Summary

The dissertation deals with the effectiveness of the use of motivational elements like different types of crossword puzzles, riddles, rebuses and word plays etc. in teaching chemistry at lower secondary school.

First, the database of motivational problems was created. The tasks (problems) are designed for practicing the curriculum of chemistry at lower secondary school in combination with one of the following subjects – mathematics, physics, biology or geography. Partial collection of problems that combine chemistry curriculum with geography or biology are available at http://is.muni.cz/do/rect/el/estud/pedf/cidlova/index.html. The remaining two collections are attached to this dissertation.

These problems were subsequently used in an one and half year research focused on the impact of their use in teaching on the relationship of pupils to chemistry and on the results of their education in chemistry at lower secondary school.

The research was initiated with a total of 886 pupils of the 3rd grade of lower secondary school. At the beginning of the second semester these pupils completed an initial questionnaire focused on their relationship to chemistry. At the same time, the same pupils were also exposed to a test focused on chemistry curriculum corresponding to their level of education. The one-semester delay of the start of the experiment after beginning of teaching chemistry was chosen for the pupils to get their own initial opinion on the subject chemistry, including the effect of their teacher.

Based on the findings of the introductory questionnaire and test, approximately 200 pupils (always the entire classes from different schools were chosen for the research; the exact number of pupils and the composition of the sample during the research differed slightly depending on the actual presence of pupils in the classroom) were chosen for the 1.5 years lasting longitudinal experiment so that the initial properties of control group and experimental group were as similar as possible. The teachers of the experimental group used the collections of motivational interdisciplinary problems (tasks) while teaching, teachers of control group received a promise to receive these databases after finishing the experiment. After 1.5 years (the end of the 4th grade of the lower secondary school) pupils answered the same questionnaire again. Furthermore, during the experiment and at the end of the experiment they solved two additional tests. The test content has always been created in accordance with the Frame Educational Program. The tested problems have always been consulted with teachers.
before testing so that pupils were not entered into the test subject matter that they not been exposed to yet.

The results of the research, described and discussed in detail in this dissertation, seem to be inconsistent: The attitude to chemistry shifted dramatically to the worse with both groups, but in the experimental group this shift was significantly smaller. But, on the other hand, the experimental group did not acquire better test results than the control group in the end of the experiment. However, this inconsistency is only apparent and it is discussed in detail in the dissertation. The discussion is partly based on the study of research papers focused on similar issues, and partly it is based on discussion with lower secondary school teachers of chemistry.

In conclusion of the dissertation it can be stated that long-term use of motivational problems in education is justified, especially for motivation, for instance as a supplement to very popular and widely used chemical experiments. An important role, however, has the teacher. He/she must accurately and deliberately choose which problems of the databases and for what purpose will be used and how much teaching time will be spent using them.