

Committed Universities

Strong in research, skills-focussed and active in society





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Professor Horst Hippler,
President of the German Rectors' Conference (HRK)

Dear Reader,

Over the past few years, the educational debate has been enriched with several new key terms. Whilst previously conducting research in the interests of technical progress and educating the future social elite were among the noblest responsibilities of universities, today further aims are coming into focus that are of increasing significance: Universities are now expected to make a growing contribution to social integration and to prepare young people for conditions of life and work that are becoming ever more complex, international, and nuanced.

A glance at the statistics quickly reveals the extent of the changes that this entails: Within just a few decades, the number of students has more than doubled; today, half of the secondary school graduates will go on to university. These substantive and structural challenges have been significant factors behind the reforms that have taken place over the past decade: the conversion of degree programmes to Bachelor's and Master's is ultimately a response to the question of how universities deal with the new social demands.

Universities have embraced this change with enormous commitment, which directly benefits students. In this magazine we go on the trail of this active involvement, which is every bit as varied as the different higher education institutions and subject areas are themselves. We have divided the contents of this publication to cover four areas, each of which plays an important role in the current debate: Firstly, we show examples of innovative concepts for the crucial beginning stage of university studies and, secondly, we describe approaches to learning through research, in which students are exposed to research questions and projects in their very first semesters. Thirdly, we present models of ways in which universities can offer academic specialization with an eye to the job market; and, finally, we take a look at learning in and with society.

In this particular magazine, we very consciously focus on Bachelor's degree programmes. The showcased examples demonstrate that universities – even in this initial phase – are working actively to counter the often voiced criticism of an overly “school-like” approach and are developing innovative models as well as new forms of teaching. In this issue we are, of course, able to show only a fraction of the many innovative concepts, but these stand pars pro toto for the numerous successful degree programmes on offer at German higher education institutions.

I hope that you enjoy the tour and I wish you an illuminating and inspiring read!

Yours,



Right at the heart of real life: with the “Coburg Way” students make contacts beyond the university (image left); at the TU Berlin they work independently on projects they have chosen themselves and construct, for example, a bicycle from renewable raw materials (image right)

6 “Universities are committed to no longer simply being centres for research but social living spaces”
Interview with HRK Vice-President Professor Holger Burckhart

Getting off to a good start at university

Learning with a view to research

- 12 **FORUM FOR INNOVATIVE TEACHING**
Ars legendi Prize to honour outstanding teaching achievements – An overview
- 16 **FAR-SIGHTED STUDIES**
Coburg University of Applied Sciences and Arts moves beyond traditional subject boundaries
- 22 **SELF-PROPELLED SUITCASES AND BICYCLES WITH ENERGY RESERVES**
TU Darmstadt promotes interdisciplinary learning
- 28 **ONE PROGRAMME, MANY PATHS**
Ruhr-Universität Bochum put innovative teaching on a broader basis
- 32 **PLATFORM FOR INNOVATIONS**
The University of Hamburg makes starting studies easier with a dedicated “Kolleg”

- 36 **TAKING TEACHING INTO THEIR OWN HANDS**
At TU Berlin students learn in self-organised project workshops
- 38 **THE PRINCIPLE OF PRACTICE**
At Aachen University of Applied Sciences, students experiment with 3D printers from the very start
- 42 **FOLLOWING IN THE GIANT FOOTSTEPS OF HUMBOLDT**
The University of Hohenheim makes research accessible even to Bachelor’s students
- 46 **FIRST STEPS IN THE LABORATORY**
Saarland University offers a research specialism from outset



66



Dull theory? No way! Students use simulation games to put newly acquired knowledge straight into practice (image left); in Munich students have founded a social enterprise so that they can do good (image right)

Learning with a view to the job market

Learning for society

- 50 **VIRTUAL REALITY LEARNING**
Computer-assisted simulation games move into higher education institutions
- 56 **SPECIALISTS IN PRACTICE**
Bielefeld University of Applied Sciences offers tailored integration for local companies in their degree programmes
- 60 **TESTING THE PROFESSIONAL WATERS**
FU Berlin and the University of Kassel go for early orientation programmes
- 64 **HEADING OUT INTO THE WORLD**
The University of Augsburg educates business economists for the international market

- 68 **POSITIVE EXPERIENCES INCLUDED**
Service Learning helps students to use their knowledge for the good of civil society
- 71 **“Sensitive to social responsibility”**
Interview with Professor Wolfgang Stark from the higher education network “Education through Responsibility”
- 76 **SEMINARS TO BROADEN HORIZONS**
Interculturality recognised by the university as a key qualification and taught in a separate programme
- 78 **THE LAWYERS IN THE UNI LIBRARY**
At Berlin School of Economics and Law budding lawyers advise their fellow students

Conclusion

- 80 **A NEW DESIRE FOR ACTIVE COMMITMENT**
Analysis by Dr Peter A. Zervakis, head of the HRK Project nexus
- 82 Glossary of terms
- 83 Links and references, Imprint



“Universities are committed to no longer simply being centres for research but social living spaces”

Professor Holger Burckhart, Vice-President of the HRK, talks about the successes and failures of university reform, the graduates of the future – and the new role for universities in society

Professor Burckhart, you are a keen sailor. How do you feel about lighthouses?

I think I know why you ask that – because of the tendency to describe anything innovative that happens at a higher education institution as a “lighthouse project”.

Exactly. There are now so many of these lighthouses that you’d think everywhere would be nicely lit up already.

Let me give you my view of it as a sailor. When you are bringing your boat in off the high seas and you spot a lighthouse, that’s all well and good. But although it gives you some initial guidance, it only shows you the one section of the coast you are heading towards. When I look at the current state of higher education, what I see is a very wide coast. It’s true that there are now some lighthouses dotted around, which can definitely help us to get our bearings, but the coast still isn’t really well lit up.

A great deal has been achieved in the past few years, but that has a lot to do with programmes like the Quality of Teaching Pact, which is bringing large amounts of money into higher education ...

But that isn’t all – they’ve triggered some hugely important debates. For the most part, the public aren’t even aware of these processes,

as they play out deep in the recesses of individual higher education institutions. Behind many of the projects you are referring to lies a very long, very intensive exchange of ideas. Just as there are research communities, so now we have teaching communities that are looking at how to raise the status of teaching and strengthen it to make it a unique selling point.

But why has it taken such expensive programmes to get something done in higher education institutions? Surely providing good teaching is one of their core responsibilities anyway.

Thanks to initiatives such as the Quality of Teaching Pact, higher education institutions are recognising the importance of good teaching. They are getting staff to engage more and more with questions of methodology, too. That has coincided with a period in which higher education institutions are once again looking for a new contemporary self-conception. In the past, universities were mostly ivory towers that society looked up to and no one dared to challenge. However, that is changing, not least because of increasing numbers. Thirty years ago, only 20 per cent of school graduates went on to university; today the figure is 50 per cent. This has led to a new form of the discussion about the relationship between academic and vocational training. At the same time, there have been fundamental changes to the funding structure. There is no longer a continuous flow of public funds to universities; instead, funding is linked to



Biography

Professor Holger Burckhart is Rector of the University of Siegen and Vice-President of the German Rectors' Conference. He studied philosophy at Cologne and has spent time conducting research and teaching in countries such as China, Japan and Norway. Burckhart's research focuses mainly on the general philosophy of science, transcendental philosophy, philosophy of language and the philosophical foundations of education.



performance or comes in the form of project grants. That also creates a different sort of public.

Has that meant a change in the form of university involvement, away from a predominant focus on research?

Universities have always been actively involved, and they still are. However, I agree that the form of our engagement has changed – in the last 15 or 20 years, there has been much more focus on the students. Rather than just talking about the importance of teaching, we are making it a priority in practice. Universities are committed to no longer simply being centres for research but social living spaces – with good teaching as a linking element.

Engagement is always linked to the issue of responsibility. What is the main role of higher education institutions

today? Is it to deliver technological progress, to educate society or to produce employable graduates?

All higher education institutions must make sure that they are fulfilling their educational mission and that – amongst other things – they are providing their students with the right sort of training, are at the cutting edge of research, and are leading the way in their priority areas. Where they decide to concentrate depends on their individual profile. That also reflects the job that society gives higher education institutions to do, of course. In short, they are a conveyor belt into the future – which also means that they have a particular responsibility. That brings me back to the issue of student numbers. Bearing in mind that higher education institutions take on responsibility for half of the population at a crucial time in their lives, I can understand why society is asking what we as universities are really doing for those young people and is demanding transparency from us. The engagement we provide should be one of the elements we report back on.

The public debate you refer to often centres on the Bachelor's degree. Do you feel that its status has changed since Bachelor's and Master's degrees were first introduced?

I think that the value of the Bachelor's degree is now recognised by both universities and employers. Initially many people saw the traditional degree or combined Master's as the be-all and end-all. However, they now recognise that, given the high number of students, it makes a lot of sense to have two levels of qualifications in higher education. In that way, we can respond much more flexibly to society's demands.

That sounds a lot like university degrees as a form of vocational training.

No, it isn't about training people for a specific job. But in the same way we generally prepare young people for higher education through the *Abitur*, we must use Bachelor's and Master's degrees to equip them with the all-round skills they need for the job market.

You have given a very positive interim assessment of the introduction of Bachelor's and Master's degrees. In that case, why has the HRK only just adopted "Recommendations for further university reform"?

