

## Main Difficulties in Teaching Chemistry in Secondary Schools

### TEACHERS' CASE STUDY

#### Teacher's Case Study No 6

Subjects: Chemistry, Biology  
School: Gymnasium Nordenham  
Place: Lower Saxony, Germany

#### Description of the Case Study

1. What do you think are the reasons for major difficulties in learning chemistry at school?

*Pupils have increasingly more problems concentrating and focussing; they seem to be also more fidgety than pupils in earlier times. Experiments work well with them, but as soon as the subject becomes more theoretical and goes more into the particle scale, interest in chemistry goes down.*

*Repetition and testing of knowledge is not a problem, the real problem is the autonomous interpretation and analysis of chemical facts reactions and context. This requires concentration, time and often relatively boring procedures the pupils are not prepared or willing to work with. Today, the pupils don't look and work for a solution of a problem themselves, they tend to browse the internet for ready-made solutions. You need this willingness and the motivation to get involved. Admittedly, in this respect chemistry is a more difficult subject, for example, compared to biology.*

*Another problem concerns older students in school who do jobs to earn some money. For them, school is secondary, and this effects learning.*

2. What major difficulties do you have in teaching chemistry?

*The major problem is the lack of time, simply because the curriculum is too big, too detailed, and too heavy. This means you have to focus on those "star topics" that will be part of the exams (and those topics are massive). So there is no room for extra topics that might interest pupils, never mind trying to do a "Youth Science" project with a class. At the same time, coping with the star topics is extremely difficult if you work with pupils who have missed the basics of chemistry.*

*On top of that, teachers are on sick leave or are gone for other reasons, and colleagues need to stand in. Again, this leaves you with less time for your normal*

work.

*Large classes are another problem. The laboratory facilities are okay, there is no sponsoring for equipment any more, but the school gets quite a high amount of money for the chemistry department. So we could do a lot of practical chemistry, a lot of experiments. But with classes of 30 pupils this is almost impossible even with the facilities we have.*

*And, last but not least, the reduction from 13 to 12 years for secondary school, but without any reduction in content, means less time and more pressure on all of us.*

3. What kind of courses - if any - on didactics of chemistry did you attend?  
*Chemistry-specific didactics made up about 15% of the studies, and an internship in school was compulsory part. However, there was very little preparation for school.*
4. Why do many young people quit learning chemistry and, in general, scientific studies after upper secondary school?  
*Without taking an advanced course of chemistry in school, it is very difficult to master chemistry at university. But such an advanced course requires at least 16 participants. So you might really be interested in chemistry, but if there are not enough participants, you lose, and that means no chemistry study most of the time.  
For most pupils and older students at school, chemistry is connected with theory, a lot of work, sometimes even dangerous work. As a profession, there are easier ways to earn a life and money.*
5. How could young people be helped take up scientific studies after upper secondary school?  
*Basically by improving the conditions in school.*
6. Which initiatives has your country undertaken in this direction?  
*There are programmes like "Jugend Forscht" and other science contests like that. They do certainly raise interest in natural sciences, but won't work for all pupils.*
7. Have you ever taken part into a research project concerning scientific learning?  
No
8. Could you mention any recent research you have heard of, that might be useful to our project?  
No
9. Could you suggest any other areas of research that might be useful to our project?  
No