

POPUCH – Popularization of Chemistry

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Abstract

The aim of this paper and presentation is to highlight major goals and approaches and to share practical experiences in training of science teachers and enhancing students motivation gained in the project POPUCH (Popularization of chemistry). Chemistry is a laboratory-based discipline. High school chemistry knowledge points are characterized by a more casual, some content also brings an abstract result, many students have strong interest in learning chemistry for students entering high school, after gradually lost interest in chemistry and therefore, as a high school chemistry teachers must effort to study high school chemistry teaching, and continuously improve their teaching. Among them, learn and master in teaching the skills to stimulate students is a very important part. The objectives of the project are popularization of chemistry and new chemistry fields mainly towards secondary school students. One of the activity is very popular among students, that is Lecture in Modern Chemistry - an interactive 45 minutes classroom show about chemistry as a life science and chemistry in everyday life (e.g. What do we know about the sense of smell and taste? What are fragrances and flavors?).

1. Introduction

Technical sciences are not easy subjects to study. Particularly chemistry is considered to be difficult. Even when the high school students are interested in chemistry they often have troubles with it and gradually lose interest in studying chemistry or technical branches at all. Many of them prefer social sciences. Thus, there is a lack of graduates of technical fields in some countries while graduates of social fields often meet problems with employment. Besides other influences (worse credit of chemistry in worldwide society, better salaries in other fields), the problem is often caused by rigid methods of high schools teachers whose teaching is based on lectures without illustrative experiments or discussion with students due to lack of experience or equipment. High school students often tend to memorize facts in chemistry without understanding the problem so they cannot succeed. Therefore high school chemistry teachers must make much effort to continuously improve their teaching.

2. Project POPUCH description

The objective of project POPUCH is to popularize science and technology at Prague secondary schools, enhance students' motivation to study technical and natural sciences. Specifically, the popularization of chemistry and chemical fields tries to bring the science understandable for secondary school pupils and to develop cooperation between the Institute of Chemical Technology Prague and high schools of Prague. The project is financed by the European Social Fund (ESF) and the City of Prague within the Operational Program Prague Adaptabilities. It was launched in March 2010 and will last till June 2012.

To achieve our project goals, the activities of the POPUCH project are divided into:

2.1 Modern Lecture of Chemistry (MLC)

Modern Lecture of Chemistry is an interactive lecture pupils. It is performed during the ordinary chemistry classes at Prague high schools. A pair of instructors from Institute of Chemical Technology Prague (ICT) demonstrates that chemistry as a modern and important branch of science which is not only ubiquitous and necessary in everyday life but also can be interesting and funny, moreover chemistry may be an interesting choice of career. The Lecture is not a boring talk but more likely an interactive show which is based on discussion with pupils and on many experiments, some of which cannot be performed in the common lessons due to the lack of equipment or legislative restrictions. The pupils can directly participate in several safer experiments. However the educational role of the lesson is still maintained. Two modules of MLC have been developed, MLC I is profiled as general while the MLC II is concerned with the topic of Chemistry and Energy. The particular topics are e.g.:

MLC I

- sense of fragrances and flavors
- smart materials, superconductors
- liquid nitrogen as coolant
- combustion and extinguishing

MLC II

- chemistry and electricity
- conversions of energy
- fuels and thermal engines
- concentrated chemical energy

The instructors have been recruited from the group of talented ICT students of all grades of study. The program is being continuously modified according to the experience of the instructors. The MLCs are very popular and up to now more than 4,800 students have been involved.



Fig.1. Modern Lecture of Chemistry I

2.2 Chemistry for Secondary School Chemists

The activity is performed at ICT and lasts one day. It consists in practical introduction to the chemistry in the lab. Therefore it is convenient for higher-grade high school pupils. Several short lectures concerning up-to-date and interesting problems are followed by two laboratory trainings at various departments of ICT (processing of polymers, analytics and hydroanalytics, biochemistry etc.). So far, almost 400 students have participated.



Fig.2. Chemistry for Secondary School Chemists

2.3 Secondary School Students in the Role of the Researchers

The activity is suitable for advanced high school students with particular experience and great interest in chemistry. The aim is to introduce advanced measurement techniques to them and enhance their interest in science. The course is opened by short lectures. Within two days the pupils are involved in research projects solved at particular research groups of ICT. 135 students have been engaged to date.



Fig.3. Secondary School Students in the Role of the Researchers

3. The results of the project POPUCH (1st March 2010 – 31st January 2012)

- Cooperation with more than 30 secondary schools in Prague
- More than 5,000 students and 40 teachers of chemistry participated in the project
- Support materials for chemistry teachers at secondary schools
- Trained propagators of science and technology