Just a second! Your question was about attitudes towards the Bachelor's degree, which are now much more favourable. We need to make a clear distinction between that issue and operational





implementation of the reforms, where there is still plenty of room for improvement. We mustn't forget that in just five or six years, at a time of huge pressure on budgets, higher education institutions have managed to bring about the biggest change to teaching for 200 years. They have done so based on a very vague mission statement and guidelines that were mainly operational. That was impossible to square with the notion that universities would have a free hand in terms of course design. We are starting to use the design possibilities that are opening up for Bachelor's degrees as well – provided that we don't totally overload them. The HRK recommendations you refer to are still necessary because we still have a long way to go at an operational level.

Let's focus on specifics. What does your ideal Bachelor's graduate of the future look like?

My vision involves thinking about what we want in terms of the finished product. What must someone with a Bachelor's degree in chemistry or philosophy know and be able to do? What is the inventory of knowledge and skills that can help guide us? The concept of a skills-based approach, which was central to university reform, was supposed to be about that, but we have turned it into something that reminds me of the old teacher training programmes. If you were training to be a teacher 30 years ago, for every three minutes of every lesson you had to note down a skill you wanted to get across to the pupils. It was awful! This can only lead to a very mechanistic approach. The "client" needs to say what skills they expect graduates to have; we should leave it to higher education institutions to work out how to get them there.

What is the client in this case? Is it other higher education institutions looking to admit Bachelor's graduates to their Master's programmes – or future employers?

That is the burning question. Why can't we set out clearly what skills a graduate needs to enter the workforce and what skills they need to continue in higher education? If that is made plain, every student will be in a position to choose one or other route. What I envisage is something like the age-old Y model. Students should stay together for the first four semesters of their Bachelor's programme before specialising. If they later realise that they have made the wrong choice, they must be able to switch courses, although obviously that will entail extra work.

Many higher education institutions have started reaching out to potential students long before they start university. Aren't they wasting resources there?

I think higher education institutions have a responsibility to support the "student life cycle". We must provide school pupils and professionally qualified people with a smooth transition to the higher education system. This broad introductory phase begins one or two years before they start university and goes on until at least the end of the second semester. Next there should be an orientation phase in which students receive support and advice from mentors to help them decide what they want to do after the fourth semester. They must always know what is going to be expected from them at the next level. As graduates, they can then offer advice to school pupils based on their experiences, completing the picture of a continuous "life cycle".

In your model, higher education institutions are responsible for the progress and success of every single student. That is asking a lot of them, isn't it?

Taking teaching seriously is one of higher education institutions' principal tasks. It requires very different resources from those currently available, of course, but with the appropriate model we could cut dropout rates significantly and, in particular, minimise chopping and changing of courses.

Doesn't that turn higher education institutions into repairs shop for society, as somehow they have to find some place for every last school graduate?

Naturally, we want to retain our successful dual education system; however, I don't consider the introduction of quotas for these two areas to be expedient. The fact that students now come from such a variety of backgrounds does make the job of higher education institutions very complicated, of course.

How do you plan to ensure that academic quality and technical depth don't suffer in view of all the supplementary and orientation courses that are springing up to address that?

Here, unlike in the UK and US, the Bachelor's degree has an academic dimension, which it must retain. Incidentally, that brings me back to your question about what higher education institutions are responsible for. I am strongly in favour of giving universities more responsibility for teaching and relaxing the formal regulations. They have a vested interest in making sure that their programmes remain academically demanding. The best way of maintaining specialist depth is to allow higher education institutions to do it themselves, rather than to keep on imposing new bureaucratic requirements.

Getting off to a good start at university

For most new students, their first few days at university are not an easy time. As well as dealing with a new environment and formalities such as matriculation and registering for seminars, they have to get to grips with unfamiliar forms of teaching and academically demanding courses. This was also true in the past, of course, but the conditions have changed. With time at *Gymnasium* (secondary school) shortened to eight years, school graduates are now pouring into higher education at a younger and younger age. In addition, there are many prospective students who, instead of taking the traditional route via secondary school, switch to the academic track following an apprenticeship, for instance. This increased diversity places particular demands on higher education institutions. Using innovative forms of teaching, they are working to make the transition to higher education as smooth as possible – and to show students from the start that it is worth it, even if it can be a struggle from time to time.





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ARS LEGENDI

FORUM FOR INNOVATIVE TEACHING



Ars legendi

The Ars legendi Prize is awarded by the German Rectors' Conference and the Stifterverband once a year in recognition of outstanding achievements in teaching. Since its launch, it has become a highly regarded award honouring innovation at German higher education institutions. The latest award focused on good concepts for the initial phase of study programmes. Here, we look at the winners and finalists

Winner

PROFESSOR MANFRED HAMPE
TU Darmstadt



Professor Manfred Hampe has long known that theory is just one element of teaching. And this is why for years the mechanical engineer from TU Darmstadt has set his students practical projects in their initial semesters: over several days, they put into practice the knowledge they have gained from lectures and seminars. This teaching concept has now set a precedent for the entire university, with almost all subject areas joining together in the KIVA project (*"Developing skills through interdisciplinary networking from the outset"*). In the very first semesters of Bachelor's degree programmes, diverse teams work on joint concepts – developing bicycles with an innovative system for recycling braking energy and writing an accompanying sales concept; coming up with solutions for refugee camps in areas of conflict or taking topics such as *future living* as the basis for unusual ideas. This new way of teaching has been very well received by the students. And mechanical engineer Manfred Hampe has no concerns that this interdisciplinary work could lead them to neglect their own subject area – quite the opposite: "The engineers of the future will both master their own fields and be experts in collaborating with others," he says. For more information about his concept and interdisciplinary teaching at TU Darmstadt, see page 22.

Ars legendi



Winner

PROFESSOR STEPHAN LORENZ

Ludwig-Maximilians-Universität München

When the students congratulated Professor Stephan Lorenz from Ludwig-Maximilians-Universität München on the occasion of the



Ars legendi Prize, they said with a wink: "Not many consider Law a fortress of creative thinking!" Without a wink, they clarified: "Your outstanding dedication

utterly refutes all claims that law is boring or dry." It was for that dedication that they nominated their professor: His classes, they said, convey passion for the subject, by using inspiring and often astonishing practical examples and explanations. No wonder Stephan Lorenz always receives top marks in the regular evaluations. But his dedication extends far beyond the lecture hall. He makes a routine of recording his lectures to put them online and make them available to everyone. His lecture podcasts are now being used by students all over Germany. On his website, Lorenz also provides accompanying materials such as case studies and extensive court rulings that are constantly updated. At the ceremony, Lorenz dedicated his award above all to the students: "Not just to the students who nominated me, but to all enthusiastic young people we so often underestimate, people who can achieve so much if we push them just a little bit. It is those students that motivate me every day to enter the lecture theatre with a smile and to leave it with a smile at the end of the lecture."

Finalist

PROFESSOR JULIA RÓZSA

SRH University Heidelberg

SRH University Heidelberg has aligned all of its teaching activities with a concept that it calls the CORE principle ("Competence-oriented research & education"). This centres on the students and on the division of teaching into five-week blocks: instead of traditional seminars and lectures that last an entire semester, study content is communicated in thematically bundled packages. Small groups with a maximum of 35 participants and close supervision of each student by a mentor aim to ensure learning success. The new study model, which was developed under the leadership of Professor Julia Rózsa and implemented by the team at the university, is used in all of its degree programmes. It is complemented by "Startklar" days that familiarise first-semester students with everyday work and life at the institution and the most important points of contact.



Finalist

PROFESSOR GERHARD MÜLLER

TU München



Around breakfast time, anyone studying with Professor Gerhard Müller will receive a message on their smartphone. This usually consists of a short question with three possible answers taken from the latest lecture. The construction engineer from TU München calls this format "prep questions to warm up in the morning." Mobile phones play a recurring role in his teaching. In each lecture, anonymous questionnaires are used to find out whether the students have understood the content. Online tests are also set every 14 days, and students receive their results very quickly thanks to the automated assessment procedure. Trained tutors and regular consultation hours led by students aim to help new students overcome their fear of asking for help. But Gerhard Müller's efforts to help beginners start much earlier than this: his students regularly visit primary schools to demonstrate experiments and to awaken a passion for engineering.

gen di



Finalists

**ULRICH KIRCHGÄSSNER,
DR RUTH MICHALEK**
Freiburg University of Education

Freiburg University of Education



At Freiburg University of Education, new student orientation aims to simplify the process of starting your studies. The two-week course is aimed at students of educational sciences and was devised by Ulrich Kirchgässner and Dr Ruth Michalek. It has three goals: first, to offer insights into this heterogeneous occupational field; second, to teach skills such as academic working



and writing; and third, to help them find their feet at the higher education institution. This initial phase is structured in such a way that the various elements build on one another. It begins with an excursion through Freiburg with an overarching theme such as *education for sustainable development*. Using the impetus from this, the students form small working groups and spend the following 14 days dealing with a particular topic with the support of their tutors and seminar leaders. At the end of the second seminar week, the groups present their results at the institution and report on their experiences. They then write an assignment. Thanks to extensive feedback from the academic teaching staff, this has become one of the first steps on the road to academic work.

