

From Russia with Math

Andre Toom

I am a Russian mathematician and teacher. For twenty years I did research and taught students at Moscow University. Three years ago I moved to the U.S. It is well-known that American culture includes various contributions from immigrants. What can we, Russian teachers, do for this country ? At first sight the answer is obvious: To do our best as teachers. But what is best ? Before discussing this, let me tell something about my background.

For a long time Russia had a paradoxical quality: there were very advanced intellectual subcultures, although as a whole it was (and remains) an ignorant, poor, non-democratic country. I became a mathematician due to my attendance of informal classes in mathematics at Moscow University for high school students. The main business of these classes was solving non-standard problems. There were no grades or certificates. Young as we were, we understood that we learned for real competence, not for bureaucratic records. We learned because it was interesting for us; the university students taught us because it was interesting for them and because they were inspired by their professors who were excellent mathematicians and did their best to educate people and disseminate culture. Every year there was a competition (called "olympiad") in solving problems. Every problem was new and unlike others and demanded a non-trivial idea and a rigorous proof to solve. In this way many original problems at various levels of difficulty were created. First as a student, then as a teacher, I became convinced that a teacher should challenge his students by giving them non-standard problems to solve.

When I came to America, my first experience of teaching was a course of algorithms to graduate students of Boston University, and it was very rewarding. I gave problems that needed thinking (some from the textbook, some of my own

invention) and my students were eager to solve them.

However, my habit to challenge my students caused a conflict when I started to teach undergraduates. Now I understand that there is a sharp difference between graduate and many undergraduate students in America; much sharper than in Russia, where most youngsters do not get into higher institutions. The subject I had to teach in that huge state university was called 'business calculus'; it was for students who wanted to go to a business school. Perhaps, the original idea was to teach students to apply mathematics to real life situations, but the actual course was much worse than that. The textbook looked impressive, but I could find absolutely no non-standard problems in it. In fact, every chapter contained a recipe, like in a cookbook, and problems did not go beyond its straightforward application. So, trying to make the course more interesting, I included several problems of my own invention on my first test. And it turned out so difficult that most of my students got very low points, complained about it, and so my habit of challenging my students became out of place. I had teaching assistants, which tried to help me, but every time I gave a non-standard problem, I had to explain to them how to solve it. So, although I did my best, as I understood it, and worked very hard as a lecturer, the department officials did not like my innovations, because they did not want to have trouble with those students who wanted to get a grade with minimal efforts. Some students were really interested in solving problems, but officials neglected them, because these students could not cause any trouble.

Other mathematicians from Russia tell about similar experiences. A friend of mine, who authored a collection of sophisticated "olympiad" mathematical problems in Russia, came to an American university and was asked to teach a group of students. He did his best as he understood it, but his students complained that he tried to teach them something new, while he was expected only to repeat some

old stuff. He still has no regular position.

The problems I describe are not specific to America. The only difference is that here the percentage of those who go to colleges is much higher than in any other country. Many college students are the first in their families to obtain a higher education. Their parents often lack understanding of what education is about. They anchor their aspirations and priorities to the bureaucratic form rather than to the substance of culture.

Some students just can not imagine that learning might have some intrinsic value, besides official graduation. Of course, nobody is born this way: all attitudes are results of social influences: those of parents, teachers etc. It is difficult to find an American counselor who says something like "this is interesting" or "this course will make you competent". What they typically say is: "this will give you so many points or semester hours".

Some people say that managers should pay more attention to grades and other records of those whom they hire. In fact managers pay too much attention to diplomas now. First and foremost they should care about actual competence of applicants. The reason why they do not seems to be that their own competence is too limited.

I believe that education in America is grossly misled by seeing schools as just another kind of business enterprises which should survive financially. This turns students into customers who "are always right" and teachers into servants (like waiters in restaurants), which have to serve what students order. There is no doubt that some students would like to order graduation as soon as possible with minimal learning. And if they get what they want, others have to follow their example not to find themselves outsiders. This may turn teaching into selling educational "indulgences" – until some new reformers will uprise against it.

Students who lack respect for culture are prone to dream of becoming rich by some

trick, without systematic work. They become easy prey of imposters who promise to "educate" them without spiritual growth or intellectual efforts, waste their most productive years for pseudo-learning and graduate with bombastic certificates, but without even the basic knowledge.

This country has many bright intellectuals, but unlike their Russian colleagues they do not consider it their duty to share their culture or disseminate respect for it. Most of them just avoid teaching without explaining why. It is like asking what was before, chicken or egg, to ask who discourages whom in this tit-for-tat: scholars who avoid teaching or students who learn for grades.

Now I can say what we, Russian teachers, can contribute to America: our vision of teaching, which is much more rewarding than the present tit-for-tat. And I hope that we will find students and institutions who need us such as we are.

Dr. Andre Toom is a Russian-born mathematician. Now he teaches at Incarnate Word College in San Antonio, Texas.