

CURRENT ISSUES OF TEACHING CHEMISTRY IN ROMANIA

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In Romania education is considered to be a national priority, the entire educational system being protected by the Constitution and by organic laws (the Education Law). The Romanian Educational System is divided along two main levels:

A. Pre-University Level is structured in four cycles:

1. Kindergarten – optional, composed of three or four grades

2. Primary school – comprises two 4-grade periods:

Elementary school – grades I to IV

Gymnasium – grades V to VIII

3. High school – four or five grades (grades IX to XII/XIII)

4. Vocational education which can continue or supplement High School, to prepare students for careers that are based on manual or practical activities.

B. Higher education is organized (or in the process of being organized) according to the principles of the Bologna process, which aims at the construction of the European higher education area. It has the following four components:

1. Bachelor – 3-4 years in most disciplines

2. Master – 2 years in most disciplines

3. Doctorate – at least 3 years

4. Lifelong learning, which includes postgraduate education occurring outside the Master/Doctorate framework.

Secondary school and college

Beginning at the age of three, many children are introduced to the Romanian educational system in the form of kindergarten. Even though kindergarten is optional in Romania, it provides a building-block for all students who do attend. Following kindergarten, children are whisked away to elementary school at the age of six years old.

Elementary school in Romania is slightly different from elementary school in the rest of Europe even though the same fundamental lessons are taught. In fact, Romanian education largely is like education throughout the rest of the world until children reach the high school level.

All the children, at fourteen-fifteen years, pass in the high school system. High school students are expected to perform exceptionally well, and only those who can stand a large amount of competition will pass the ever-looming Romanian Baccalaureate Exam. In order to be admitted in a Romanian university, all high school students must pass the Romanian Baccalaureate Exam. This exam is comprised of a number of different oral and written tests that are to be passed towards the end of June and again at the end of September. Any Baccalaureate Exam can consist of two to three oral/practice examinations and three written examinations spanning a large number of topics.

Those who fail this exam have no hope of obtaining a high school diploma or applying to university.

The possibility to find talented pupils and orient them to scientific education is the essential achievement of Olympiads.

The Olympiads, according to our observations during decades, also constitute a kind of a “social lift” for many of Olympiad participants and winners who come from small towns or not wealthy families and ensure them access to good higher education. Winners of our national Olympiads are admitted into universities without exams; participants of international Olympiads and top winners of national competitions receive rather high scholarships. A possible participation in exciting international competitions also tempts pupils to learn chemistry willingly.

Olympiads affect the general system of higher education through involving and encouragement of the best and active school teachers. Many teachers are deeply involved in training process, conceiving Olympiad tasks and organizing of competitions. Those teachers who prepared winners of international Olympiads receive state awards, and coaches of winners of national and regional rounds are encouraged too. That is why the teachers' community watches closely the Olympiad tasks and uses them in learning.

A special program has been developed since 2000, aimed to detect talent in chemistry, generally in science, at public high schools in poor neighborhoods, affected by many social problems, caused by deficiency and violence, and a wide work of motivation to the study of chemistry was done.

Higher education

After the fall of the communist regime, we experienced tremendous changes in higher education in general, and in teaching exact sciences in particular. While some changes were beneficent, other were uncontrolled and destructive.

The main advantage after 90s was the possibility to establish research and teaching cooperation worldwide, that were almost completely interrupted during the last decade of the communist era. In this frame, our best undergraduate and graduate students can access international exchange programs like Erasmus or Socrates. Besides this, the university has bilateral agreements with several universities, mainly from European Union, that support student exchanges. After the integration of our country in the EU, these exchanges became even more accessible.

The main drawback of this necessary opening is the continuous and unstoppable *brain drain*. In 90s, from various reasons, this was mainly limited to doctoral and postdoctoral students. Now it extended to undergraduate level, meaning that the best college graduates – including prize winners of international contests of chemistry – go to study chemistry in faculties from abroad. Although beneficent at a certain level, because they can take advantage of a very good

instruction, unfortunately most of them do not return home. This process deprives us of the most qualified people and generates a loop with long run consequences.

During the last two decades, major changes occurred on the labor market. Once flourishing, the chemical factories are nowadays almost extinct. Also, the labor market remains in certain aspects primitive and doesn't require highly qualified personnel, e.g., for doing scientific research. On the other hand, the number of available positions for chemistry teachers is currently very low. This makes the study of chemistry at university level less attractive, as the chance to work in the field after graduation is quite low; as a consequence, most of college graduates enroll as students in fields like economics or law.

Two other aspects are worth being mentioned. One is the decrease in interest in exact sciences. This trend happens also in secondary school and college education, and this seems to affect also the Western European and North American universities. While renowned international universities attract well trained college graduates from abroad, as a partial solution, this is not our case. The second point is a major change of structure that was applied since 2005, the so called "Bologna process". Aiming at creating a unitary higher education frame in Europe, it imposed in our case a two cycle structure, undergraduate with three years of study and graduate (master) with two years. Previously, the undergraduate chemistry studies took five years to accomplish. This change leads sometimes to poorly qualified chemistry graduates, some of them becoming later lower qualified chemistry teachers. This opens again, an unwanted loop. In the worst case scenario, in a decade we won't be able to attract highly qualified people as faculty members, to replace older, retiring persons; in the best case scenario, this will be done attracting people who were trained and worked abroad.

Another aspect, affecting both the secondary and university teaching is the legislative instability. Often changes at the government level increased this negative effect. In the present circumstances, it would be essential to benefit from a coherent, long run vision engaging the role of the education and its connection to the social and labor market needs.