Finalist

PROFESSOR UDO NACKENHORST
Leibniz Universität Hannover

For many years, Professor Udo Nackenhorst of the Institute of Mechanics and Computational Mechanics at Leibniz Universität Hannover has been experiencing the same difficulties in engineering degree programmes: the dropout rate is high and many students lack the intrinsic motivation to complete the considerable workload of such a study programme in a structured manner. Shortcomings in mathematical education make the effect even worse. To provide guidance and boost motivation, Nackenhorst has introduced the *Project management in engineering* study model. As well as teaching the supposedly difficult basic subjects, this model aims to familiarise students with the breadth of the profession at the very start of their studies

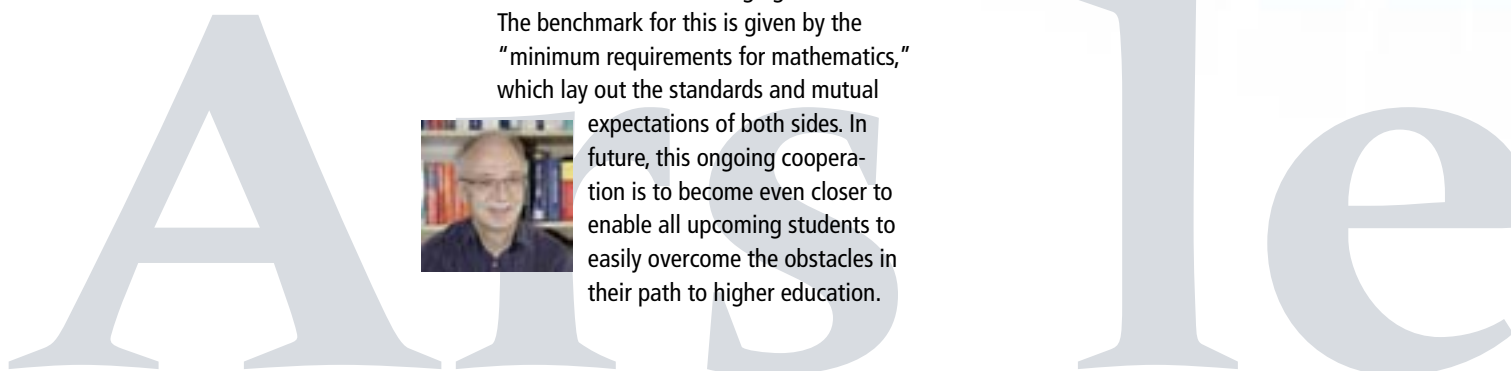


so that they can make informed decisions when choosing which subjects to study. It also communicates important elements of study strategy such as team work, project management and research, as well as the basics of scientific working methods. These basic abilities are tested in specific construction projects such as planning a passive housing development or an offshore wind energy farm.

Finalist

PROFESSOR KLAUS DÜRRSCHNABEL
Karlsruhe University of Applied Sciences

Professor Klaus Dürrschnabel from Karlsruhe University of Applied Sciences has long been vexed by the increasing habit of schools and higher education institutions to talk about each other and not to each other. And his subject area, mathematics, is one of the particularly critical points: school curriculums and teaching methods have been noticeably reformed and higher education institutions have even modified their teaching by introducing Bachelor's and Master's degrees. Now, Dürrschnabel and his colleagues want to make it easier to negotiate the increasing divide between the *Abitur* (secondary school exams) and higher education. To this end, annual joint conferences take place in Baden-Württemberg under the project title *cosh* (Cooperation between schools and higher education); schools include additional mathematics courses as a fixed part of their teaching, and higher education institutions offer bridging courses. The benchmark for this is given by the "minimum requirements for mathematics," which lay out the standards and mutual expectations of both sides. In future, this ongoing cooperation is to become even closer to enable all upcoming students to easily overcome the obstacles in their path to higher education.





Finalists

**PROFESSOR RICHARD GÖTTLICH,
PROFESSOR SIEGFRIED SCHINDLER**
Justus Liebig University Giessen

Professor Richard Göttlich and Professor Siegfried Schindler from Justus Liebig University Giessen have developed a range of courses to help students studying chemistry as a subsidiary subject to make the transition from school to higher education. First, they evaluated students' prior knowledge of chemistry and used the results as a basis to design both a preparatory course and numerous e-learning elements such as electronic lectures and exercises. Their teaching also makes use of electronic laboratory programmes such as Virtual ChemLab. A glance at the figures alone proves that their efforts are paying off: more than 2,000 students from 14 different degree programmes are currently taking part in their courses.



Finalist

DR SAŠA SOPKA
AIXTRA – Aachen Interdisciplinary Training Centre for Medical Education

AIXTRA – Aachen Interdisciplinary Training Centre for Medical Education
When co-founding AIXTRA, Dr Saša Sopka envisioned close links between clinics, academia and teaching. Today, Sopka heads the Aachen Interdisciplinary Training Centre for Medical Education together with a colleague. Budding doctors are taught skills from all areas of medicine, from taking blood samples to communicating with patients. In their work, the Aachen-based academics define primary learning goals that they use to continuously hone the profile of the degree programme. In addition to professional training and continuing education for doctors, AIXTRA specialises in interdisciplinary and inter-professional teaching, with special seminars for occupational therapists, physiotherapists, nurses and paramedics. The broad range on offer is based on close collaboration with many clinics and institutes in Aachen. One particular feature is the involvement of student assistants, who receive specialist and educational training so that they too can contribute to teaching. Several graduates of the *Master's of Medical Education* degree programme also support the development of new concepts.



Finalist

PROFESSOR DANIEL GRIESER
University of Oldenburg

Placing creativity at the heart of his module, Professor Daniel Grieser is convinced that a passion for mathematics develops from making your own discoveries, not from learning definitions and formulas by heart. In his introductory course at the University of Oldenburg,



which comprises a lecture and tutorials, he therefore aims to make his students aware of mathematical challenges so that they can come up with their own solutions. In a second step, the students on his course learn strategies for solving and proving problems, and practise making their ideas precise and formulating them clearly. This works because all components of the course are completed interactively. The course finishes with a written exam because the student numbers do not permit a more individual form of examination – 200 people take the course each year, most of whom will become maths teachers because the student numbers do not permit a more individual form of examination – 200 people take the course each year, most of whom are studying teaching, although some also come from the traditional Bachelor's programme in mathematics.

gendli



COBURG UNIVERSITY OF APPLIED SCIENCES AND ARTS

FAR-SIGHTED STUDIES



Through its project "the Coburg way", Coburg University of Applied Sciences and Arts in Franconia has made interdisciplinary teaching and individual support an integral part of many degree programmes. Participants study across subject boundaries, receive intensive supervision – and gain new perspectives on their own discipline

For Professor Barbara Fuchs, the breakthrough came when students from her interior design programme visited an old people's home. "We immediately stopped focusing on what we liked aesthetically," she says. "Instead, we started to look at the residents' specific needs. Do they prefer to sit on sofas or on chairs? How high does the bed have to be to enable them to get up on their own? That was a real eye-opener!" Accompanying

projects across disciplinary boundaries – for example, students on the interior design and social work programmes were asked to come up with ideas for an old people's home of the future. More interdisciplinary classes are interspersed throughout the remainder of their course. "We are starting to break down the old barriers between faculties" is something you hear over and over again in Coburg – and it is said with a degree of pride.



Studying in style: the new lecture wing on the Coburg campus

Barbara Fuchs' interior design students on their visit to the old people's home were social work students and their supervisor Wolfgang Budde, who have a completely different perspective on the issue of ageing.

Coburg University of Applied Sciences and Arts has set interdisciplinary collaboration as one of its main goals. The aim is to build this up systematically, especially at the start of degree programmes; that is one of the principles behind the "Coburg way". The model, which is funded under the Quality of Teaching Pact, is based on the traditional "studium generale". Even in the first semester, students taking a whole range of subjects are involved in joint lectures and seminars. In their second and third semesters, students work together on specific

For instance, the first semester now features a lecture series on an overarching theme such as demographic change. Business managers, health scientists, civil engineers, social workers, philosophers and insurance experts explore the issue from their particular vantage points. For the students, it is not just about hearing a broad range of views – it also about making contact with colleagues from other subject areas and discovering how they think, so that they can all pull in the same direction when working together.

"This small university is enabling a wide range of disciplines to work together in a way I haven't come across before", says Barbara Fuchs, the Professor of Interior Design, who has worked previously in Munich and Berlin. In



An exciting prospect: the old brewery is now home to the Design Faculty

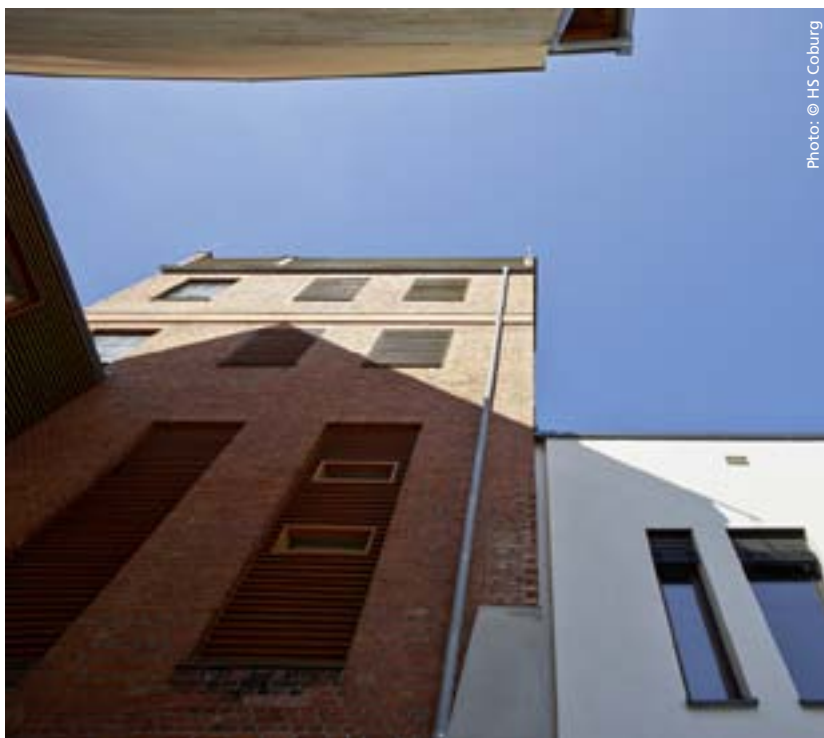


Photo: © HS Coburg

“We want graduates who think decisions through carefully and don’t have a quick answer to everything”

