely) in 1995. At the beginning the foundation focused on the development of abilities of students in Forms 2--12 outside the school; later on it has extended its activities and prepared students also for university admission exams. Its students finished in top positions in numerous competitions and some of them continued their studies at universities.

<sup>4</sup> "The members of the association organised regular club meetings, created a higher level series of text books and various exercise books. They focused their activities on talent support in secondary schools, but they also organised activities for primary school students and university students." (Extract from the information of the *Hungarian Genius Portal* available at <http://geniuszportal.hu/taxonomy/term/15?q=node/3076>, downloaded on 02. 05. 2011.)

<sup>5</sup> "The association operates an IT scientific group (*Bittologatók szakkollégium*) where researchers and IT experts give presentations or presentation series on their activities and the *Farkas Gyula task resolving club*, the task-resolving activities of which are supplemented by a series of presentations. The association regularly organises talent support camps in the spring, provides research scholarships to students and supports joint teacher-student research programmes, with the help of which gifted students can join research prior to beginning their studies at universities." (Extract from the information of the *Hungarian Genius Portal*, available at <http://geniuszportal.hu/node/4199>, date of downloading 02. 05. 2011.)

and the *Bolyai János mathematics competition* in Odorheiu Secuiesc (Székelyudvarhely) in 1993.

The *Transylvanian Hungarian Mathematics Competition* (Hungarian abbreviation: EMMV) in its current form, supported and also officially recognised as a regional competition by the Romanian Ministry of Education, was the result of joint co-operation and enthusiasm. The competition was organised by Székely Mikó College of Sfântu Gheorghe (Sepsiszentgyörgy) for several years, however, it became a roaming competition again during the last five years. At the same time, Báthory István Grammar School of Cluj organised its competition *in memory of Radó Ferenc* each year between 1997 and 2007. In the first year, students in Forms 5--8 took part in the competition, and then the range of competitors gradually increased until the competition became the year-end competition of students in Forms 5--12.

Approximately 200 students take part in EMMV each year, and almost all secondary schools of Transylvania are invited to the competition. (In some districts, qualification rounds are organised, while in other districts entries can be made based on invitations.) In Transylvania, this competition is the qualifying competition for the *International Hungarian Mathematics Competition*<sup>6</sup> (Hungarian abbreviation: NMMV). Although EMMV is organised by different schools every year, the professional jury of the event generally consists of members who are outstanding experts in talent development in Transylvanian secondary schools and are not members of the local school. (Over the last five years, the juries have been dominated by members of SimpleX Association.)

In 2010, the 19<sup>th</sup> International Hungarian Mathematical Competition (organised by three Hungarian secondary schools of Satu Mare [Szatmárnémeti]: Kölcsey Ferenc Grammar School, Hám János Roman Catholic Theological Centre and Satu Mare Calvinist Grammar School) was finally officially recognised by the Ministry of Education of Romania. Thus, the students awarded in the competition, their teachers and institutions became eligible for special ministerial awards in the 2011 academic year. Another important feature of that competition was the composition of the competition committee, because all of its members were former competitors.

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<sup>6</sup> “The decision to organise a mathematics competition for secondary school students with Hungarian mother tongue was made at *Rátz László Roaming Conference* in Szeged, in 1991. The competition was first organised in 1992 and is attended by 200-300 secondary school students and teachers from the Carpathian Basin. The purpose of the competitions is not only to test the mathematical knowledge, but also to create a standard Hungarian mathematical terminology and to learn about the regions, culture, history and habits of Hungarians living in various countries”, states the Wikipedia Encyclopedia (available at [http://hu.wikipedia.org/wiki/Nemzetk%C3%B6zi\\_Magyar\\_Matematikai\\_Versenyt](http://hu.wikipedia.org/wiki/Nemzetk%C3%B6zi_Magyar_Matematikai_Versenyt), downloaded on 02. 05. 2011.).

### 3. Talent development outside the school. Clubs and camps

The mathematics club of Márton Áron Grammar School of Miercurea Ciuc (Csíkszereda) was established in 1992, simultaneously with the competitions and I was in charge of the club for four years: first I led the club for my fellow students as a competing student, and then I returned to my former school each week as a university student to present for the mathematics club. That club practice was also considered worth adapting by the Heuréka Foundation of Odorheiu Secuiesc (Székelyudvarhely) in 1996. The foundation supported a similar club at Tamás Áron Grammar School with my involvement. During the subsequent three years Tamás Áron Grammar School supported the club.

