



Slovensko kemijsko društvo
Slovenian Chemical Society

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Chemical Society Annual Report to the EuCheMS Division of Chemical Education for 2021-2022¹

1. Abstract

In the post pandemic times Slovenian chemical education returned to pre COVID times. At all levels of education students returned into school environment. There were no official changes in national educational policy in Slovenia. The process of changing lower and upper secondary school chemistry national curriculums is continuing. Centre KemikUm carried out experimental activities for primary, secondary and university students again, especially those needed for ERASMUS+ projects. As in previous years, a Commission for Chemical Education of Slovenian Chemical Society cooperated with ZOTKS, an organisation that organises chemical competitions for primary and secondary school students and they were part of the national chemical examinations. Some papers about chemical education research were published in Acta Chimica Slovenica.

2. National educational policy

There were no changes in national educational policy in Slovenia in the last year regarding chemistry education. A project (<https://www.zrss.si/objava/projekt-na-ma-poti>) supported by the European Structural and investment funds (https://www.eu-skladi.si/?set_language=en) Slovenian Ministry of Education, Science and Sport (<http://www.mizs.gov.si/en/>) led by National Education Institute Slovenia (<https://www.zrss.si/en/>) in cooperation with three major Universities in Slovenia (University of Ljubljana (<https://www.uni-lj.si/eng/>), University of Maribor (<https://www.um.si/en/Pages/default.aspx>) and University of Primorska (<https://www.upr.si/en>) who educate science teachers for primary and secondary school try to implement scientific literacy development activities into the curriculums from kindergarten to upper secondary school is coming to an end.

However, also a national group for reforming national chemistry curriculums for lower and upper secondary school is formed and a few online zoom meetings were held, but further development was not done due to the changing of Slovenian government. According to the

¹ July 2021-July 2022, all levels of chemistry education: primary, secondary schools, universities, LLL, general and vocational education.

analysis of national curriculums the reform will be done in the next few years. The exact plan is still unknown.

The COVID-19 situation got better, and new variants of SARS-CoV-2 virus caused milder symptoms most of the students of lower and upper secondary school finished their school year at schools. Distant learning was not an option anymore. Also, at the university level studying took place at the university f2f.

3. Events in chemical education

In the period from June 2021 to June 2022 Centre KemikUm organised again experimental workshops in the laboratory for primary and secondary students especially in the context of Erasmus+ projects. Slovenian teachers and their students participated at the 12th European Science on Stage festival, which took place from 24-27 March 2022 in Prague, Czech Republic. The activities will go on regarding participating of Centre KemikUm in the programme of European Researchers' Night in September 2022 which will involve presentations and experimental workshops for primary and secondary students in various parts of Slovenia.

4. Activities of the National Chemical Society

The Commission for Chemical Education of Slovenian Chemical Society with ZOTKS organised chemical competitions for primary and secondary school students in March, April and May 2022. This competition was organised in cooperation with University of Ljubljana, Faculty of Chemistry and Chemical Technology (they also prepare secondary school students for Chemical Olympiad) and Faculty of Education.

5. Publications

Slovenia Chemical Society publishes SCI journal Acta Chimica Slovenica ACS (<http://chem-soc.si/acta-chimica-slovenica>) – four issues per year. There is also a section Chemical Education Research in the journal and from the last report only one paper was published:

The Students' Perceptions Using 3DChemMol Molecular Editor for Construction and Editing of Molecular Models by *Danica Dolničar, Bojana Boh Podgornik, Vesna Ferk Savec* (Acta Chim. Slov. 2022, 69(1)) presented a study in which 54 university students were introduced to a newly developed, free, web-based 3DChemMol molecular editor with a toolbar, which they then evaluated. The tool aims to increase representational competence related to submicroscopic representations. Students who used the software for the first time, were instructed to create molecular models using the model building/editing tools in three activities with varying levels of difficulty: 1) building a simple model (butanoic acid), 2) converting one model (hexane) into two models, 3) converting from a non-cyclic to a cyclic structure (glucose). It took students from two up to 15 minutes to accomplish each of the activities. Several types

of help were available in the *3DChemMol* molecular editor toolbar to assist students during their activities, including a video tutorial, button hovering, action status display, and a help menu. Undo/redo and restart options were also available. Students' completion level, difficulties, and use of the help features were investigated using student self-evaluation questionnaires. The *3DChemMol* molecular editor proved to be a useful support for students in completing simple chemistry activities. Students were successful in model building, although they encountered some specific difficulties, especially in steps that involved spatial operations, such as rotating the selected part of molecule around the bond. In students' perception, the video tutorials were the preferred and most frequently used type of help, and the undo function was considered essential. The results suggest that the *3DChemMol* molecular editor can be used effectively in introductory chemistry courses at the tertiary level, whether for direct instruction, self-study, or other forms of support in the pedagogical process. The results and new findings of this study will be used to further optimize the interface in future versions of the evaluated tool.

6. Liaison with the chemical industry

Pharmaceutical industry in Slovenia (Lek and Krka) sponsor chemical competitions organised by ZOTKS (see above).

7. International and European initiatives

Members of the Commission for Chemical Education of Slovenian Chemical Society are active members of research groups of EU ERASMUS+ projects that are in progress at the moment. These projects are:

Online resources for Chemical Safety in Science Education (2020-1-SE01-KA201-077945); from 1. 9. 2020 to 31. 8. 2023; national coordinator: dr. Vesna Ferk Savec; coordinator: University of Stockholm, Sweden

Diversity in Science towards Social Inclusion – Non-formal Education in Science for Students` Diversity (DiSSI) (612103-EPP-1-2019-1-DE-EPPKA3-IPI-SOC-IN); from 1. 15. 2020 to 14. 1. 2023; national coordinator: dr. Iztok Devetak; coordinator: Ludwigsburg University of Education, Germany.

Development of Regional Joint Master Program in Maritime Environmental Protection and Management (619239-EPP-1-2020-1-ME-EPPKA2-CBHE-JP); from 15. 1. 2021 to 14. 1. 2024; national coordinator: dr. Vesna Ferk Savec; coordinator: University of Montenegro, Faculty of Maritime Studies Kotor, Montenegro.

8. Other events and activities

Member of the Commission for Chemical Education of Slovenian Chemical Society is a member of the chemistry national examination group. In school year 2021/22 chemistry was part of the subject that were tested at the end of the lower secondary school (4504 students aged 14 participated in the assessment). The average score students obtained was 46%.

9. Name of delegate and deputy

Delegate: Prof. Dr Iztok Devetak

Deputy: Prof. Dr Vesna Ferk Savec

10. Contact details of delegates.

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