

Abstract

The primary goal of this thesis is to create a standardized tool to determine the level of competency in Chemistry (i.e. knowledge, abilities, and skills) among secondary school students, formulated in the form of "expected outcomes" in the Framework Education Programme for Secondary General Education (RVP G, 2007) and then use this tool to determine the success of students in secondary schools in teaching the tests expected outcomes of chemistry in the academic year 2014/2015. The creation of this research tool and determine the success of students after a few years of starting curricular reform allows for use in future years to monitor the development of education in chemistry by general educational programs.

The study first conducted analyses of these expected outcomes from the perspective of Bloom's Taxonomy of Educational Objectives (Amer, 2006; Anderson et al., 2001; Hudecová, 2004; Krathwohl, 2002; Krietzler et al., 1994). By examining the School Education Programmes of secondary schools participating in the study, a curriculum was identified that is overlooked or not clearly defined by RVP G (2007), whose inclusion in education falls within the competence of each school. Requirements were also compared for outputs of chemistry education for secondary school students in the Czech Republic and Slovakia.

In order to create the correct research methodology, evaluation and assessment in education was reviewed along with basic principles of testing and didactic tests, which became a tool for fulfilling primary and partial objectives of the presented study.

Last but not least, national and international research pertaining to natural sciences literacy and education was reviewed (e. g. NIQES, TIMSS, PISA, the research of the team Řežníčková et al., 2013), and individual hypotheses were posed for this study based on the results of this research.

Four didactic tests were used to determine the level of expected outcomes in students of secondary schools, whereas each was created for a different field of chemistry, as defined by the Framework Education Programme for Secondary General Education: general chemistry, inorganic chemistry, organic chemistry, and biochemistry. A total of 15 secondary schools participated in testing; for general chemistry the test sample numbered 396 tests, for inorganic chemistry 396 tests, 243 took tests for organic chemistry, and 103 took tests for biochemistry. The teacher survey was completed by 19 pedagogues at secondary schools participating in the testing.

The evaluation of didactic tests indicated that the expected outcomes for general, inorganic, and organic chemistry can be managed by students in secondary schools at about the same level. The slightly better outcome in biochemistry was discussed, and may have been caused by the composition of the sample of students. The level of mastery of expected outcomes in chemistry for students in secondary schools is very low; when setting 33% (MŠMT, 2012) as a passing grade, the required level would not have been met in biochemistry by 18% of the students, in general and organic chemistry by 38% of the students, and in the field of inorganic chemistry by almost half of the total respondents. The results of the presented study may then lead to a discussion of the causes of failure: either the expected outcomes defined in the RVP are not defined in sufficient detail for teachers to set the proper educational goal, or teachers are familiar with the expected outcomes but, according to the results of the survey, do not attend to their verification, which can lead to the incorrect setting of educational goals and thereby results of teaching not defined by the RVP.

From the results of testing there is an apparent influence of several factors on success rates in the didactic tests of expected outcomes: the interest of the respondents in the subject of chemistry, for example, or their final grade. On the contrary, the characteristics which in the testing did not present as significant for success in the test include: type of secondary school by term of study (except for the field of organic chemistry), frequency of practicing various types of tasks, and the gender of the respondents.