

Recent Developments in Germany

Claus Meyer-Bothling, Gulpen 2006

As was reported by Prof Bernd Ralle and Sabine Thomas in Wageningen 2005, the international studies Timss and Pisa shook the German educational scene like an earthquake. Consequently, just like tectonic plates being pushed up or down during a real earthquake, the conservative forces among the educational community became less prominent and the reformers found it much easier to argue their position.

Meanwhile a reform has been initiated in Germany that has changed many aspects of school education. Not all of the 16 Bundesländer have moved with the same decisiveness, but Baden-Württemberg, where I teach, is a pioneer in this field and we have since not only initiated a thorough reform of science teaching but have also just started the third year with our newly developed science syllabus.

How momentous the change is I cannot hope to make you understand in this short exposé but as a symbolic attempt let me at least show you our syllabi before and after the reform.

Before the reform we used the *Bildungsplan* from 1994 that listed the topics to be covered in great detail. E. g. for the first year of Physics (Klasse 8, 13-14 year olds) the syllabus contained 3 Lehrpläneinheiten, each of which was broken down in further detail (shown here for the third Lehrpläneinheit).

- Lehrpläneinheit 1: Einführung in die Physik < 16 > (Akustik, Wärme)
- Lehrpläneinheit 2: Grundlagen der Mechanik < 16 >
- Lehrpläneinheit 3: Elektrizitätslehre I < 18 >
 - Magnete und ihre Wirkungen
 - [Magnetisieren]
 - Magnetfeld
 - Elektrischer Stromkreis
 - Leiter und Isolatoren
 - Wirkungen des elektrischen Stromes
 - Stromdurchflossene Spule als Magnet
 - Technische Anwendungen
 - Gefahren des elektrischen Stromes
 - Strom als bewegte elektrische Ladung
 - Ladungsmenge
 - Ladungserhaltung im unverzweigten und einfach verzweigten Stromkreis
 - Stromstärke
 - [Meßinstrumente]

From summer 2004 we are using the new syllabus, the *Bildungsstandard*, where we have switched the emphasis from contents to skills (Kompetenzen). The following excerpt is from the syllabus for the first year of physics (Klasse 7, 12-13 year olds).

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3. Formalisierung und Mathematisierung in der Physik

Die Schülerinnen und Schüler können bei einfachen Beispielen

- den funktionalen Zusammenhang zwischen physikalischen Größen erkennen, grafisch darstellen und Diagramme interpretieren;
- einfache funktionale Zusammenhänge zwischen physikalischen Größen, die zum Beispiel durch eine Formel vorgegeben werden, verbal beschreiben und interpretieren;
- einfache, auch bisher nicht im Unterricht behandelte Formeln zur Lösung von physikalischen Problemen anwenden.

4. Spezifisches Methodenrepertoire der Physik

Die Schülerinnen und Schüler können

- einfache Zusammenhänge zwischen physikalischen Größen untersuchen;
- erste Experimente unter Anleitung planen, durchführen, auswerten, grafisch veranschaulichen und angeben, welche Faktoren die Genauigkeit von Messergebnissen beeinflussen;
- an ersten einfachen Beispielen Strukturen erkennen und Analogien hilfreich einsetzen.

...

Contents are hardly mentioned at all in the *Standard* for physics. This is intended to clearly change the emphasis: Before the reform we knew which topics to teach and after teaching the topics of the syllabus we were done with it. However, our poor results in the international studies showed us that we had not really touched the students with our teaching and as a consequence we have now begun to ask what the student should be able to do after the lessons.

To give just three examples, cited from the above, now the students *themselves* should

- plan suitable experiments to find the relation between variables,
- be able to describe the relationship between variables,
- find and use formulae that have not been explained in the lessons.

Of course you do need contents to teach science, but this is now up to the schools themselves. At my school, the Geschwister-Scholl-Gymnasium in Stuttgart, the teachers have spent quite some time and effort to develop a curriculum for each subject that they deem suitable to teach the skills. We have published it for all subjects on our homepage <http://www.geschwister-scholl-gymnasium.de>. (-> Unterricht -> Schulcurriculum)

The significance lies not in the particular contents we have chosen - they are different for each school. It is much more important that the hierarchy between the two aspects has been switched. It used to be "Content before skill". Now it is "Skill before content". Or to put it another way we used to ask, "which topics should we teach?". Now we ask "what should the students be able to do?" Thus we have switched our focus from the input to the outcome of our teaching.

Apart from the introduction of a radically new syllabus there are various other aspects of the reform which I shall only briefly mention today:

We have introduced several scientific subjects throughout the school career, i. e.

- The subject Naturphänomene (natural phenomena) in years 5 and 6,
- the subject Naturwissenschaftliches Praktikum (scientific practical) in year 7,
- the new major subject NWT (science and technology) in years 8, 9 and 10.

On a more general note, the German ideal that lessons take place during the morning while the afternoon is essentially free time is being eroded and many schools have even started to serve lunch to students on some days of the week.

Last but not least we are reducing the number of school years from 9 to 8.

One thing is for certain: the international studies have been a wakeup call for the German educational scene. The reform has meant a lot of work for all involved and hopefully there will be some reward for it in terms of more interested students and better results. But changes in education need time to take effect so in order to really be able to judge the result we will have to wait for another few years.

You are welcome to look at the new syllabus yourself at:

<http://www.bildung-staerkt-menschen.de/service/downloads/Bildungsstandards/Gym>