Coburg she has her office in the old brewery, whose walls form the core of the university’s spectacular design campus, although its interior has been totally reconstructed following a fire. The architects who designed the campus chose deliberately to play up the contrast between old and new. Just a few yards from the brewery towers a purist new building featuring large expanses of glass. This houses facilities including the workshops where Coburg’s budding designers and architects assemble their models. One of the things the “Coburg way” does is prevent them shutting themselves away in this carefully crafted world. The aim, Barbara Fuchs says, is to encourage students to think about their approach: “As designers, we have a completely different way of thinking from business managers or engineers. That is precisely why we are trying to link up with them.” She has initiated projects with mechanical engineers as well as social work experts; recently she ran a seminar with someone specialising in cultural studies. “I get a huge amount out of our discussions about our different perspectives. And it is clear that the students find that fascinating when it happens during a joint seminar. They get to see how their professors’ points of view differ and to see them challenge each other from their opposing perspectives. That is very important for any career they end up pursuing in future.”

If you take a walk from the former brewery up the steep hill at the edge of the old town

of Coburg, you come to the university’s main campus. From here you can gaze down on the town’s twists and turns and on Coburg castle, which stands on the hill opposite; from the new lecture building, students enjoy an uninterrupted view of this imposing symbol of the region. The university’s President, Professor Michael Pötzl, and its Vice-President, Professor Eckardt Buchholz-Schuster, have their offices in this panoramic setting. It was they who, together with their colleagues, first came up with the “Coburg Way”. “Only a few higher education institutions of our size offer such a wide range of subjects,” Pötzl says – at Coburg there are even professorships in philosophy, cultural studies and languages. He sees the establishment of closer ties between different subjects and the fact that both students and academics are now able to draw on one another’s expertise as a logical development, albeit a challenging one: “In this we are guided by the principle that the whole is more than the sum of its parts.” What he and his colleagues envisage is an holistic education that opens up new perspectives for students. As Pötzl puts it, “For me, one of the university’s primary tasks is to promote personal development, as it is the basis for successful learning”; this is a principle enshrined in Coburg’s mission statement. He sees the “Coburg Way” not as the result of a revolution but as the logical extension of many earlier initiatives, especially some innovative degree programmes in which the barriers



Photo: © HS Coburg



Photo: © HS Coburg



Photo: © HS Coburg

Working things out together: students engaged in project work in the "Coburg Way"

Impacts at a glance

Right from the outset, students get to know about other perspectives and ways of working through interdisciplinary work; this also allows them to forge links with students in other subject areas. Local businesses benefit from having a pool of potential employees with experience of team working. And thanks to Coburg's unique offering, the university has been able to attract applicants from all over Germany.

between disciplines had already been broken down. The integrated product design programme, for example, brings together artistic, managerial and technical elements, while the automotive technology programme involves a combination of mechanical engineering, electrical engineering, computer science and business administration; in the Design Faculty, future architects and civil engineers attend joint classes right from the start. These courses are attracting applicants from all over Germany; in the end, it was this positive response that prompted the university to take the next step.

One of the main pillars of the "Coburg Way" is support for individual students. A whole range of programmes – all featuring the letters "CO", the abbreviation for Coburg on car number plates, in their name – have been laid on to provide that. For example, first-semester students can choose to take part in an "anCOmmens-Woche" (freshers' week for new arrivals) before things really get going. This gives them an initial taste of university and town life – as well as a chance to get to know the people they will be studying with. There is another programme called CO-Teaching that involves two teaching staff from different disciplines running a joint seminar as a way of bridging the gap between their subjects. Then there are the tutorials; during the 2013-14 winter semester alone, 54 tutor positions were created to support the "Coburg way", ensuring



Photo: © HS Coburg

Prioritising creativity: the “Coburg Way” is producing fresh ideas

“This small university is enabling a wide range of disciplines to work together in a way I haven’t come across before”

that new students will benefit from intensive supervision. Students on all participating programmes now have a dedicated point of contact to help them with questions like how to go about writing assignments, how to cite academic literature and how to solve that tricky maths problem.

Support for the “Coburg way” is not unanimous, however; some academics remain sceptical about the new measures. For that reason, not all of the university’s 4,800 students are taking part in interdisciplinary courses. Currently, involvement is limited to those enrolled in one of seven participating programmes – around 700 first-semester students a year. The university is investing heavily in the project to ensure that everything runs smoothly for them. Nine professors and teaching staff have been appointed specifically to deliver the “Coburg way”; there are also a further 21 project workers. Vice-President Buchholz-Schuster sees the concept as a way of clearly defining his university’s identity: “We want graduates who think decisions through carefully and don’t have a quick answer to everything.”

The new approach also demands a great deal of teaching staff, as Professor Jutta Michel observes. Professor Michel is a mathematician and the Dean of the Business Faculty. Together with some academic colleagues, she has put together an interdisciplinary project entitled “The human cost factor in health insurance”. “Everyone has their own ideas about how to do it. The legal experts want to construct case studies, the philosopher would like to focus on the ethical aspects and I am interested in how everything works out financially,” says Michel. She sees interdisciplinary courses of this kind as an essential part of any degree: “They help

students to mature and give them a sense of what awaits them in their later careers."

The impact of the "Coburg way" has also been felt beyond the university – for example, at the Coburg Theatre, a company with a long history of staging operas, plays and ballet. "We don't have any drama or music students in the town to provide a natural link, as it were, with the theatre," says Bodo Busse, the theatre's director. The university has made a unique contribution in other ways, however. Its interior design students have put together some of the sets, while in one experimental production the chorus was made up of students from its engineering and business administration programmes. Students have also been flocking to premiers at the theatre. "I have never seen such close collaboration between a theatre and a higher education institution whose real specialism is in subjects unconnected to its work," Busse remarks. This has had benefits for both sides. According to Busse, his company has been given a boost and has, in turn, had a stimulating effect on the students: "The theatre offers complex ways of thinking and isn't always focused on outcomes, so it provides a useful supplement to many degree programmes – as well as a stimulant from which graduates can benefit later in life." Some students become involved with the theatre through partnership working with their professors, but in most cases they are brought there by a curiosity and openness first kindled in the lecture theatre.

Michael Pötzl and Eckardt Buchholz-Schuster, the two people who came up with the "Coburg way", are delighted that there is so much excitement around. "Just the fact that we are now having even more intense discussions about teaching is very positive," Buchholz-Schuster notes approvingly. "This model is giving us the time to appreciate the value of interdisciplinary working!" Even at this early stage, it is clear that Coburg's initiative has struck a chord – academics from far and wide are now applying for positions there, as its open approach to teaching encapsulates what they have always seen as important. Employers are looking forward to taking on students with more to offer than technical expertise, while an increasing number of those enrolling at the university come not from its traditional catchment area but from places all over Germany.

The university can only take encouragement from the positive results it has achieved by offering such an attractive range of courses.

Spotlight on students

Annemarie Ammer is a social work student in her third semester.

At first, the topic we were given for our "Coburg way" project sounded really abstract. Its formal title was "All the same – all different!?! Intercultural openness – living and learning in a pluralist society". I would never have thought that that could throw up such fascinating research questions. With other students from our year, we formed small groups, each of which tackled a specific aspect of the topic. My group decided to look at the theme of individual and cultural models of home. It included both social work and business administration students. After an extensive theoretical grounding, we carried out qualitative interviews aimed at establishing the importance of "home" for those taking part in the study – for example, whether for them "home" meant a specific place or whether instead it was defined in terms of social relationships. Our interviewees included both men and women; some were people from around Coburg, while others had a migration background. We were surprised by how similar their answers were. So what did I get out of the project? First and foremost, I see it as a superb exercise in qualitative research methods that I will definitely need to use again while I am at university. I am interested in the topic because, after leaving school, I did my voluntary service in Zambia. Being so far away from Germany, I spent a lot of time thinking about what home really means to me.



Eva-Maria Popp is a business administration student in her first semester.

I wouldn't really have engaged with the issue of quotas for women if it hadn't been a "Coburg way" topic. In the first semester, there are interdisciplinary classes where we take part in a seminar and an exercise with students from other subjects. The overarching theme for our year is "social transformations". I am part of a seminar run jointly by a linguist and a law professor on "Legal norms in a changing society – what has that got to do with me?" One of the issues we looked at was quotas for women, which is a hot topic at the moment. I find it interesting that we are dealing with questions that, at first glance, have nothing to do with the subjects we are actually studying. It is a lot of work, of course, and many students complain about the extra workload, but completing the assignments helps you learn how to work and write in an academic way.





