Meeting of Modern Science and School Physics: College for School Teachers of Physics in ICTP

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Science education in Russia

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SCIENCE EDUCATION IN RUSSIA

Trieste, 2011
The main landmarks of science education in Russia

- 1701 the first state educational institutions were organized: navigation, cannon and other ones
- Russian Academy of Sciences in Petersburg established in 1724
- in 1755 Moscow university was founded
- at the beginning of 19 century by M. Speranskyi reforms the education system was distributed by regions and locked on universities; three types of colleges were established: elementary, regional and provincial ones (gymnasium)
- 1872 – the year of foundation of Moscow polytechnic museum
As a result of two centuries development were obtained some positive results:

- There were 8 universities and about 20 technical colleges with more than 100,000 students.
- In elementary schools, gymnasiums and lyceums there were about 2 mln. Pupils.
- A number of Russian technical elaborations became world-renowned, Russian scientists and professors were famous, world recognized (such as Lobachevskyi, Mendeleev, Sechenov and many others).

However,

it had a number of serious shortcomings caused by socio-economic and political problems. Thus by 1914 70% of Russian population was illiterate so it distinguished Russia from leading western countries.
The following factors promoted the hitch to a peak of scientific knowledge:

1. Russian elite university education from the very beginning excelled by the profound thoroughness. Initially universities and gymnasiums were discerned as the necessary constituent part of Russian Academy of Sciences. Moreover, it is important that the absolute majority of famous Russian scientists taught in universities what promoted natural origination and quick maturization of scientific schools.

2. Gymnasium education (as well as in real colleges) had no analogs in European education and it meaningfully excelled the European ones by level of knowledge. Russian’s elite schools advantageously differed from usual European schools by the width of the scope of studied subjects and by the solidness of their learning. It was difficult to study in these schools, however, a result of "overloaded" school programs an erudition of pupils raised - they were potentially future scientists and inventors.

3. It is also necessary to point out about the unique practice of tens of university professors and pedagogues of leading technical institutions of Petersburg and Moscow who delivered popular lectures for schoolchildren and they also regularly held studies and seminars in gymnasiums and real colleges.
1958 - for the discovery and the interpretation of the Cherenkov effect
1962 - for his pioneering theories for condensed matter, especially liquid helium

L. D. Landau
1964 - for fundamental work in the field of quantum electronics, which has led to the construction of oscillators and amplifiers based on the maser-laser principle

N. G. Basov

A. M. Prokhorov
P. L. Kapitsa

1978 - for his basic inventions and discoveries in the area of low-temperature physics
Zh. I. Alferov

2000 - for developing semiconductor heterostructures used in high-speed- and optoelectronics
2003 - for pioneering contributions to the theory of superconductors and superfluids

A. A. Abrikosov

V. L. Ginzburg
2010 - for groundbreaking experiments regarding the two-dimensional material graphene
International Soros Science Education Program

Support for education in the fields of physics, chemistry, mathematics, biology and Earth sciences in Russia

1994 - 2005
Grants to Educators

Criteria of Selection

- **High School Teachers**
  The best teachers are selected by their students who are currently enrolled in colleges and universities (80,000 students polled annually)

- **Professors**
  - **Associate Professors**
  Evaluations are based on the citation index, teaching load, quantity and quality of publications (evaluated using impact factor of journals), and grants received. In all, there are approximately 20 indexes used for computerized selection
Olympiads
840,000 participants

High Schools
89 winners of int'l. Olympiads

Undergraduate
Students – 8,100

High School
Students

Associate Professors
and Professors

High School
Teachers

University

Graduate & Ph.D.
Students – 4,630

Professors
2,830

Associate
Professors
2,350

High School
Teachers – 27,000

Undergraduate,
Graduate and Ph.D.
Students

ISSEP Geography

45,000 grantees

840,000 Olympiad participants

2,600 locations and 5,400 high schools
Directions of Activities
Carried out by Laureates

- Conferences for High School Teachers
- Educational Journal
- Encyclopedia of Modern Natural Sciences
- Olympiads for High School Students
- Publishing of the best textbooks for High Schools
Conferences for High School Teachers

Professors lectured at 450 conferences for high school teachers carried out in 74 cities over the country.

High School Teachers participated in round-table discussions on current Core Curriculum for each discipline at these conferences.
Soros Professors wrote review articles on recent scientific achievements for high school, college and graduate students and teachers.

For 6 years 70 issues with 1,100 articles were published, total circulation (free of charge) is 2,000,000 journal copies. All high schools’ and universities’ libraries were receiving journal monthly.

There is a Georgian version of the SEJ.
Over **840,000** students in **3,500** high schools from **1,350** cities all over the countries solved problems in three rounds of Olympiad.
74 cities, where conferences were held
ALL-RUSSIAN CONTESTS OF HIGH SCHOOL TEACHERS
AWARD FOR EXTRAORDINARY ENDOWMENT IN SCIENCE EDUCATION

CONTESTS

TUTOR FOR FUTURE SCIENTIST

EDUCATOR OF A PUPIL

YOUNG TEACHER

NOMINATIONS OF TEACHERS

4 Laureats

363 Laureats

101 Laureats

30 Laureats
IN THIS NOMINATION TEACHERS-LAUREATS ARE NAMED BY THEIR PUPILS

MASSIVE POLLING OF STUDENTS, 53500 STUDENTS FROM 137 UNIVERSITIES AT 61 REGIONS OF RF
EVERY STUDENT DESIGNATES BEST SCIENCES TEACHER

COMPUTER ANALYSIS: DETERMINATION OF A NUMBER OF REFERENCES FOR EACH TEACHER

SELECTION: REVEALING TEACHERS WITH MAXIMUM REFERENCES

TAKING INTO ACCOUNT A TYPE OF LOCALITY
Distribution of laureates by the type of locality

- Cities of polling: 42%
- Village: 28%
- Town: 20%
- City: 10%
ALL LAUREATES 2005-2010

Chemistry  Biology  Mathematics  Physics

99  488  511  124
101  97  44  67

2005-2010

1  2  3  4  5  6