

Appendix A: Teacher education program in our institution

The chemistry education track aims to prepare active, skilled, and enthusiastic research-oriented chemistry teachers capable of lifelong learning. The program goal is to enable preservice chemistry teachers to experience the nature of teachers' practical work in class. The program spans over two years and covers topics in general education and chemistry education while strengthening chemistry teachers' mastery of key concepts and pedagogical instruction skills in chemistry.

This specific research was conducted during a course taught on the topic of teaching high-school inquiry-based chemistry laboratories. This course, "Teaching inquiry-based laboratories in chemistry education", is a 3-credit undergraduate level course for preservice chemistry teachers. For one semester, students meet weekly for 4 hours. The course includes theoretical aspects of what inquiry-based chemistry laboratories are, the different levels of inquiry-based experiments, and the assessment method and process of high-school students' laboratory reports.

In the course, four themes are emphasized and learnt along the semester which are:

1. Getting familiar with the mandatory learning unit of inquiry-based laboratories in chemistry education. This includes learning about open-ended type inquiry experiments and the requirements of the Ministry of Education.
2. Experiencing and conducting open-ended type inquiry experiments in several levels.
3. Learning about and developing higher order thinking skills related to inquiry-based laboratories in chemistry education.
4. Learning about and conducting different assessment methods in the mandatory learning unit of inquiry-based laboratories in chemistry education. This includes assessing using the rubric, formative and summative assessment, organized portfolio, and an oral exam.