



Polish Chemical Society Annual Report to the EuCheMS Division of Chemical Education for 2014-2015

1. Abstract

In 2014/15, a number of activities promoting chemistry, increasing the level of knowledge and developing the skills of students and teachers were continued, following the scheme of the previous years (publishing magazines, conducting CoP and CoL, organizing conferences, science festivals, workshops, etc.). Interesting initiatives include a videoblog presenting spectacular chemical experiments.

A new format of the upper secondary school final exam was introduced. Universities will welcome now students who have completed chemical education in schools following a completely different curriculum than before.

Employers in the chemical industry gained influence on the university chemistry education curricula. Among other things, based on their recommendations, the emphasis on developing students' soft skills was increased.

The risk of disappearing research in chemistry education at Polish universities has become more and more real.

2. National educational policy

In 2014/2015, as a result of the curriculum reform, a new format of the upper secondary school final exam was introduced. In particular, the tasks of the 'Matura' exam in Chemistry aim to test:

- reasoning, argumentation and deduction skills,
- ability to use information from various sources,
- ability to design chemical experiments and interpret the results,
- ability to use mathematical tools for the description and analysis of phenomena and processes

This year, higher education institutions will welcome students who have completed chemistry education in schools following a curriculum completely different than before. They can be characterized by, among other things, much greater diversity of knowledge and skills than in the

previous years. Universities have attempted to adapt their training mode for first year students of bachelor degree studies to these changes.

Together with the recently introduced changes to the legislation concerning academic degrees and titles (basing the promotion on such parameters as h-index and journal impact factor), and a growing number of Polish universities obtaining European accreditation: The Chemistry of Quality EuroLabels[®], Eurobachelor[®], Euromaster[®], Doctorate EuroLabel[®], the possibility of obtaining the MSc, PhD and postdoctoral degree in Poland in chemistry education has been limited significantly (at some chemistry faculties, it is almost down to zero). The situation requires immediate and comprehensive corrective actions; otherwise, it will lead to closing or re-profiling of chemistry education departments, limiting research in the field and leaving the universities by scientists/researchers to work on other positions (in schools, publishing houses, etc.)

3. Events in chemical education

Various conferences, meetings, workshops for chemistry and science teachers took place in Poland, e.g. a training seminar "The 5th Chemical Experimental Workshops for Science Teachers: Nature as Seen by the Eyes of a Chemist – Ecology" (November 15, 2014, Warsaw), the 52nd Scientific Session of Science Teachers entitled "Problems of Contemporary Science Education and Possible Solutions" (June 2015, Krakow, approx. 100 participants)

Faculties of Chemistry at Polish universities have organised various events such as: the Science Festival, Night of Science, Children Universities and Universities of the Third Age, workshops and meetings for students, including for example:

- summer chemistry school for lower secondary school students, entitled "Become an Olympian" (September 25-29, 2014, at the Faculty of Chemistry of the University of Warsaw)
- a few-day-long "Outstanding Scientific School of Chemistry and Biology at the University of Warsaw" for the students of upper secondary schools of the city of Warsaw,
- Year-round workshops preparing upper secondary school students for final exams in chemistry (83 people, 67 hours of classes at the Jagiellonian University in Krakow)
- The 4th National Young Chemists Forum (September 4-7, 2014 at the Faculty of Chemistry of the University of Warsaw and the Faculty of Chemistry of the Warsaw University of Technology). Participation in the Forum allowed the upper secondary school students to present their own projects, develop their chemistry knowledge and skills, and exchange experience with students of similar interests from entire Poland.

Many chemistry competitions for secondary school students have been organized. They include for example: regional competitions, the 61st Chemistry Olympiad and E-ChemTest competition for upper secondary schools students, organized by the Faculty of Chemistry of the Jagiellonian University (EChemTest Center in Krakow, General Chemistry 1 & 2 tests). Two winners of the Polish national level competition took part in the international contest in Ljubljana organized by ECTN.

4. Activities of the Polish Chemical Society

The Educational Division meeting was organized in the framework of the 57th Annual Conference of the Polish Chemical Society held in Czestochowa in September 2014. Ten lower secondary school chemistry teachers received there the Zofia Matysikowa medals in September 2014. Regional branches of the PChS undertook a number of actions, partly listed in Item 3.

5. Publications (selected)

- Paweł Bernard, Iwona Maciejowska, Małgorzata Krzeczowska, Ewa Odrowąż '[Influence of In-service Teacher Training on their Opinions about IBSE](#)' *Procedia - Social and Behavioral Sciences* 2015, 177 pp. 88-99
- Karol Dudek, Paweł Bernard '[Polish lower and upper secondary school students' conceptions of a scientist](#)' *Problems of Education in the 21st Century* 2015; 63(63) pp. 40-52
- Iwona Maciejowska, Jan Apotheker, Raising youth awareness to Responsible Research and Innovation through Inquiry Based Science Education, *Annales Universitatis Paedagogicae Cracoviensis, Studia ad Didacticam Biologiae Pertinentia III*, ed. Katarzyna Potyrała, 2014, pp. 119-126
- Iwona Maciejowska, Ewa Odrowąż, IBSE for beginners (?) – a Polish case, *Science and Technology Education for the 21st Century. Research and Research Oriented Studies. Proceedings of the 9th IOSTE Symposium for Central and Eastern Europe*, ed. Martin Bilek, Hradec Kralove, Gaudeamus, 2014, 260-273

Since 1995, the Jagiellonian University has been publishing a quarterly for teachers entitled *Niedziałki*. Subsequent numbers include, among other things, articles presenting knowledge in the field of chemistry (including that on chemical processes occurring in the students' environment), methodological advice, lesson plans, questions from chemistry competitions for students.

6. Liaison with the chemical industry

The representatives of the chemical industry, as potential employers of chemistry graduates, are members of curriculum boards at chemistry-related faculties. Their task is for example to evaluate curricula and students' learning outcomes.

7. International and European initiatives

Numerous projects of EU programmes have been initiated (e.g. Erasmus plus, Tempus) or continued (FP7). The Jagiellonian University in Krakow (Department of Chemistry Education) has been participating in two FP7 projects: IRRESISTIBLE, the main objective of which is to introduce RRI issues to school practice, and SAILS, dealing with the issue of students' assessment in the context of IBSE. As part of those projects, CoL (Communities of Learners) and CoP (Communities

of Practice) have been operating systematically. The M. Skłodowska-Curie University in Lublin has just completed the PROFILES project (FP7). The Amgen Teach project has been implemented in Warsaw. It is another project promoting IBSE in Poland.

8. Other events and activities

In Poland, the qualifications to work as a chemistry teacher at school are acquired when preparing to work in the teacher's profession (MSc in chemistry). Starting from the academic year 2015/2016, at the Faculty of Chemistry of the University of Łódź a new major of study will be launched – Chemistry Teaching. These will be graduate studies.

At universities, projects of training raising the competence of chemistry students have been implemented. They focus not only on hard competencies (e.g. environmental monitoring using modern analytical techniques and chemometrics – University of Łódź), but on soft ones as well, e.g. communication, teamwork, project management, decision-making (Jagiellonian University).

A videoblog was launched, presenting spectacular chemical experiments <http://chemvlog.pl/>.

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