

Prof. Heindirk tom Dieck,  
German Chemical Society GDCh

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## Science Education on the Secondary School Level The case of Germany

With the increasing internationality of education, globalization of industries and required mobility of the work force it has become good practise to compare and evaluate national system with the inclusion of foreign experts. But even with the most precise data and comprehensive knowledge about statistics and educational content in other (supposedly leading) countries comparisons between national educational systems are difficult and even dangerous. Beyond facts and objective criteria the following has to be considered:

- Is the existing national educational system strongly linked to national self-esteem
- Is the existing educational system very broadly embedded and accepted in the social structure
- Is the individual pupil/student expected to draw maximum profit for him/herself or is he/she expected to render good result for the society
- Are the political decision makers, not the opposition, willing to make substantial changes against a widely accepted system

The impact of the Scientific Learned Societies on the public discussion of educational matters in Germany is quite important, since these Learned Societies play a dominant role for the academic field and the academic professions. The teachers' associations probably have a more direct influence on educational matters at school, but they are dominated by other disciplines than science and mathematics. As an example of the activities of the Learned Science Societies in Germany enclosed are inter alia:

### Appendix # 1

Memorandum concerning "Mathematical and Scientific Education at the Threshold of a New Century" ("Mathematische und naturwissenschaftliche Bildung an der Schwelle zu einem neuen Jahrhundert"), edited by 10 scientific bodies, including the German Chemical Society, as of June 1998 (in German) This is a memo of the cultural wealth of scientific education including arguments why biology, chemistry and physics shall continue in parallel manner and must not be combined to a more general teaching subject "sciences".

### Appendix # 2

Position Paper of Chemistry Organisations from Science and Economy on the Secondary II School Education and the development of the Final School Examination  
("Positionen der Chemieorganisationen aus Wissenschaft und Wirtschaft zur gymnasialen Oberstufe (Sekundarstufe II) und zur Weiterentwicklung des Abiturs")

Also published in 1998 was this position paper of the Chemistry Organisations. This is a typical and important example to demonstrate the very close cooperation of organisations, all of which are linked to chemistry, but which have very different goals and missions: These chemistry organisations include further to Gesellschaft Deutscher Chemiker (the German Chemical Society, 28 000 members) some smaller learned societies, the Chemistry Trade Union, The Chemistry Employers Union, the Association of Chemical Producers.

### Appendix # 3

Position paper "General Education through Science - Teachers' Formation in the Sciences" ("Allgemeinbildung durch Naturwissenschaften – Zur Lehrerbildung in den naturwissenschaftlichen Fächern" edited by GDNÄ, the oldest German Learned Society in cooperation with the specific Learned Societies). This paper was published in March 2001

### Appendix # 4

#### Position Paper of GDCh to the results of the TIMSS and OECD studies

(“Stellungnahme der GDCh zu den Ergebnissen und Auswirkungen der dritten Internationalen Mathematik- und Naturwissenschaftsstudie (TIMSS) und der OECD-Studie “Bildung auf einen Blick”. This earlier study was already published in June 1997. This was followed by two recent public GDCh recommendations for the chemistry teachers’ formation for Secondary School Level and for the primary school teachers’ formation for the teaching of elementary sciences. These are added as

#### Appendix # 5

Recommendations of the University Studies Reform Commission of GDCh for the General Sciences Teachers’ Formation for Primary Schools

(“Empfehlungen der Studienreformkommission zur Ausbildung von Primarstufenlehrer/innen im Fach Sachkundeunterricht”), prepared for GDCh Board decision, April 2002

#### Appendix # 6

Recommendations of the University Studies Reform Commission of GDCh for the Chemistry Teachers’ Formation for Secondary High Schools

(“Empfehlungen der Studienreformkommission zum Studium Lehramt Chemie an Gymnasien und vergleichbaren Schulformen”) edited by GDCh in December 2001

#### Appendix # 7

Teachers’ Congress 2002, held by VCI and supported by GDCh

(Example Invitation to a “Lehrerkongress” by VCI and GDCh, program not included)

This is an example invitation to the 13<sup>th</sup> Teachers’ Congress since some years. These congresses have the goal to bring teachers in contact with up-to-date scientific aspects and their impact on every day life; this is meant as an addition to teachers’ continuous education, which is insufficiently provided by the state authorities. Over the years GDCh has attracted more than ten thousand chemistry teachers to the GDCh teachers’ continuous education courses (no participation fee for members, low fee for others) and more than 7500 chemistry teachers to the teachers’ congresses (no participation fee)

#### Remark and Appendix # 8

Recommendations of the “Education Forum”

(“Empfehlungen des Forums Bildung”, edited November 2001)

Educational matters have always been of prime importance in the public discussion, although there existed over a longer period a political polarization as pointed out in my earlier statement (“Science Education on the Secondary School Level in Germany with special emphasis on chemistry as an example”).

The international comparative studies of the type of TIMSS or PISA have nourished the public debate and have offered a special focus on the topic of education.

The Federal Government of Germany and the State Governments have decided to create a common forum (“Forum Bildung”) to secure the Quality and the Sustainability of the German Educational System. Under the joint presidency of the Federal Minister of Education and Research, Mrs. Bulmahn (social democrat), and the Bavarian State Minister of Science, Mr. Zehetmair (christian socialist) the ministers of the states, representatives of the important social groups, of the science, of the churches, and students have worked on general educational recommendations.

By the end of the year 2001 the “Forum Bildung” has published a **report** (only available in German language), the short version of which is attached (Exhibit No 8) and the short and the long version are available on the server of the Federal Ministry [www.bmbf.de](http://www.bmbf.de). Much of the general public debate can be followed on the server [www.forum-bildung.de](http://www.forum-bildung.de).