The members of the clubs held in the two towns (and those taking part in their continued activities) have turned into researchers, teachers, mathematicians or other experts operating in different fields. Some of them recall the atmosphere, activities and benefits of the former clubs as indicated below:

HAJNALKA CSAPÓ *teacher* : “Of course, the mathematics clubs meant a lot more than gaining additional mathematical knowledge, preparing for mathematical competitions, or resolving mathematical problems for sco-ops of ice cream... For me, personality development was the most long-term effect. As a secondary school student, most of my memorable moments related to the mathematics clubs as they determined my career choice: I have been teaching mathematics in the school which I had attended for 11 years, and I also regularly organise mathematics club meetings trying to keep up , the spirit of those memorable activities.

RÉKA FAZAKAS *trainee attorney* : “The regular afternoon meetings and the intensive studies, organised and led by members of the (current) Simplex Association equipped me with knowledge that is still effective and I am convinced that it will accompany me through my whole life and career. The meetings and competitions helped me develop a logical, yet creative and open approach, which helps me resolve problems in my work and in everyday life.”

GÉZA HEGYI *historian, physicist* : “The knowledge and skills obtained by practising mathematics proved to be very useful for me. Surprisingly, they were also helpful in my other speciality, history: the disciplined yet intuitive approach, learned in the mathematics club, the logical arguments and the requirement for regular proof, the understanding of the set theory

and topology methods often gave me an advantage, provided a new point of view and helped me grasp deeper correlations.”

Dr. Sándor KRISTÁLY *mathematician, researcher* : “Those activities were generally referred to as club work. I think that they were a lot more than classic mathematics studies. The work performed there was a real experience: in relation to each problem lots of brilliant ideas were suggested and we could win or offer sco-ops of “Pumukli” ice cream for the right solution. That activity did not have an official title at that time. These days it is referred to as the talent support activities of SimpleX Association. Obviously, what is important is not the title, but the fact that those working for the association perform their detective and teaching activities with the same enthusiasm as at the beginning of the 1990s. For the members of the SimpleX Association, in the past, winning various mathematics competitions was not an issue... It was almost obvious, because we arrived at various competitions with a huge arsenal of knowledge. It is worth taking a look at the “*International Hungarian Mathematics Competitions*” book edited by Sándorné Kántor and Sándor Kántor<sup>7</sup>. For many of us, the adventures/research in mathematics did not stop with the studies and competitions: they provided the indispensable initial impulse for us, based on which we got to like and made mathematics our way of living.”

Dr. Ágoston RÓTH *mathematician, researcher* : “With the healthy competition spirit gradually developed in the club, we have learned to cope with problems both individually and in groups. However, in relation to an especially difficult problem, a single or multiple invitation(s) to “Gondúzó” restaurant in Odorheiu Secuiesc (Székelyudvarhely), matching the degree of difficulty of the problem proved an excellent motivation factor.”

A summer mathematics camp, attended primarily by the most successful award winners of mathematics competitions, has been organised regularly since 1996 as a natural extension of the two mathematics clubs described above, and the summer camps organised by the Association of Hungarian Pedagogues in Romania<sup>8</sup> and Teleki Education Centre<sup>9</sup> as an award for the problem-solving column of *Matlap*<sup>10</sup> [Journal of Mathematics]. The most important specificities of those camps included team competition, application-centred activities and the diversity of alternative programmes: hikes, arts films, dance, play group, night swimming,

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<sup>7</sup> SÁNDORNÉ KÁNTOR, Sándor KÁNTOR, *International Hungarian Mathematics Competitions*, Stúdium Publishers, Debrecen, 1999.

<sup>8</sup> *Mathematics journal for youth*, a mathematics journal edited by Radó Ferenc Mathematics Society, published in Cluj.

<sup>9</sup> Professional interest protection and interest representation civil organisation of kindergarten, primary and secondary school teachers teaching in the Hungarian language.

<sup>10</sup> National methodology and training centre of the Association of Hungarian Pedagogues in Romania.

group games, etc. The technical activities of the camps are led by members of SimpleX Association, while the other expenses of the camp are funded from various applications and individual contributions.

