The impact of educational reform and categorization of scientific journals and scientists on physics in Serbia

Cite as: AIP Conference Proceedings **1517**, 146 (2013); https://doi.org/10.1063/1.4794262
Published Online: 28 February 2013

Mirjana Božić, **Milena** Davidović, **Agneš Kapor**, **Dragica** Knežević, **Milica Pavkov-**Hrvojević, **Nevena** Puač, **Ilija** Savić, **Maja** Stojanović, **and Tatjana** Marković-Topalović

The Impact of Educational Reform and Categorization of Scientific Journals and Scientists on Physics in Serbia

Mirjana Božić[a], Milena Davidović[b], Agneš Kapor[c], Dragica Knežević[d], Milica Pavkov-Hrvojević[c], Nevena Puač[e], Ilija Savić[e], Maja Stojanović[c], and Tatjana Marković-Topalović[f]

[a]*Institute of Physics, University of Belgrade;* [b]*Faculty of Civil Engineering, University of Belgrade;* [c]*Department of Physics, Faculty of Sciences, University of Novi Sad;* [d]*Faculty of Sciences, University of Kragujevac,* [e]*Serbian Physical Society;* [f]*Medical School, Šabac*

Abstract. The trend of the increasing participation and importance of female physicists in Serbia continues. Many women have taken leading position in research and faculty governance and are contributing significantly to educational reform and the improvement of physics education in the primary and secondary schools.

Keywords: women in physics, physics education, categorization of scientists, categorization of journals, Serbia
PACS: 01.40.-d; S 01.75.+m; 01.85.+f

MORE AND MORE FEMALE PHYSICISTS ARE LEADING IN RESEARCH AND HIGHER EDUCATION IN SERBIA

The increasing participation and importance of female physicists in Serbia reported at the 3rd IUPAP International Conference on Women in Physics in 2008 [1] has continued. Of the 31 physics projects approved for 2011–2014 funding by the Ministry of Education and Science, seven are led by women, among them:

- Maja Burić, professor in the Physics Faculty of Belgrade, leads the project "Physical implications of modified space-time." Her research fields are black holes and noncommutative field theory.
- Zorana Dohčević is leading the research on transport and optical properties of manganites with colossal magnetoresistance effect, wideband gap semiconductors, and nanometric nonoxide ceramics. She is currently engaged as a National Contact Point for nanoscience and nanotechnology in Serbia for the Seventh Framework Program (FP7).
- Two project leaders are young physicists under the age of 35 from the Institute of Physics, Belgrade. Nevena Puač is leading the research on radiofrequency plasmas and applications, in particular to treat wools and seeds. Dragana Jović is leading the research on optical solitons, vortices, and self-organized structures in photorefractive crystals.

In 2010 negotiations began for the Serbia membership in CERN. Many women are among the researchers who have spearheaded the country's involvement in CERN since 2003, collaborating in the ATLAS and Compact Muon Solenoid experiments at the Large Hadron Collider, as well as in grid computing projects. Ivanka Božović is conducting experimental research in the High Energy Physics (HEP) Group of the Institut Vinča, related to electroweak physics and precision measurements, in the framework of HEP collaborations at the Large Electron–Positron Collider, International Linear Collider, and ATLAS.

In the new leadership elected in 2010 at the University of Novi Sad Faculty of Sciences, one dean and three vice-deans are women. The vice-dean for International Cooperation and R&D is a physicist, Professor Milica Pavkov-Hrvojević. Pavkov- Hrvojević and Nevena Puač have been elected vice- president and secretary general, respectively, of the Serbian Physical Society. Mirjana Božić became a member of the Advisory Editorial Board of *Europhysics News* and of the Executive Board of the EPS Forum Physics and Society. At the XVIII Symposium of Condensed Matter Physics in Belgrade in April 2011, 33% of invited speakers were women.

CATEGORIZATION OF SCIENTIFIC JOURNALS AND SCIENTISTS

The Ministry of Education and Science, the main funding source of scientific research in Serbia, established numerical rules for the evaluation of researchers and their scientific results. All researchers are classified into one of six categories depending primarily on the number of papers she has published in Science Citation Index-listed journals. The salaries of scientists are determined more by their categories than by their scientific titles.