TU DARMSTADT

SELF-PROPELLED SUITCASES AND BICYCLES WITH ENERGY RESERVES

From their very first semester, students at TU Darmstadt embark on interdisciplinary work. This aims to increase their awareness of their own field and teach them to be independent: one of the core features of the concept is the project work that has been completed by 4,000 students so far

“The engineers of the future will both master their own fields and be experts in collaborating with others”

By the third day of working with them, Frank Kühl knew that the young developers were on the right track. The students were to develop a bicycle that recovers braking energy, not exactly an easy task for first-semester students of mechanical and industrial engineering. “After the first few days, they were supposed to fill in a questionnaire about how well I had supported them,” says Kühl with a smile. “But they just looked at me and said: ‘But you haven’t done anything!’” That was the best possible feedback the doctoral student in mechanical engineering could have received – his group were coping perfectly well without him.

Challenging the students with complex questions is part of the teaching concept at TU Darmstadt. All subject areas have adopted the concept of *competence development through interdisciplinary cooperation from the beginning*, a project known as KIVA that is promoted through the Quality of Teaching Pact. It

is made up of six pillars (see page 25) ranging from strengthening mathematical education, to the inclusion of inspiring visiting professors, through to complex projects in the initial phase of study programmes. This project work, which also includes the development of the bicycle with recuperation technology, is one of the core elements of KIVA – if only due to the fact that it involves almost all new students. “Now, almost all subject areas are involved in the interdisciplinary tasks,” says Beate Kriegler, main KIVA coordinator. “Each year, several disciplines work together on large-scale projects and develop tasks tailored to their students.”

The man who laid the foundations for KIVA and received the *Ars legendi* prize for good teaching in recognition of his idea, has his office just a few minutes outside the city centre on the TU Lichtwiese campus. “The engineers of the future will both master their own fields and be experts in collaborating with others,” says Professor Manfred Hampe. The



Impacts at a glance

Students consolidate their own specialist knowledge and also expand it through contact with other disciplines. Moreover, they also practise independent project work from the outset. The university is able to create better links between its vast range of expertise and becomes more attractive to students and researchers alike.



mechanical engineer is the academic director of the KIVA subproject *interdisciplinary first-year student projects* and one of the pioneers of project work. For more than a decade, he and his colleagues have been devising complex tasks for the students to solve together in their first months of study. "This encourages them to identify with their own field and to engage with the methodology," explains Hampe – and it acts as a strong incentive because the students have to apply their knowledge straight away and acquire new skills. "Afterwards, they can use the tools of their trade much better,"

knowing how to find missing information by themselves and seeing how fellow students from other fields approach the same question in a different way – this experience is has a lasting impact. Hampe is convinced that a project phase of just one week is perfectly sufficient: "Even the very young students seem much more adult. This one week is like a spark that initiates a self-learning process."

Depending on the subject area, the interdisciplinary projects take place in the first, second or third semester. Some last just one week,



Photo: © Paul Globowski TU Darmstadt

Five computers and even more good ideas: Darmstadt students plan their joint project

says the professor of mechanical engineering. And the statistics show just how well his concept works: of those who begin a mechanical engineering degree, a mere 20% fail to finish, an unusually low dropout rate for the field of engineering.

Hampe's initiative prompted the project to be extended to the entire university and interdisciplinary teams to be formed. Despite some initial scepticism, most of his colleagues are now convinced that it works. "The students change during the project, and it's much easier to work with them afterwards," enthuses Manfred Hampe. Learning to work in a team,

while in other cases students work regularly on their tasks over a whole semester. As you can imagine, topics vary widely; however, they are all socially relevant. For example, *Supply and prevention of refugee camps through technical support* involved around 300 IT, biology, philosophy and political science students. Their task was to consider how a refugee camp could be organised in such a way as to prevent epidemics, fairly distribute supplies and education and guarantee that human rights are observed.

In a further form of cooperation, around 600 students from the departments of electrical engineering, sociology and industrial engineer-



The KIVA model at a glance

Developing skills through competence development through interdisciplinary cooperation from the beginning (KIVA) extends throughout the whole of TU Darmstadt, involving all 13 subject areas. KIVA is made up of six closely connected subprojects. They are also linked with projects throughout the country dealing with similar topics. These include the network for 'Tutorial work at higher education institutions' as well as a cooperative network currently being established that will allow people to share their experiences of interdisciplinarity and includes the Quality of Teaching Pact projects of TU Berlin, the University of Hamburg, TU München and Goethe University Frankfurt am Main.





Photo: © Patrick Bal TU Darmstadt

Team work: students develop a recuperation system for a bicycle (left) and a self-propelling suitcase (right)

ing examined the topic of *future living* with the aim of using technology to meet the needs of different age groups. For example, one team constructed a suitcase for frequent travellers that automatically follows its owner around the airport. The most successful product in this project was a system that prevents children from unfastening their seatbelts by themselves while the car is in motion – the young students have now registered a patent for this idea.

After its first few years, Darmstadt's academics now look back on the concept from a positive perspective: "In many projects, we formed both interdisciplinary and monodisciplinary groups," says Professor Joachim Vogt, a psychologist, who leads the KIVA evaluation. "We can clearly see the benefits of bringing people into contact with one another." Ultimately, this also fits with his experience in industry: "Again and again, I have seen projects fail because people could not engage with one another." He explains that the start of a person's studies is exactly the right point at which to teach this skill – participants were often much more open to fellow students from other subject areas.

The whole of TU Darmstadt is involved in organising these interdisciplinary projects. In the 2013/14 academic year alone, a total of 2,300 students took part and were divided into small groups. Each team required its own workspace, trained supervisor and a well-thought-out task. "We need at least half a year to prepare for this one week," says Dr Robin Kröger, who leads the interdisciplinary projects. He is particularly proud of the intensive support provided. Each of the small working groups (12 to 15 students) has two supervisors: one to look after the academic side, answering questions and intervening if the team is in danger of reaching an impasse, and one to look after the team work. These are usually advanced students in the humanities and social sciences who have previously spent a semester training to become team supervisors. KIVA gives them the chance to use their new knowledge straight away: "We provide a brief introduction to team work and then watch how the group members organise themselves," explains Janine Schwan, who has worked as a team supervisor for several years: "If we realise that it would be useful to have a moderator or that nobody is writing down the results, then we provide



appropriate guidance.” Manfred Hampe, the academic director, explains that this intensive support allows Darmstadt’s academics to avoid the problems that frequently arise in group work: “They cannot hide behind their fellow students and avoid contributing; at the same time, nobody can dominate the team.”

During the week, the professors are available to act as sounding boards, and they also form part of the jury that ultimately awards the prizes to the best student solutions. Industry representatives are also involved and, as Manfred Hampe recounts, never cease to be amazed by what the students achieve in their first semester. “The sentence I hear most often is ‘these are exactly the sort of graduates we need’,” Hampe grins. But for him, the greatest satisfaction comes not from their acceptance by the jobs market, but from the fact that his students would make excellent mechanical engineers, not least thanks to the innovative approaches employed at the start of their studies.

Spotlight on students

Sebastian Kilb and Lukas Zimmermann are first-semester mechanical engineering students.

We had only been at the university for a few weeks when we formed a team with some fellow students. The professors gave us a clear task to get us started: we were to develop a bicycle that stores and recycles its braking energy. On the second day, we decided to use a hydraulic storage system rather than a spring, fly wheel or pneumatic storage system. We then formed small development teams, each with two or three people, to focus on the storage tank for the hydraulic fluid, the drives, the clutch and the pump. In the meantime, a group of industrial engineers drew up a business proposal and calculated the manufacturing costs and profit margins. The technology was based on a simple principle: if, for example, our bicycle braked for a red light, the energy freed up would pump hydraulic fluid from a low-pressure tank to a high-pressure tank. When the lights changed to green and the bicycle started moving again, the fluid flowing back could be used to generate kinetic energy to propel the bicycle. The professors and economic representatives must have been convinced by our solution, because of all 60 teams with the same task, we won first prize. We are particularly pleased because a prototype is now being built based on our design, and we are really excited to see how the bike will work.



RU BOCHUM

ONE PROGRAMME, MANY PATHS

Ruhr-Universität supports its students with a new teaching approach throughout the entire Bachelor's phase, from bridging courses for new students to advice and insights into research. Bochum's academics are building on their long experience with innovative teaching



"We leave university and enter real life but always stay connected to the theoretical background"

She was enthusiastic about the topic from the outset: the project offered by the Department of Social Theory and Social Psychology is called *Social sciences in the theatre* – and Heidi Lorei is fascinated by the interaction between science and art. "It focuses, for example, on rituals in the theatre and on transformations in the urban space," she says, remembering a statement by a fellow student: "We leave university and enter real life, but always remain connected to the theoretical background". Students from theatre studies and the social sciences participate in the project; there is even one engineer, who is taking the opportunity to try something totally different to his regular studies. Heidi Lorei is herself involved in two roles: as a participant and as a student assistant, helping with organisational tasks.

Social sciences in the theatre is part of the inSTUDIES programme at Ruhr-Universität

Bochum (RUB); the name stands for *intensive, international and interdisciplinary study*. The slogan *Mach mehr aus deinem Studium, mach mit bei inSTUDIES* call on students to "get more from your studies, get involved with inSTUDIES" and the programme brings together numerous initiatives, projects and offerings from across the entire university that support students in their own personal path through higher education. "We focus on three decisive points in the Bachelor's degree programme," explains Dr Andrea Koch-Thiele, who is responsible for project management. "It begins with the transition to university in which we prepare students for what lies ahead, continues through to intensive and targeted studies, and concludes with the successful move to professional practice or a Master's degree." Koch-Thiele and the project team are three tram stops away from the Ruhr-Universität campus, which is bursting at the seams. But she



Photo: © Georg Oligmüller

Field work: budding biologists from the *What's life?* project

assures us that the distance is no problem – quite the opposite: she sits in the office together with colleagues from various university faculties and administrative departments who are now working together on inSTUDIES.

