

Short Report on the Discussion Groups on

“What are the major problems facing Engineering Maths Education in Europe?”

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Below we outline the problems which were discussed and possible solutions as seen by participants. It remains open whether the problems are specific to European higher education or rather world wide.

- Engineering students' attitude towards mathematics

Students often don't see the usefulness and value of mathematical education for their overall engineering education as well as for their future professional life. This results in a bad attitude towards mathematics and maths education. Sometimes this attitude is not restricted to mathematics but students lack general motivation in their studies. This might be attributed to the wealth of society, the “press-button-generation” and a general unwillingness to do “difficult things”. Students are accustomed to getting instant gratification, so if they do not see the value of mathematical education immediately, they are discontent. There are some counter-measures which could be taken. Mathematics could be put into context in order to show its value; instead of going into detail too fast one should start with a broader view; problem-based learning and learning in project work are also ways of putting mathematics into context. The poor general motivation might be addressed by making students responsible for their own learning.

- Teacher attitude and teacher understanding of background and entry skills

Sometimes the teachers at university do not have a good understanding of the background and basic skills of the students resulting in misjudgement and frustration on all sides. This could be avoided if there were more contacts between university lecturers and school teachers such that university lecturers know what to expect and school teachers know better what would be desirable.

- Student intake

The lack of basic skills of university freshmen is well known and seems to be Europe-wide. Participants saw as reasons for this state the expansion of higher education, the lack of training at schools, the abuse of the calculator and also missing qualifications of school teachers. Moreover, there is great pressure on the school curriculum to include ever more topics.

- Heterogeneity

University education has to deal with a very heterogeneous student cohort which makes it hard to find a level that serves the needs of all students. There were complaints that there is too much help for weak students at the expense of the education of more talented ones. As measures to deal with heterogeneity, participants identified project work and peer-to-peer teaching where the more talented students teach the weaker ones (e.g. in tutorials). In order to maintain or achieve a higher level, universities should try to attract more talented students.

- Framework conditions

With the Bologna process new educational degrees have been introduced in many European countries and it has still to be determined what the “interface to mathematics” for the different degrees (and different kinds of engineering job profiles) should be.

- Assessment of student achievement with integrity

Assessment of real student achievement is still a problem. In some countries this has become even more problematic because of an increase in cheating in assessments.

- Low number of female students

The low number of female students in engineering was also mentioned as a major problem. This does not only refer to the desire to get more capable students into engineering but also to the experience of participants that the presence of female students leads to a better learning atmosphere.