



**ESTONIAN
CHEMICAL
SOCIETY**



Estonian Chemical Society Annual Report to the EuCheMS Division of Chemical Education for 2018-2019

1. Abstract

Estonian representatives have been attending in major conferences in chemistry and science education. Several PhD projects related to chemical education are in the finalising process, one is defended and outcomes of those have been successfully implemented in updating school chemistry education. MSc programs in chemistry education at school level are offered by two Estonian universities. Unfortunately the number of students undertaking those programmes has decreased during the last years. As an outcome of the last curriculum reform, the number of chemistry lessons at upper secondary school was decreased and this may give negative influence on chemistry education. Estonian Chemistry Education community has started discussions to improve the situation. Estonian Chemistry Teachers Association is playing the major role in compiling position paper on this matter.

Several in service programmes (e.g. development of teaching materials) have been made available to chemistry teachers. Digital materials for chemistry teaching have been developed and evaluated by chemistry teachers community.

New courses in Chemistry education at BSc level have been introduced to students. Administering existing MOOC- for learning analytical chemistry is ongoing, more MOOC-s are in the process of development

Estonian Chemical Society organised celebrated 100 years of the society by launching scientific conference.

2. National educational policy

Chemistry education is provided in three universities: University of Tartu, Tallinn University of Technology and Tallinn University. Chemistry teachers are trained (at pre and in-service level) mainly in University of Tartu, Tallinn University is training science teachers for primary school, chemistry teachers are trained by individual programme. Since 2010, when new competency based curriculum was launched, the number of compulsory chemistry lessons at upper secondary level was decreased from 4 to 3 lessons during the upper secondary school years (at primary level 4 lessons over two years) To balance the decrease at upper secondary level, three optional courses in chemistry and one interdisciplinary (Science- Technology-Society) course is offered. Upper secondary school final examinations are divided into state examinations and the school examination. There is no state exam in chemistry. Usually students take school exam in chemistry or biology if they wish to continue at chemistry or in medical sciences at tertiary level. The faculty of medicine in the University of Tartu is the only one requiring exam in chemistry or biology Science faculty is only interviewing applicants, exam is not compulsory. Until 2019 chemistry exam was one of the options in science for grade 9 graduates. The Minister of Education has proposed to omit exams at that level. Science education community has expressed concern by writing joint position paper to Estonian government. Estonian Chemistry Teachers Association, Estonian Academy of Sciences, Estonian Chemical Societies, University of Tartu and Tallinn Technical University supported this paper.

Studies in chemistry at upper secondary level are supported by on line course materials. Teachers are reinforced to gain skills to develop on line teaching materials themselves.

Estonian Ministry of Education has introduced on line context based examination in science to provide formative feedback to students at the end of the different school levels: in case of chemistry education, this is playing role in grade 7, 9 and 12. This type of assessment has gone through several piloting stages. The leader of the team is University of Tartu, members of the team are formed by representatives of science teachers, who compiled the initial tasks.

3. Events in chemical education

a) Research in chemical education is coordinated by the Center of Science Education (prof. Miia Rannikmäe). Main directions are: rising students awareness about science related careers; paradigm shift in science (chemistry) education towards promoting wider competencies and scientific literacy among the students ; development of student motivational teaching materials in science (chemistry) education. New research is based on promoting core ideas in science and developing interdisciplinary strand maps for students use.

b) The staff of the Institute of Chemistry, University of Tartu is involved in:

- development of digital materials for upper secondary school on organic chemistry course, supported by Estonia Ministry of Education
- developing and updating 100+ experiments (videos) in Chemistry (Jaak Arold team leader);
- creating context based tasks for chemistry as an on line package (lead institution INNOVE),

- developing chemistry olympiade tasks and administering the olympiade at all levels (incl International):

- the exemplary tasks for school based examination in chemistry

c) The Center of Science Education, University of Tartu is the leader in :

- offering in service courses for science (chemistry) teachers on new trends in science (chemistry) education;

- in service courses for science (chemistry) teachers on context based assessment

-- supporting activities of Estonian Chemistry Teachers Association

d) Estonian Chemistry Teachers Association:

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4. Activities of the National Chemical Society

National Chemical Society has formed specialized committees advancing:

- chemical terminology in modern Estonian
- environmentally sustainable chemical technology
- chemical science and innovation
- chemical education

(Chairman Margus Lopp , Tallinn University of Technology; email: margus.lopp@ttu).
Estonian Chemistry Teachers Association (EACT) and association of Chemical Industries keep collaboration with National Chemical Society.

Estonian Chemical Society organised celebrated 100 years of the society by launching scientific conference. Over 100 participants, including international participants. Issues related to chemistry education at gymnasium level were introduced by Miia Rannikmäe

5. Publications

6. Liaison with the chemical industry

-Under Horizont 2020 project MultiCo „Promoting Youth Scientific Career Awareness and its Attractiveness through Multi-stakeholder Cooperation” , which partner is Center for Science Education of University of Tartu, cooperation between schools, university and industry (incl small scale industry) is taking place. The goal of the project was to rise young people awareness related to science related careers. Several visits to industry have been taken place and a range of teaching –learning materials have been developed. New project proposal has been submitted to EC,

- As during the previous years, around 30 teachers have been participating in an in-service course targeting visits to chemical industries, provided by the Center of Science education, University of Tartu

- Visits to chemical industries have been made part of science teacher pre service education programme in University of Tartu, furthermore all students are developing science career related teaching learning materials based on visits.

- Students Chemistry Quiz “ Colb” (organised by Indrek Viil & Aivar Vinne) awards for students and teacher`s is provided by chemical industries

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7. International and European initiatives

- Professor Ivo Leitto team continues offering Internationally recognised MOOC on learning analytical chemistry
- Estonian representatives participated in ECRICE 2018 in Warsaw
- Representatives of EACT and Centre of Science Education attended Horizont 2020 project MultiCo final conference in Joensuu.
- Estonian chemistry teachers attended in Baltic Chemistry teachers school in Lithuania, in 2018 EACT.

8. Other events and activities

Annual Conference of Estonian Chemistry Teachers Association highlighted issues in chemistry teaching, more attention was paid on global warming and gene technology. High level group of science educators was formed to work out strategies how to make chemistry teachers profession more popular. Estonia is lacking of gymnasium chemistry teachers, as the number of students undertaking MSc to become a chemistry teacher is low and there is no tendency to improve the situation.

9. Name of delegate and deputy

Professor Miia Rannikmäe

Head of the Center for Science Education, University of Tartu

10. Contact details of delegates.

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