The project, which is supported by the Quality of Teaching Pact, uses RUB's optional courses as a platform for new offerings. This optional compulsory element is a fixed part of many Bachelor's degree programmes and is supported by 14 faculties, which provide a range of interdisciplinary teaching each semester for more than 10,000 interested students. The underlying idea is that every student should not only deepen their specialist knowledge, but also acquire key qualifications that will prepare them for a career after their Bachelor's studies. Depending on their interests, students may, for example, be able to specialise in a particular region by attending

seminars and language courses relating to that region, gain an insight into research or expand on their personal skills through communication, presentation and project management tasks. The optional element allows students to earn credits for the inSTUDIES projects. "Their commitment earns them tangible credit points, rather than additional offers. At the same time, they expand and hone their individual study profiles," says Birgit Frey, who has the role of project coordinator for optional courses in the inSTUDIES team.

The inSTUDIES office has become a place where the university's many points of contact and institutions work together to further develop teaching. This includes the Student Support Centre, e-learning administrative office, international office and careers service – inSTUDIES has now given RUB the opportunity to network and extend its offering much more strongly.



In the picture: Bochum students present their findings

Impacts at a glance

The advice and teaching on offer shows students how to better navigate their studies, while the wide range of specialist options helps them to develop their own profile. The university receives valuable inspiration for innovative teaching formats and uses interdisciplinary offerings to encourage the academic investigation of major social development issues.

Workshops and special further training are held for this purpose, and all participants meet once a month. "This is important to us, because we have close personal links and are all pulling in the same direction," says Andrea Koch-Thiele.

The content of the courses offered varies widely. For example, two-week summer schools see mathematicians and philosophers tackle questions of modelling time, biologists and theologians consider bioethics, and other students look at humanitarian aid in the 21st century. Projects with regional relevance form another focal point; a new teaching project is currently being prepared about the industrial culture of the Ruhr and the history of social movements. However, the international projects are the most complex, covering topics such as Poland and the Holocaust or political, religious and social upheavals in India. In addition to the intensive preparation phase, in-country work also forms part of the project.



Photo: © Birgit Frey

Bochum's academics are particularly proud of their student projects, and students can also contribute topics that are especially important to them. The inSTUDIES team helps them to implement their ideas and supports them in subject, organisational and methodical matters. "Two budding teachers devised activities focusing on the correct use of e-boards in language lessons or on preparing for practical training. Another group is currently examining the use of computer and video games to impart knowledge, motivation and behavioural changes, for example in healthcare," says Andrea Koch-Thiele.

Heidi Lorei, the student from the *Social sciences in the theatre* project, is now also a student member of the inSTUDIES steering group. "I want to see what goes on behind the scenes of the university, and how such a programme changes it." She has retained her enthusiasm despite the large workload. "I'm constantly thinking 'wow, that has so much creative potential!'"



Photo: © RUB/Anja Heile

Research from the outset

Professor Dominik Begerow (photo, left) and Dr. Jens Wöllecke (right) had not expected such a response. They asked the new Bachelor's students what they would like to achieve in their biology studies – and one answer has stayed with them ever since. "I would like to develop a drug that can cure all forms of cancer," one of the budding academics wrote on the board. Jens Wöllecke grins briefly, then becomes serious: "And that's precisely why we ask these questions. They help people to find their way and assess themselves." The biologists have no intention of curtailing the ambitions of their new students; they simply wish to help them get started on manageable research tasks, to learn how scientists go about their work. Dominik Begerow's project at Ruhr-Universität Bochum (RUB), *What's life?*, received the Ars legendi faculty prize for mathematics and natural sciences. It is part of inSTUDIES and fulfils many roles, acting as a sort of preparatory course while also providing initial contact with biological research, individual working groups and the depth of the subject area and is ultimately a motivational programme that supports the highly theoretical first few semesters. The programme is open to anyone who is interested. "We arrange it over three semesters," explains Jens Wöllecke. To begin, he and his colleagues invite participants to a two-day information event to find out more about the students' expectations and prior knowledge. This is followed by traditional introductions to academic work such as a "journal club" in the second semester. "Here, we read recent articles from researchers in our faculty," explains Jens Wöllecke. This gives students an initial impression of what academics do and how wide-ranging the subject area can be. Finally, the students choose their own questions and whether they want to work alone or in a small group. These are not major projects like a universal cure for cancer, but rather manageable tasks such as *A comparison of flight behaviour in male and female blackbirds*, *The occurrence of fungus in the faculty building* or *Penicillin production in wild type P. chrysogenum depending on pH value, light and temperature*. What is important is that they must be able to link their topic to an RUB research area. In the third semester, they will have the chance to work in the laboratory themselves, and to discuss their approaches with experienced non-professional academic staff or even the professors themselves. At the same time, the additional teaching load is shared between several members of the faculty. "In one department, the research even led to a publication featuring our third-semester student as co-author, because he contributed to the project," says Wöllecke, praising the constructive collaboration that often ensues. "Many students have already received offers to write their Bachelor's dissertations on the areas featured in their first research projects."



UNIVERSITÄT HAMBURG

PLATFORM FOR INNOVATIONS

To smooth the transition to higher education, the *Universitätskolleg* at University of Hamburg gathers good methods from all faculties, from mentor programmes to workshops for school pupils. The purpose: to permeate these ideas to other subject areas

Professor Arndt Schmehl is, of course, aware that the goal is ambitious: students should find it easier to start university, academic teaching should be improved, the dropout rate should decrease and the initial semesters should be made more appealing to students. "Many faculties already have tried-and-tested instruments for all of these issues," says Schmehl, who heads the *Universitätskolleg*: "We have picked up on many of these ideas and developed them to produce something new."

The college has now accumulated 40 projects, including initiatives to boost enthusiasm for mathematics among female school graduates, workshops on writing academic texts in the humanities and social sciences, and large-scale tutor projects for budding lawyers. The college aims to help these good ideas spread more quickly. The hope is that not every discipline will have to reinvent the

wheel if another university department already has a successful model for the initial phase of study programmes. "Colleagues in the MINT subjects have already gained experience with 'introductory weeks' in which they introduce students to how things work at the university," says Arndt Schmehl, himself a professor of public, financial and tax law. "Why shouldn't we in the law faculty benefit as well, for example?" Various ideas are shared at regular meetings and by the university-wide communicators (known in German as "Kolleg-Boten").

Hamburg's academics term their approach – which is financed by the Quality of Teaching Pact – an innovation network. However, the college is still an independent institution with an overarching concept and does not centrally control the details of the individual projects. "They remain in the respective faculties and work independently of one another," states Schmehl. The central facility concentrates primarily on conceptual cohesion and sharing solutions. Schmehl explains that this cautious approach, which does not lump together all subject areas, was consciously chosen to ensure that ideas remain where they will have the most effect. "Although the *Universitätskolleg* is a central facility, it is not a satellite that simply orbits the university; it should be right in the middle of the action."

One common feature of the projects within the college is that they focus on the phase from

Impacts at a glance

Students receive closer and more personalised support, from deciding what to study through to their first semesters at university. University departments are networked, allowing them to use new or tried-and-tested methods from other faculties.



Flagship: the writing workshop is one of the many projects run by the *Universitätskolleg*

student orientation through to the initial semesters. "If the university is to fulfil its responsibilities as an institution of academic teaching and scientific education, it must pay particular attention to this period," emphasises Arndt Schmehl. But the aim is not to homogenise the content – quite the opposite: the high level can only be maintained if the great diversity of the students is taken into account.

focus is on increasing "the effects of integration during the first two semesters on the university socialisation of students," as Arndt Schmehl puts it. And he hopes this is precisely will become the University of Hamburg's hallmark.

"Through our work, we want to help boost the reputation of teaching innovations," says Arndt Schmehl. The college's teaching lab was set up specifically for this purpose: teachers can apply who wish to align their classes with the latest methods but have no time to do so in their day-to-day work. "We take away the workload of their other teaching commitments for one or two semesters so that they can concentrate fully on this one activity," Schmehl explains. At the same time, the University of Hamburg is setting up the *Interdisciplinary Centre for University Learning and Teaching (IZuLL)*, for which three professorships have been established. In the medium term, the similarities in their objectives are set to bring IZuLL and the college closer together.

