

Key words

mathematical modelling, chemical principles, shape and structure of the molecules, visualisation of chemical structures, chemistry and mathematics interdisciplinarity

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Abstract

The primary aims of the dissertation project is identification of “contact areas” of subjects of chemistry and mathematics and creation of interventions to solve the problems of chosen areas.

At first, it was necessary to analyse available literature by the authors from the field, that have mentioned the problematics of interdisciplinarity between mathematics and chemistry. A part of literature research was dedicated to a search for the expected outcomes in curricular documents in Czech Republic and in Slovak Republic. In Czech Republic these were Framework Educational Programmes (RVP ZV, 2017 a RVP G, 2007). In Slovak Republic thee documents are State Educational programme ISCED 2 – lower secondary education (2015) and State Educational programme ISCED 3A – upper secondary education (2015). After that the analysis of a sample of School educational programmes of chosen schools in Czech Republic was conducted. The sample was chosen through proportional stratified selection according to the layout of schools in Czech Republic.

Next, the thesis contains the methodology of research tools that have been used to fulfil the aims of the thesis. These tools are the method of item analysis, interviews didactic testing and statistical evaluation of data.

The following part of the thesis is dedicated to evaluation of the parts of research investigations. The research tools – analysis of curricular documents, interview and the item analysis of the test items in testing conducted by T. Cífková (2015) have fulfilled one of the main aims of the thesis, the identification of the “contact areas” between the subjects of mathematics and chemistry.

The last part dedicated to the evaluation of the researches contains the qualitative and quantitative evaluation of the pupils' and students' solutions of the test tasks in the follow-up testing. The sample contained 129 tests, 56 of them were taken by the students of the 1st year of the bachelor's degree (chemistry teaching, biology) and 76 tests were taken by high school students during their graduation year. Statistical quantitative analysis of these tests shows that the male students gained slightly better assessment than the female students (approx. 8 % out of test max score). Considering the level of education of the tested students, the high school students were assessed better (approx. by 10 %). The qualitative analysis of the students' solutions was the source for the focus of content of the interventions (methods containing the inquiry approach to education). The interventions are included in the last chapter of the thesis.

The using of proposed interventions in practical high school education can help in the future to create the required key competences mentioned in the curricular documents.