

RESEARCH-BASED DEVELOPMENT OF PRE-SERVICE CHEMISTRY TEACHERS' COMPETENCIES FOR THE IMPLEMENTATION OF THE CONTEXT-BASED APPROACH IN ORGANIC CHEMISTRY TEACHING

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Introduction

Context-based teaching approach represents an effective tool for promoting conceptual understanding and functionalization of organic chemistry knowledge (Putica & Trivić, 2016; Schwartz-Bloom *et al.*, 2011), which is why it is important to develop pre-service chemistry teachers' competencies for its implementation in organic chemistry teaching.

Methodology

Four pre-service teachers at Faculty of Chemistry, University of Belgrade, developed their context-based organic chemistry teaching competencies by means of experimental research. Each pre-service teacher conducted an experiment that compared the effectiveness of the context-based and the traditional teaching approach when it comes to promoting conceptual understanding and functionalization of the selected organic chemistry content. Within each of these experiments, the pre-service teachers developed context-based teaching materials for the students in the experimental group, the pre-test and the post-test. Unlike the pre-test which consisted of items that resembled regular textbook items, the post-test, which was used as an instrument for comparing the effectiveness of the two teaching approaches, consisted of items that required deep understanding and the application of the newly acquired organic chemistry knowledge in solving real-life problems.

Pre-service teacher A

The experiment was conducted within the elaboration of the teaching topic *Alcohols*, with third year grammar school students*. The academic content of this teaching topic was presented within various everyday life contexts. Given the students' age (the students were 17-18 years old), some of these contexts were the production of alcoholic beverages, as well as negative consequences of their overuse. The experiment encompassed 163 students, 81 students in the experimental and 82 students in the control group.

Pre-service teacher B & Pre-service B

The experiment was conducted within the elaboration of the teaching unit *Alkanes*, with eight grade elementary school students*. The academic content of this teaching unit was presented within various everyday life contexts. Given that teaching unit was elaborated during winter, the most prominent of these contexts was central heating. The experiment encompassed 74 students, 40 students in the experimental and 34 students in the control group.

Pre-service teacher C

The experiment was conducted within the elaboration of the teaching topic *Carboxylic acids and their derivatives*, with third year grammar school students*. The academic content of this teaching topic was presented within various everyday life contexts, as well as contexts of its application in various professions. The experiment encompassed 241 students, 118 students in the experimental and 123 students in the control group.

Pre-service teacher D

The experiment was conducted within the elaboration of the teaching topic *Carboxylic acids and their derivatives*, with third year grammar school students*. The academic content of this teaching topic was presented within various everyday life, as well as history of chemistry contexts. The experiment encompassed 114 students, 58 students in the experimental and 56 students in the control group.

*each school issued a written permission for the experiment to be conducted; all students that participated in the experiments were volunteers

Results and Conclusions

Within each of the experiments, the students in the experimental group achieved a statistically significant higher overall percentage of correct answers, as well as statistically significant higher number of correct answers on most of the items on the post-test, which confirmed that the context-based teaching approach was more effective than the traditional approach in promoting students' conceptual understanding and functionalization of organic chemistry knowledge. These findings also confirm that the research-based approach represents an effective tool for developing the pre-service chemistry teachers' competencies for the implementation of the context-based approach in organic chemistry teaching.