

## The Interdisciplinary Genius of Maria Skłodowska-Curie Inspiring an Original and Attractive Science Teaching Method

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*Motto*

*I'm one of those who believe  
that science is something  
very beautiful...*

Maria Skłodowska-Curie

There is no doubt that in the 21<sup>st</sup> century science and technology should have the most important role in development of our societies, as they are dominated and even driven by ideas and products from these domains [1]. However, as we know from comparative investigations in many countries, interest for science and technology studies is falling [2]. This lack of interest often manifest itself already at school level, where curricular choices are made. The question then arise: how to stimulate students' interest in science and the learning of science? Besides the variety of styles and approaches used in school practice, in this paper we propose to motivate students' science process skills by encouraging them to take a part in the interdisciplinary science projects competition.

Last year we celebrated the 100<sup>th</sup> anniversary of Maria Skłodowska-Curie, Pierre Curie and Henri Becquerel Nobel Prize in the field of physics awarded for investigation of the radioactivity phenomenon. Maria Skłodowska-Curie received the Second Nobel Prize in 1911<sup>th</sup> in the field of chemistry for separation of two new chemical elements: polonium and radium. Furthermore, from her private lesson notes we know, that she was one of the first science teachers who tried to apply the active methods in teaching process [3]. The science and teaching genius of this amazing woman was an inspiration for the Education of Physics Laboratory to organise the competition for an interdisciplinary educational project, addressed to Polish Students and their teachers, under the general title "Radioactive World". The organisers set to the participants the following tasks:

- to present the original and attractive types of teaching methods and techniques applied to the radioactivity issue,
- to integrate the science, literature, history and art teachers environment at schools, realised during the work on the interdisciplinary project,

- to stimulate the students' natural fascination on the technological and social aspects of science and motivate them to development of scientific process skills,
- to raise the local communities' knowledge about the problems concerned with the radioactivity, its applications and protection.

The Competition Committee received 44 projects from upper and lower secondary schools. Most of them engaged teachers of various disciplines including science subjects (physics, chemistry, biology), mathematics, computer science, literature, art, and history. The Committee awarded 15 projects which were the most valuable and their results were presented to the wide local community by press, radio and TV. A few examples of the innovative teaching methods from the best projects are presented below.

The laureate in the category of upper secondary schools a project titled "In the XIth Upper Secondary School in Wrocław we live in the Radioactive World", discover the presence of the radioactivity phenomenon in the whole world around us. During the project students were exploring the different spheres of life and knowledge: culture, technology, medicine and ecology to find the evidence of this fact. They prepared plenty of materials: posters, presentations (with the use of multimedia) and WWW pages illustrating the advantages and disadvantages connected with the existence of radioactivity in the environment. The teachers of various disciplines (e.g. chemistry, biology, physics, IT, history, literature and foreign languages) were realised interesting lessons connected with the theme of project.

Another awarded project "The People in the Radioactive World", completed in Tadeusz Kościuszko Upper Secondary School in Wieluń, gave emphasis for the students' own investigations of different kinds. One of these was an examination of the knowledge level concerned with the radioactivity phenomenon in the wide population of school Students, their families and teachers. The questionnaire examined an understanding

of the physical aspects of radioactivity, the threats connected with the radioactivity as the energy source and the use of radioactive materials in medicine and technology. The results of the questionnaire clearly showed the necessity of undertaking educational actions related to the radioactivity issues in the society, as it was stressed by Eijkelhof, [4]. The second area of Students investigations were the radioactivity measurements of natural sources (coal, ashes, furnace sludge, fertilizers, materials used in preparation of building construction materials) with the use of ICT based Geiger-Müller counter and discussion of the measurements results.

During the realisation of one of the best projects, completed in the 1<sup>st</sup> Upper Secondary School in Bolesławiec, students and teachers visited the near Świeradów Zdrój SPA health resort. One of its radon containing springs was given the name of Maria Skłodowska-Curie. Students collected the information about the radon therapy and observed the radon concentration measurements in laboratory of Świeradów. After the visit they had the opportunity to discuss the advantages and disadvantages of using the low ionising radiation doses in medicine.

In the majority of the awarded projects teachers applied innovative teaching methods like dramas, panel discussions with scientists and local authorities, visits to the scientific laboratories performing the ionising radiation measurements or observing the radiation therapy in medical physics laboratories in hospitals.

Students prepared their own web pages, animations of radioactive decays, posters and reports. The results of the projects were published in school and local press.

The most valuable competition materials e.g. lessons plans, PowerPoint presentations, posters, computer animations and WWW materials had been already presented at the conferences and workshops addressed to science teachers, published in the form of booklet [5] and are actually in preparation for the publication at our Laboratory web page as the resource, inspiring materials for the interesting lessons on radioactivity, alike to Maria Skłodowska-Curie lessons, which she was given to children in 1907 – 1908 in Paris [3].

### References

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