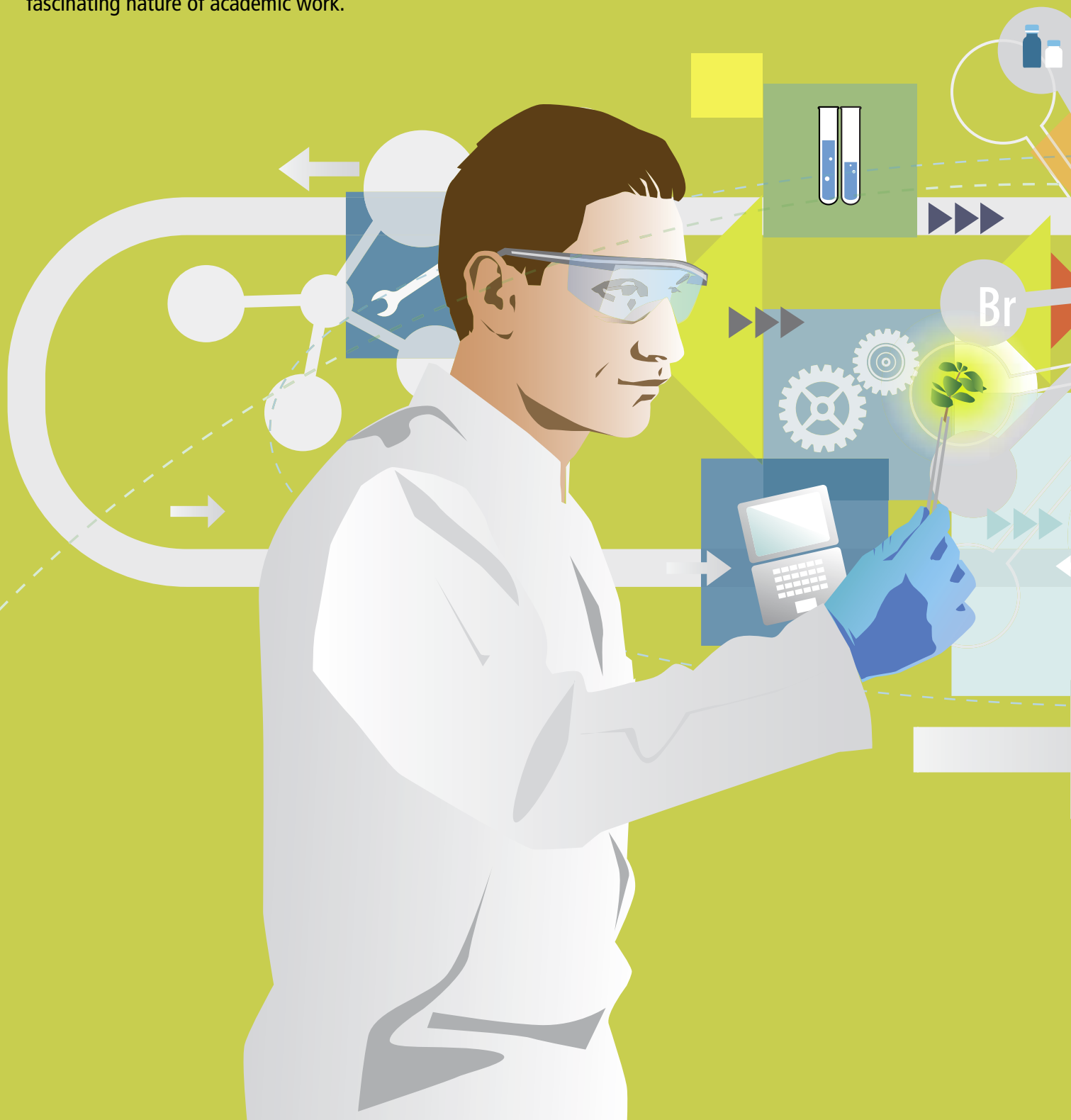
The aim is to transform new student orientation throughout the university. Education through science should be tangible from the outset and cross-disciplinary teaching content expanded as a pillar of general academic learning. In short, the

The eight fields of action at the *Universitätskolleg*



Learning with a view to research

The union of teaching and research is an ambitious ideal. The old universities drew their self-image from the notion that they formed a community of researchers and teachers. This image has changed considerably over the past few decades, if only on account of constant increases in student numbers. Researchers withdrew to their laboratories and students were informed of their findings in lectures or seminars, if at all. Now, many places are returning to the previous setup. Students watch researchers at work from an early stage and work on their own research projects – and not just in the natural sciences, but across all disciplines. This helps them to better understand the basics of their own subject area and to investigate interconnections more deeply. And they experience something that is often in danger of being overlooked between exams and textbooks: the fascinating nature of academic work.







TU BERLIN

TAKING TEACHING INTO THEIR OWN HANDS

At the Technische Universität Berlin (TU Berlin), students are engaging with topics that inspire them by organising their own projects – with the support of professors and a great deal of enthusiasm

Thomas Finger is still mulling over the problem with the glue. “We really need a chemist,” he muses, and points to the prototype: a bicycle with a wooden frame. The spokes are made of bamboo and are attached to the hub using hemp fibres held together using a resin adhesive. “We’re looking for an ecological alternative to the glue, but in order to develop something suitable, we need the help of some chemists.”

Thomas is wearing a thick wool jumper and a green baseball cap. He studies aerospace technology and is head of the Nawaro Bicycle working group at the Technische Universität Berlin. ‘Nawaro’ is an abbreviation of the German term for renewable raw materials; Thomas and his fellow students are trying to build a bike that contains virtually no metal or plastic parts. “This,” he says, picking up a moulded wooden

part, “is the prototype for a new pannier rack.” It is made from several wooden boards that have been glued together and then pressed into shape. It still has to undergo a few stress tests, and then it will be ready for use. There is a vast assortment of different wooden components on the table, including a range of wooden handlebars of different strengths and curvatures. Thomas’s working group has over twenty students who are working on individual components for the bicycle in small development teams.

Technische Universität Berlin has a long tradition of this kind of teamwork, and it remains a core component of the teaching. “In 1985, the students went on strike and demanded a greater degree of self-determination and more innovative approaches to teaching,” explains Johannes Dietrich. He is responsible for coordinating the range of student projects at the TU that evolved following the strike; this includes project workshops such as the Nawaro bicycle, as well as the so-called ‘*tu projects*’.

Whereas the project workshops are funded from the university budget, the ‘Quality Pact for Teaching’ federal funding programme enables the broad-scale implementation of the concept under the title of *tu projects*. The approach

Impacts at a glance

The students put theory into practice and are motivated to learn through research. The university reduces its dropout rate and creates a strong link between research and teaching from an early stage.



Glue first, show later: students build a bicycle frame made of wood – and proudly present their results at a trade fair

is similar to the workshops: students submit proposals for topics they would like to cover, and then two students are chosen as tutors and build their own team. The students involved are accredited for their work. Most importantly, they can put the theoretical part of their course directly into practice, regardless of their 'home' faculty. In the bicycle-making team, for example, the load capacity for a new component has to be calculated immediately – this kind of practical application is not always a given in the field of materials sciences.

“This way of working boosts the students’ motivation immensely, especially during their first semesters,” says Professor Hans-Ulrich Heiss, Vice-President of the TU Berlin. “It encourages students to take the initiative, and they can choose to tackle topics that they find lacking in the standard taught modules.” Moreover, topics related to social responsibility for engineers that students have repeatedly been calling for are now included in the general course programme. Heiss calls the project workshops a ‘key component’ of the university’s teaching concept: “Our goal is to interconnect research and teaching as early as possible, across the board – just as we have done effectively in the individual projects. We want to

confront students with research-relevant topics and working methods from an early point in their studies”. This goal has a strong impact on teaching, not least in that it immediately exposes any deficits in the theory that is taught. Project workshops and *tu projects* have been awarded numerous prizes, and they are popular amongst the students, too: some of the projects have had over 100 applicants, and the average number of participants per project is around 15. Twenty-two project workshops and *tu projects* are currently running at the TU. And yet these projects are aimed merely at amateur inventors: the projects often discuss social issues and question the implementation of technology.

This is also a driving force for Thomas Finger, who is building a bicycle made from renewable resources together with fellow students. “We also want to stimulate critical engagement with the waste of resources”, he says. The research undertaken in this project is relevant to the discussion: the bike light is to be made from natural plastic that is manufactured using a 3D printer. If the bicycle reaches a stage when it is ready to go into production, Thomas believes that the unique bike could even become a business concept – then the students could gain experience in marketing their idea.

“Our goal is to interconnect research and teaching as early as possible, across the board”



THE PRINCIPLE OF PRACTICE

During the product workshop, future mechanical engineers at Aachen University of Applied Sciences pour their knowledge into research projects. Such innovative teaching methods have turned this 3D printing into a subject area into which paves the way for new teaching methods

“We want to make the students see more clearly why they are actually learning all this stuff”

A 3D printer nozzle continuously is forging its path; a complex lever arm keeping it accurately on track. It is extruding molten plastic, applying layer after layer with millimetre precision. It has been in motion for hours now, and the fine layers are beginning to take the shape of a black plastic vase. “This is our 3D printer,” calls Laura Thurn, peering from behind a large screen. She is a mechanical engineering student and works in the production lab at Aachen University of Applied Sciences where a whole fleet of 3D printers are working side by side.

These high-tech devices work on a simple principle: they heat up plastics and apply it as extremely fine coats like a paintbrush. Adding numerous layers creates a three-dimensional object. The point is to write sensible instructions for the printer in order to obtain the desired object according to the specifications. “We use this,” says Laura Thurn, pointing at her screen, “to programme the shapes that the printer creates.”

Her enthusiasm is contagious – and is being developed in Aachen as a way to motivate whole classes of bachelor students. After the current pilot phase, this will benefit students on all four Bachelor degree programmes in the Faculty of Mechanical Engineering and Mechatron-

ics. The students in Aachen call this approach ‘*product workshop*’, in which 3D printers play a central role. Everything comes together on the first floor of the time-honoured building where the dean, Professor Andreas Gebhardt, has his office. “Our idea,” he says, “is to help the students realise why they are learning all this. To do so, we sought out a product that can be constantly developed and that we can use as a focal point for our teaching,” say Gebhardt, while sitting in his office with Professor Martina Klocke and Professor Klaus-Peter Kämper who, as vice-deans, are also supporting the extensive changes transforming the entire study programme in the Aachen faculty. Students are to use their knowledge to solve complex tasks by conducting their own tests and research – that is their concept. In doing so, they are taking the tried-and-tested approaches of project-based learning used in many technical faculties and modernising them, applying them to the whole subject area and extending them across the entire study period.

