



## CHEMISTRY EDUCATION IN THE BALKAN REGION: TRENDS, CHALLENGES AND OPPORTUNITIES

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According to the European Commission, education, science, technology, research and innovation are a prerequisite for achieving a sustainable EU economy. EU leaders have agreed to work towards a European Education Area by 2025 to take full advantage of education, training, and culture (EU, 2019). Scientific literacy takes center stage in major reforms in education and is often presented as a key goal of science education. This is due to the idea that scientific literacy could be a prerequisite for the economic survival and technological development of the society, at least if judged by the research based on correlations between large-scale international testing results and country's economic prosperity level (Hanushek & Woessmann, 2010). Chemical literacy presents a significant constituent part of scientific literacy, given that the use of various chemicals plays a vital role in our daily lives whether we are talking about food, medicine, clothing or climate change.

The action against social exclusion and poverty is of particular importance to countries of the Balkans, as mitigating poverty and social exclusion is one of the key challenges in this region (Džunić et al., 2015). Another challenge in education in the Balkans is the structure of the population in identity, culture and historicity, ethnicity, language and religion, which makes it interesting for educational research. Over the years, the Balkans region has been continuously struggling to attain a similar level of development as the majority of its neighboring countries. For this region to develop in terms of economic growth and social achievement, substantial reforms in education are needed.

Considering both the importance of chemical literacy and the current state of science education in countries of the Balkan region based on the results of international testing (OECD, 2007; 2010; 2013; 2016; 2019) it is clear that research on student learning of the topic is necessary and provides endless research opportunities.

Therefore, this special issue collects research papers that explore challenges and issues of teaching chemistry in countries of the Balkan region and propose methods to improve students' interest and motivation for learning chemistry. In this issue, five studies of researchers from four Balkan countries are described (Greece, Serbia, and Turkey). It is interesting to note that these studies included participants from all three levels of education. Researchers from Greece examined the influence of various factors on students' motivation to study chemistry and physics. Research conducted in Serbia took place in several directions: (I) the students' views on the application of one specific responder system in the teaching of chemistry were examined; (II) the effectiveness of the application of inquiry- and project-based learning on the development of entrepreneurship competencies were investigated; (III) the effectiveness of the context-based approach, which included interesting activities as



part of the field trip, was examined. Finally, a study conducted in Turkey dealt with chemistry textbooks and the features of the periodic table they contain.

Based on these contributions it is possible to draw several general conclusions. Namely, understanding some chemical concepts can be improved using context-based approach and special activities within it. Students' interest and motivation for learning chemistry can be improved by using mobile applications and responder systems as well as modern approaches to learning such as: particulate drawings, project teaching and inquiry-based teaching. In addition, research has shown that the academic experience gained during tertiary education had a huge effect in motivating students to learn chemistry or physics compared to those in secondary education. Interestingly, research has shown that teachers favor the use of chemistry textbooks with less detailed and simpler illustrations, although they like to show students illustrations with all the data first and later use more sequenced ones.

As directions of future research, it is recommended to apply effective techniques such as eye-tracking, planning more effective field trips and practical classes, in order to foster understanding of chemical concepts and increase students' motivation to learn chemistry. Increasing the number of respondents of different grades and classes in research will result in better and more valid results and it is certainly something that should also be pursued.

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