

Closing Remarks

Given by

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“Attracting more students and educating well-trained
engineers: sensible ways to advance the field of engineer-
ing education”

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Introduction

Ladies and Gentlemen,

We have nearly reached the end of this two-day conference on engineering education. Together we have discussed a lot of critical issues like student dropout, the need to improve the students' first semesters' and the prior knowledge of mathematics. One of the most striking points here is that nowadays it is even more difficult to teach than 30 years before. Not only that we have a much bigger number of first semesters, and that we have to educate for an increasingly diverse world of work, we also have a very diverse student body in our courses.

Please allow me, before closing this meeting, to make a short remark on this special challenge for teaching, that is a very burning issue for me and my colleagues, and as we know for most universities in Germany today: the fast growing student diversity.

I. Educational diversity

Let's take my university as an example:

The Cologne University of Applied Sciences is Germany's biggest University of Applied Sciences with about 21,500 students and 430 professors. Eleven faculties offer more

than 70 courses of study predominantly in engineering and sciences.

If we look at the freshmen' routes to our university – and this is no exception - we see very different groups of beginners:

- 45 % graduated from a general education school,
- 25 % already finished a vocational training and then graduated with university entrance diploma,
- 15 % have a school education from abroad,
- 13 % completed a full-time vocational education, then got a university entrance diploma,
- A small but growing number completed vocational training and vocational experience, and then started directly into studies. The number is fast increasing for political reasons.

Of course, this is only one aspect of diversity and there are quite a lot of other aspects in which our students differ with consequences for the teaching situation. For example with regard to the biographical background we have to work with social climbers, people with immigration history, mature returner students, and so on. Briefly speaking, our students have become more and more diverse and we see the need to take a new approach to teaching.

We decided to actively deal with our heterogeneous student body and therefore developed a strategy for our future teaching, the Educational Diversity project. In 2009, we applied successfully for funding at the Excellence Initiative of the 'Stifterverband', a German association for the development of science foundations. For the implementation of our concept, which includes detailed planning, we were awarded a million euros. This enables the appointment of didactical experts and other academics to advise and support the professors in their development of new teaching methods. Besides that, with our Educational Diversity project we are also an associate partner of the large-scale project "Diversity as Opportunity" that is run at the Bertelsmann Foundation's 'Centre for Higher Education Development' (CHE).

At the beginning of the Educational Diversity project, we conducted a study to examine the concrete educational differences in our university. Students contributed information about their background and academic experiences. Moreover, professors and tutors also had the opportunity to participate in the study.

The goal of our project is very challenging, personalised learning. Based on the results, new teaching approaches

were formulated. This knowledge is then accessible to all of the university's professors via a central Good Practice hub. Because every teacher must process the material differently, the considerable additional burden on professors had been calculated into the project: each teacher can request additional resources in order to appoint new assistants. Therefore, the additional workload remains manageable. Furthermore, the Educational Diversity project is being implemented carefully: the changes have been initially limited only to courses in the first two semesters. The professors receive support from tutors and didactical experts. If the methods from this initial implementation phase work well and the first successes are confirmed, then the scope of the project can be expanded. The advantage is clear. The teachers learn about new teaching methods step by step and can experience the success by themselves. Further, by concentrating on the freshmen courses, it is possible to prevent students from early deficits that exceed in front of them for the rest of their studies.

There is a considerable will to change: many professors have found out the hard way that some of their students slip behind in class. It is for this reason too that Educational Diversity enjoys such wide support in our university. The deans of all faculties have unanimously spoken out in favor

of the project and the university management is also on board alongside representatives of the student bodies. This is only one example for the quotidian efforts of German Universities to deal successfully with diversity.

II. The importance of teaching and learning

The examples and inputs of this conference have shown a lot of other challenges for teaching and learning in the engineering education but also the great interest of universities and teaching staff on a development of education. Current educational research confirms the idea that dynamic teaching methods and strategies are more effective than information merely presented for passive consumption. This insight has provoked a transformation in the culture of teaching and learning at our universities.

And the idea really seems to be catching on: in more and more departments, the question what is good teaching and how we are able to reach this goal is being discussed. For universities, this represents an opportunity to change traditional models that have been in place for decades. However, the goal is not simply to throw out-dated approaches overboard, but to think about the potential for improve-

ment and the possibilities for implementing worthwhile innovation.

At first sight it's the students who benefit directly from good teaching. But research will benefit as well, since the active involvement of students and their deep understanding (that can be reached with new teaching and learning methods) also brings new ideas into laboratories and think tanks. At this point, the unity of research and teaching, a necessary concept often evoked these days, becomes a reality.

Conclusion

Ladies and Gentlemen,

Let me close this conference with a short summary.

Yesterday, Professor Prömel reported the status quo and new activities in German engineering education and Professor Van Petegem from Katholieke Universiteit Leuven complimented the international perspective on teaching and learning in engineering. Prof. Vornberger gave us a very vivid insight of what new media like Opencast Matterhorn can achieve and Dr Marjoram addressed the demand for transformation and innovation in engineering education.

Today, we have listened to Prof. McCormick and the NSSE (National Survey of Student Engagement) as a tool to measure and make use of students' engagement. Professor Jones linked in his input engineering attractiveness to engineering education and showed us the close correlation. For the expert-discussion we have widened our focus and have integrated the students' and the employers' perspective.

I want to thank all who have contributed to the event and made it possible, the speakers, the panelists, the participants and those who organised the conference.

I think this conference has been a very good step in moving forward toward our common goal and I want to express my confidence that we are on the right path. I hope that many of you can build on the work done during this conference. But it's worth mentioning that a lot of challenges have already been met. In your daily work that is characterised with dynamic changes and insufficient financial and personal support, we successfully prepare students for a fruitful career and life.

Ladies and gentlemen,

I hope the presentations and discussions over the past two days will enable us to draw lessons and practices from one another. I thank you for coming to Berlin and hope you had a pleasant stay here.

Thank you all very much and I wish you a safe journey home.