

Mathematics is Poetry, NOT THE BOOGY MAN



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MATHEMATICAL HIGH SCHOOL

This is an elite school because its pupils acquire elite skills in mathematics, physics, astronomy, computer science and chemistry, which is confirmed by numerous medals won at the Mathematical Olympics

You can hear and see all of that if you socialise with pupils of the Mathematical High School in Belgrade for a couple of lunch breaks. This is a secondary school of particular national interest that this year celebrates 50 years of its existence. It is not a long existence. In Serbia there are many grammar schools, secondary and primary schools several times older the Mathematical High School, but it is impressive that already in the first decade of its existence this school acquired the reputation of being an elite place where one acquires elite knowledge in mathematics and natural sciences. Its pupils have always had elite knowledge, but not elite origins.

Today, the Belgrade Mathematics High School is well known not only in Serbia, but also in Oxford, Cambridge, at America's MIT and Moscow's Lomonosov, in Berlin, Beijing, Shanghai and other univer-

They look like most teenagers - yelling, laughing, fluttering short or long, flowing hair, torn jeans and backpacks on their backs. If you listened to their conversations, alongside the usual teenage "jargon" and jokes, you would also hear a number of algebraic, geometric and trigonometric expressions, and those of IT communication, discussions of stars and galaxies, and the chemical bonds of atoms and molecules jokingly explained as "love chemistry".

But these children, or newly emerged young men and women, are very different from their peers from other high schools - they are the owners of an enormous number of medals in international Olympic and regional competitions in mathematics, physics, computer science, astronomy and chemistry.

One of the all-time best pupils of this school if undoubtedly Teodor fon Burg, a young man who is currently completing his masters studies at Oxford University. He is the best young mathematician of all time at the Mathematical Olympics. He has won four golds and two silver medals, which has so far never been achieved during the 57-year history of the Olympic competition.

sity cities. And every year these universities accept at least two or three candidates from the Mathematical High School. Oxford a few years ago decided to hold an entire class from this school, but then only seven of them opted for this university.

- And this was not only the case with Oxford, but rather also some other universities. But not all stay. It is easy for our students to pass the entrance exams, but there are other reasons why they give up or postpone enrolment in such prestigious colleges – explains director of the high school Srđan Ognjanović, himself a former pupil of the school. - Many do not know, but practice shows, and our pupils themselves often point out, that it is much better to enter Mathematics, Electrical Engineering or a related faculty at the Belgrade University and complete basic studies here, only to then later go out into the world for specialisation and doctoral studies. The knowledge that we gain in our faculties is somewhat more compact, more powerful, and an excellent base for further work, which is not the case with all “well known” foreign colleges.

Director Ognjanović himself quotes the famous sentence about “educating our children for the wide world” and says:

- It's not exactly like that. That's more of an urban legend, but there was a generation, especially during the '90s, when up to 90 per cent of our students went to study abroad. They do leave now too, but it is not as massive, perhaps 35 to 40 per cent of graduates from this school. Others continue their education here in Belgrade at the colleges that suit them. But the problem arises when they finish university and wish to continue working or training primarily for doctoral studies. The conditions for working on doctorates here are very modest, and the chances of gaining employment if they did not select a call in the context of information technology are very slim. All software engineers in Serbia are mostly our pupils, not all of course. They quickly find employment, because at the moment there is a need for about 30,000 experts in information technology. All of our faculties train barely 1,000 per year. The others, who opt for another similar call, are all very smart, able to complete their studies quickly and with distinction, and then leave because there is no work or adequate jobs. They are now older, and want to get to know the world, to improve, to earn something.

The school's director adds that these departures are not necessarily terrible. On the contrary, they are somewhat necessary so that young people can learn how people live in other places and can improve themselves.

- It is in some way becoming a trend not only in our country - says Ognjanović. - Yesterday I spoke with the principle of an almost identical grammar school from Malmo in Sweden. He says that their pupils go out into the world, and some have begun to inquire about Belgrade. That is an unstoppable process, and nothing is surprising. Only Swedish pupils and young people differ

from ours, because after a few years of absence they tend to return to Sweden and give back to their country the best that they acquire. Our most educated young people, as a rule, remain where they initially go, or continue even further.

-This Problem cannot be solved by this school or the Belgrade University. It needs to be solved by the state, and the way to do that is very well known. Highly educated people with degrees and doctorates in the field of mathematical, physical and natural sciences have to work and be in serious production and financial systems, or at institutes and laboratories where science is not only taken seriously, but where their work is appreciated and supported by appropriate means. We all know how things are here - says Ognjanović. - We are a poor country; we do not have oil or sea mineral resources. The only thing we have are these young, smart and talented people, who, after training, we give as a gift to rich countries, but we do not receive any balance from those countries, any compensation from the rich.



