

Researching the inquiry-based chemistry laboratory for the enhancement of cognitive and meta-cognitive skills

Dvora Katchevich

Advisors: Avi Hofstein and Rachel Mamloke-Naaman

The inquiry-based chemistry laboratory program enables a different learning environment from the classroom one. In this environment the learning is held in small groups. The students are exposed to inquiry-based tasks at different levels which foster a learning discourse that enables the participation of each student according to his / her cognitive and meta-cognitive skills. The discussion during the different stages of the inquiry-based tasks is a fruitful land for the construction of arguments. The following will serve as examples for inquiry-based tasks which foster the construction of arguments: Choosing an inquiry question, writing an hypothesis, planning an experiment, analyzing the results and drawing conclusions,. The students need to strengthen their arguments in order to convince the other members of the group to accept their ideas. Moreover, the students, as scientists, are asked to draw conclusions at the end of each experiment – to argue claims that are based on the results of the experiment and to add scientific explanations which connect between the claim and the results of the experiment. The construction of arguments is a cognitive process that enhances and improves conceptual understanding. This process enables students to understand why the scientific claims are right and not to accept them without any doubt. The construction of arguments demands cognitive and meta-cognitive skills, awareness of what one knows, awareness of the knowledge construction procedure, and awareness of changes in one's own conceptual structure.

According to what was previously mentioned, the objective of the research is to find out whether learning by the inquiry-based chemistry laboratory program enhances the cognitive and meta-cognitive skills, and other skills such as planning, evaluating and monitoring the cognition. Furthermore, we intend to investigate how various intervening activities can assist the improvement of these skills.