Women in Physics
AIP Conf. Proc. 1517, 146-147 (2013); doi: 10.1063/1.4794262

EDUCATION REFORM MARKED FIRST DECADE OF 21ST CENTURY

The percentage of women who earned BSc degrees in physics in Serbia is still greater than the percentage of men, but it has slowly decreased in recent years (Figure 1). Reform of higher education has been going on during the transitional period from the public to the private sector. Due to the spreading of market logic, there is tendency to marginalize physics courses. Students at all faculties of medicine in Serbia no longer take a general physics course, despite the fact that medical physics has become important in many countries. At many faculties, physics courses have become optional and most students do not choose to attend.

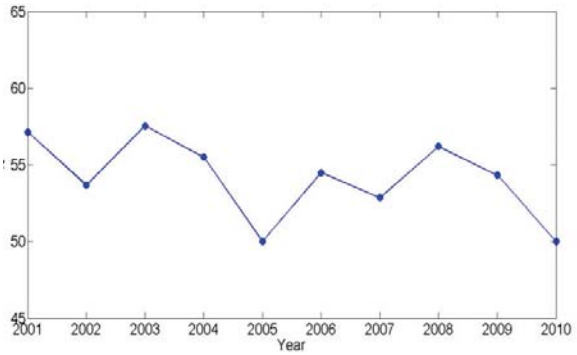

Figure 1. Percentage of women among students who earned BSc degrees at four physics departments in Serbia. from 2001 to 2010.

During education reform in Serbia, there was a tendency toward fewer physics lectures in secondary and grammar schools. Through the Belgrade Forum of Grammar schools, the Serbian Physical Society, teachers trade unions, and university physics departments, physicists have been opposing the tendency to marginalize physics in primary and secondary schools. One of the arguments has been that in the European Union, many educational projects were initiated with the aim of improving primary and secondary physics education and increasing students' interest in physics.

IMPROVING PHYSICS EDUCATION IN PRIMARY AND SECONDARY SCHOOLS

In Serbia women outnumber men as teachers (62% are women) in the primary and secondary schools. Many women are active in education reform, fighting for a better standing for physics in the curriculum. Until a few years ago, only one institution in Serbia was approved to publish textbooks. According to a new law, other publishers now have the right to publish textbooks. The Ministry of Education reviews and approves the textbooks to be used in schools. Recently, several female authors have written physics textbooks.

Nataša Čaluković, an inspiring physics teacher according to *Europhysics News* [2], was awarded the "Nagrada Grada Beograda" Prize of Belgrade for education in 2010. The Serbian Physical Society nominated her for the EPS Educational Prize for 2011. Leaders of Serbian teams at the International Junior Science Olympiads have most often been female physicists.

We believe that children's creativity should be encouraged and nurtured in and out of school. Children should experience and have access to a diverse range of cultural activities because these opportunities can enhance aspirations, achievements, and skills. Science fairs, explorer's nights, and physics talent searches attract the interest of both boys and girls.

Since 2010 many schools in Serbia have been participating in the European FP7 Fibonacci Project [3, 4], which promotes inquiry-based science education methods. A branch of this project, Greenwave, which started in 2011, attracted a lot of interest. Out of 12 regional coordinators in Serbia, 10 are female physics teachers [3]. Student observations and measurements of the signs of spring have been organized through a collaboration of teachers in junior and senior classes of primary schools and physics teachers in secondary schools.

Tatjana Marković-Topalović, a physics professor in the Medical School in Šabac, became famous in her town, and in all of Serbia, because she has been using classical and innovative methods to induce students to have an interest in learning physics. Thanks to her reputation as a professor and her communication abilities, the globe DING (Day and Night Globe) was erected in March 2011 in the Great Park in Šabac [5].

Last, but not least, the winner of the national FameLab competition for 2011 in Serbia was Mariana Jaškov, a physics student from Novi Sad, who won for explaining why the sky is blue and the clouds are white.

REFERENCES

1. A. Kapor et al., in *Women in Physics, 3rd IUPAP International Conference*, AIP Conference Proceedings 1119, New York: American Institute of Physics, 2009, pp. 163-164.
2. B. Cvetković and Z. Hadžibabić, "Nataša Čaluković, Inspiring Physics Teacher," *Europhysics News*, 41(2): 13-14, 2010.
3. Fibonacci Project website, http://fibonacci.uni-bayreuth.de/.
4. Rucka u Testu (Hands-On) website, http://rukautestu.vin.bg.ac.rs/.
5. T. Marković-Topalović and M. Božić, "Serbia Hosts Teachers' Seminar," *Physics Education*, 46: 365-367, 2011.