This school is also known for high-quality teachers. A dozen of those who were once pupils of this school themselves, and who set off into the world to acquire doctoral degrees, have returned and are now working as teachers at the school

Taking IT power as an example, our interlocutor says that our bright young people take advantage of the moment and the world boom of the internet and information technologies, and that, without almost any government assistance and care, they succeeded within five or six years of dedicated and successful work to acquire foreign currency inflow into the country that exceeds raspberry or corn producers. And this applies only to Informatics and IT companies that are registered and whose foreign currency income is monitored. And there must be at least 30 to 40 per cent of those whose

existence we know nothing about, and who work here for employers all over the world, thanks to the internet and other communication technologies, and whose income we officially know nothing about.

- For us, as a country and society, it would be most beneficial if our educated, capable young people had stronger links with industry and

science in this country. Not all of them have to return, it is enough to cooperate. We have our scientists at CERN. So where would they come back to, when CERN is the only one of its kind in the world. And those from CERN have communication with the Institute of Physics, Mathematics and the School of Electrical Engineering. Today, you can work from anywhere in the world for employers across the globe. What would happen if hundreds of thousands of our experts in the world returned to Serbia? How would we take care of them, what money would we pay them with? What is disturbing is that our entrepreneurs and the economy, even as weak as it is, is showing no interest in achieving at least better communication and using the knowledge, experience and contacts that our young people have, all in order to develop their business, to strengthen the economy - indicates Dr Ognjenovic.

He immediately adds that the school maintains strong links with its students. For the past half a century, the Mathematical High School in Belgrade has educated about 7,000 students. More than 480 medals have been won at the International Mathematics Olympics - a figure that does not include medals from regional competitions of young mathematicians, physicists, chemists, computer scientists.... If it did, there would be more than 1,000 medals.

- It is often considered and I hear how medals are our goal. But that is not so. We are not athletes, for whom victories and medals are the objective. For us, they are confirmation of the knowledge and values of our students, proof that what we do and how we teach our children is valuable for their further development, professional and scientific training - insists Director Ognjanović.

- But we are proud of them and each medal is dear to us, because we know what kind of work from pupils and teachers is behind that.

- Interest among parents and children in becoming pupils of this high school is acknowledgement of our working method. At the beginning, exactly 50 years ago, there were only 56 entrants and the school operated as a three-year high school. Today, the Mathematical High School has six outposts in major cities in Serbia, and especially talented children are enrolled after sixth grade. There are plenty of summer programmes for children to expand their knowledge of mathematics and computer science, while parents often bring young children of preschool age to this school in order to develop their interest in these sciences from an early age.

The Mathematical High School, with its quality and the achievements of its pupils, stands shoulder-to-shoulder with the best gram-

mar schools of this kind in the world. But Dr Ognjanović modestly points out that the Russians and the Chinese are better, while the Japanese and Singaporeans also have strong education in these areas, as well as some Caucasus countries.

- I hope that we won't experience the same fate as Hungarians and Romanians. They had a strong mathematical grammar school,

but it had to be abolished when they entered the European Union. They were told that they do not have the need for such schools, nor to educate talented children and raise interest in the mathematical sciences through special schools. Bulgarians somehow managed to save their grammar school and I can freely say that this is an excellent school - says the director.

This school is also known for high-quality teachers. A dozen of those who were once pupils of this school themselves, and who set off into the world to acquire doctoral degrees, have returned and are now working as teachers in the school. Otherwise, mathematics professors do not have any special privileges or rewards compared with teachers in other schools. The salary of a Mathematics High School professor is the same as that of any high school teacher in Serbia. Each of the professors has at least several open invitations to transfer to a similar school abroad. However, they do not leave, because their love for the school, its teaching methods and pupils is really great. Our interlocutor was also invited by several different parties back in the day but, for him, leaving the school was not an option then and still isn't today.

- In an elite school, when it comes to education, it should be more expensive than other schools, but it is not, explains director Ognjanović. On the contrary, it's

cheaper than in any professional or vocational school, such as catering, agricultural or medical schools. They have expensive equipment, while all we require are computers, chalk and a blackboard. Books, professors and knowledge of our students are what matter to us. ■



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The Mathematical High School was founded in 1966. Its creator was Vojin Dajović, an academic and professor of the Faculty of Sciences. The school has evolved continuously and one of its most famous directors was Dr Milan Raspopović, who remained in the post for three decades. During that time, the Mathematical High School gained renown only in Serbia and the former Yugoslavia, but also throughout the world.