The primary objective of the mathematics programme of the camp is to make students see mathematics not as a collection of a series of interpretation—thesis--application, but to experience it as a human activity, to understand the genetic development of mathematic terms and the process of development of the compactness of formalism. It means that most exercises approach a very specific problem from several aspects, e.g.:

- Why do we interpret the Möbius function as it is interpreted?
- What is in the background of completion tasks? [see Szilárd ANDRÁS, Örs NAGY, *Measuring with unscaled pots - algorithm versus chance*, Romania, 2010 (Electronic Journal of Mathematics and Technology 4).]
- How can we create any Poncelet polygon?
- To what extent can you generalise an elementary geometry problem?<sup>11</sup> Etc.

In general, two lessons are held each day (approximately 4 hours), and there is also 2-3 hours of group work. Sometimes a course leading into a special topic (e.g., code theory or differential equations) is embedded into the lessons. In addition, we also regularly organise logic play groups, where students can play, test and analyse metal and wooden mechanical puzzles, various three-dimensional puzzles (Happy Cube, Impuzzable) and other logical games (sometimes we also produce our own games according to our own ideas). The programme of each camp contains at least one interdisciplinarity lesson, and an activity based on experiment, for building a mathematical model of the analysed phenomenon. At the same time, group recreation organised mostly by the participants themselves is also an important aspect (e.g., hikes, dances, watching films and analyses). Each camp is closed with informal interviews, group and individual interviews, and questionnaires, through which we try to collect and analyse the feedback of the participants.

In 2010 the mathematics camp became a programme of the Association of Hungarian Pedagogues in Romania under the title of *Academy of Young Talents*. We managed to organise a camp during the academic year in several years, including also 2011, during the competition period. As a result, gifted students can take part in two intensive one-week camps. The first is a technical camp (based mainly on resolving problems), while the other is

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<sup>11</sup> The materials of several activities are contained in the book published by PRIMAS project (see later) (Szilárd ANDRÁS, Hajnalka CSAPÓ, Örs NAGY, Kinga SIPOS, Anna SOÓS, Judit SZILÁGYI, *Curiosity Driven Mathematics Teaching*, Státus Publishers, Miercurea Ciuc [Csíkszereda], 2010.), the electronic version of which will soon be available also on the project website and at [www.simplexportal.ro](http://www.simplexportal.ro).

dominated by application, and activities aimed primarily at individual research and enhancement of knowledge. In the last few years we managed to co-operate also with several European projects in relation to the camps. The most important of those projects were PRIMAS<sup>12</sup> (*Promoting Inquiry in Mathematics and Science Education Across Europe*) and DQME II<sup>13</sup> (*Developing Quality in Mathematics Education II*).

One of the specificities of the camps is that they are always attended by former competitors, university students and doctorate students, which modifies the conservative teacher-student relationship prevailing in most schools. It therefore represents a continuous shift in talent support in secondary school and at universities.

#### **4. Summary**

Since the systemic change there have been various mathematics talent support activities in Transylvania, depending on the opportunities, in which teachers of theoretical grammar schools played a dominant role.

A structure or, as referred to in the modern terminology, network, which can be referred to as an example of professional co-operation in many other regions of the world has developed genetically as the key point of an imaginary field, generated by needs and opportunities. I am convinced that if talent support development options increase in the subsequent years, all structures will adapt to that: the focus point will be shifted and new structures will develop. I sincerely hope that those changes will continue to be organic changes, serving essential goals.

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<sup>12</sup> A four-year project financed by the EU, which supports a shift in methodology of primary school and secondary school students all over Europe primarily in the field of interest-based learning in mathematics and natural sciences.

<sup>13</sup> Project financed by the EU, focusing on the development of the quality of mathematics teaching in Europe, and is also an experiment to teach mathematics based on international relations.

## Literature

SZILÁRD ANDRÁS, Hajnalka CSAPÓ, Örs NAGY, Kinga SIPOS, Anna SOÓS, Judit SZILÁGYI, *Kíváncsiságvezérelt matematikatanítás, (Curiosity Driven Mathematics Teaching)*, Státus Publishers, Miercurea Ciuc [Csíkszereda], 2010.

SZILÁRD ANDRÁS, Örs NAGY, *Measuring with unscaled pots - algorithm versus chance*, Romania, 2010 (Electronic Journal of Mathematics and Technology 4).

MIHÁLY BENCZE, *Erdélyi és nemzetközi magyar matematikai versenyek (Transylvanian and International Hungarian Mathematics Competitions) (1984-1997, 1997-2002, 2003-2008)*, Fulgur Publishers, Brassov, 1997 (2002, 2009).