For the first time, the *product workshop* is taking place at the beginning of the third semester. The students are divided into groups of five or six and are given special tasks. “Everything revolves around a common topic that fascinates the students,” says Martina Klocke. “3D

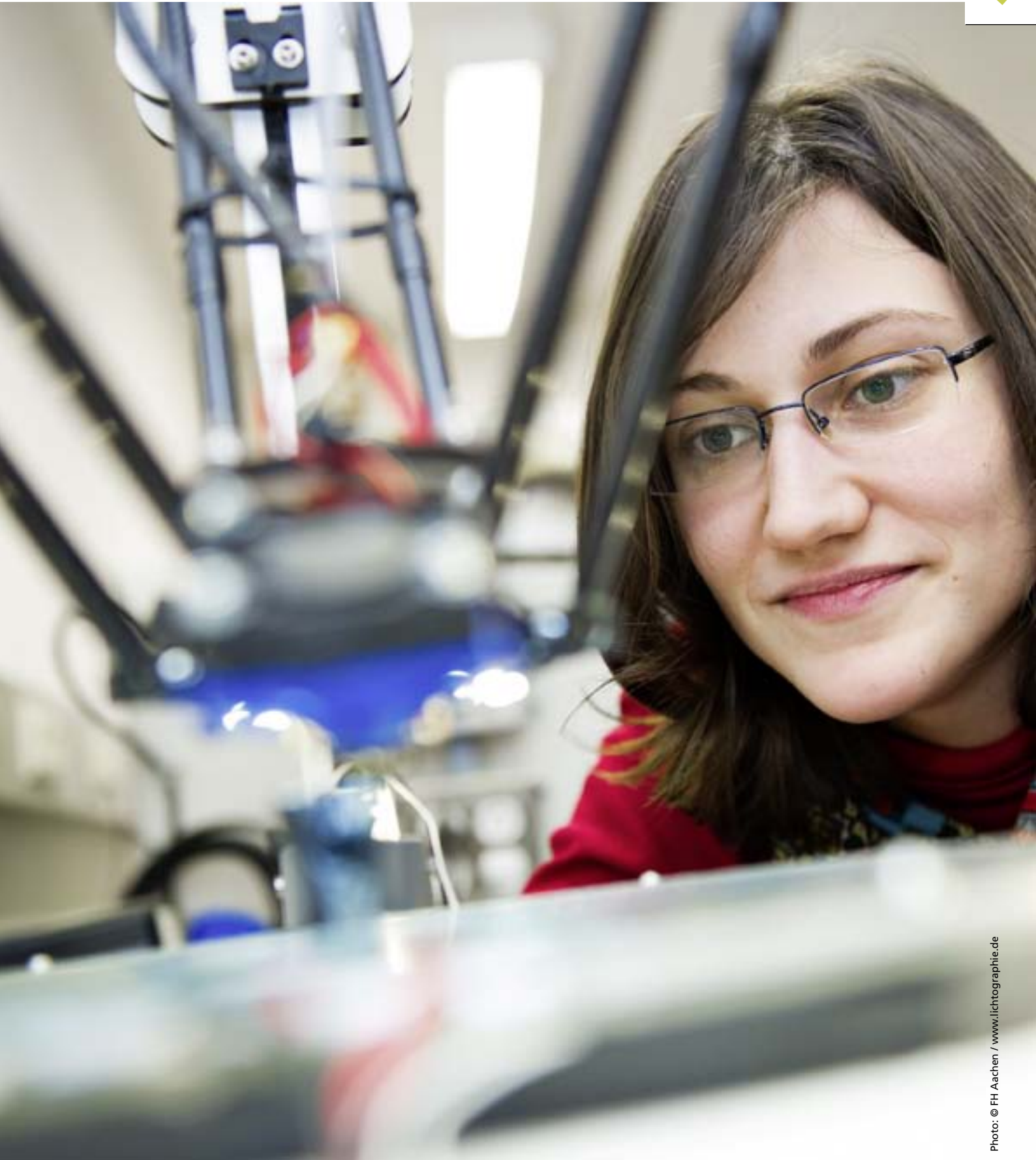


Photo: © FH Aachen / www.lichtographie.de

Object of interest: the 3D printer produces a component that the students have designed themselves



Critical eye: can the model from the 3D printer be used?

printers are ideal for use in research," she adds. The future engineers are given tasks that enable them to directly apply what they have learned during their first two semesters – and that are closely linked with the printers. "In materials science, for example, the students have calculated the properties of materials right at the start and have learned plenty of formulas," says vice-dean Klaus-Peter Kämper. "But as soon as they actually examine a plastic object made by the 3D printer to find out its characteristics, the theory gains a whole new dimension!" A tensile testing facility, for example, enables the students to determine which forces the plastic can withstand – or how far long plastic bars will bend when placed under pressure. Another group has programmed the printer to produce complex items. To conclude, the professors explain that,

suddenly the students have the chance to use their basic knowledge about various subject areas and link it together. "During these project days, they understand what the formulas are based on," says Martina Klocke.

Ghislain Magoua is already certain that he will benefit from the *product workshop* he completed just a few days ago. The mechanical engineering student is holding a gleaming green pyramid just a few centimetres high. "Look, this is what I programmed," he says proudly. He took out his seminars notes from the first two semesters to check the occasional formula or find the right procedure. "I now finally understand why we need data processing," he says.

To ensure that the activities during the *product workshop* run smoothly, advanced students supervise the younger students – naturally, the professors can be consulted too. The project is still in its trial phase and took place for the first time in the 2013/14 winter semester. "Just 30 students took part in this seminar cycle after having applied for it," says Martina Klocke. "But now that the principle has proven its worth, we would like to extend it to the students of an entire year." However, that's not all: in the medium-term, the *product workshop* is to become a recurring element throughout Bachelor's degree programmes, allowing students to repeat what they have learned each year through appropriate tasks. 3D printers will

Impacts at a glance

The students connect subject matter from different disciplines and examples of use prompt them to look at the theory from a new angle. At the same time, they familiarise themselves with 3D printing technology. The university reduces its dropout rate. Industry gains graduates with experience in interdisciplinary project work.



also be a key element running throughout the seminars in the semester. “Each professor refers to the topic regularly in their subject area,” says vice-dean Kämper. “Interconnections arise in all disciplines, from electrical engineering to mechanics; these constantly highlight the correlations in the subject matter.”

Aachen University of Applied Sciences now has plenty of experience with these innovative ways of teaching theories. The professors began making use of innovations as soon as the tiered Bachelor’s and Master’s degree programmes were introduced. “Back then, there was a debate about integrating more soft skills into the degree programme,” recalls dean Andreas Gebhardt. “But rather than adding this separately to the existing content, we wanted to integrate it appropriately into the rest of the curriculum.” This resulted in Pro8, which they have been trialling for seven years now – “Pro” is short for “project,” while the “8” refers to its status as the university’s eighth faculty. In the fourth semester, all students complete a compulsory week of targeted problem solving. “We divide up the entire faculty into teams of ten people that we have put together very carefully,” says Martina Klocke, who helped conceive the Pro8 week. Each team has the same number of more engaged or passive students, vocal and quieter participants, future industrial engineers as well as future mechatronics and mechanical engineering specialists. On Monday, all of the students gather in the largest lecture hall and are given their task for the following days – but it is also a competition, with prizes for the best teams.

Aachen’s students show an impressive amount of creativity when approaching this task: a long corridor in the faculty building is adorned with prize-winning presentations to inspire future students. The task is different each time: one year, the groups had to develop a lift for Hamburg harbour that would travel from the pier to a floating pontoon – meaning that the height of the lower exit would be constantly changing depending on the water level. Another year the students had to develop a cover for tractor trailers that would be in constant use under tough conditions and could be quickly opened and closed.

“What we are practising is far more than just pure technical knowledge,” says Martina Klocke. For a team to win, their product must have an appropriate design, a sensible price – and be convincingly presented. “Almost incidentally, the students learn important skills that

they will need in their later careers,” explains Klocke.

The 3D printers will accompany them through their studies not just as examples in lectures, but also as a potential field of activity. Laura Thurn, the student in the production lab is currently printing glowing red key rings labelled “Berlin 2013” – a souvenir for an entrepreneurship summit she is attending with some of her fellow students, where they will present their new projects. She predicts that “we will see these printers in many normal households and people will be able to produce things for themselves, for example replacement parts.” This is a development that the students at Aachen University of Applied Sciences can start working on right away – thanks not least to the *product workshop* they completed during their undergraduate studies.



Photo: © FH Aachen

Spotlight on students

Robert Winkens is a fifth-semester student of rail vehicle technology.

My task in the product workshop was to first produce components in the 3D printer and then to destroy them again. We used the printer to construct special plastic parts that we used to test the resilience of the material – first we calculated it theoretically, then we put it into practice. Naturally, all the parts broke, but we obtained precise measurements in the process.

As a tutor, I was responsible for making sure everything was well prepared for the younger students who were just starting their third semester. To do so, I first designed all the components we were going to use myself. Standardised tensile specimens with defined dimensions exist that are normally made out of metal. I produced these specimens in the 3D printer using plastic and then took the measurements myself. I also learned how to operate the tensile machine required for the test. I was then ready to help the others in the product workshop.

What have we gained from the product workshop? I think that all of the participants have revisited the basics they learned previously in their lectures – after all, there is a real difference between working something out on paper and proving it yourself in a tensile test. It was the same for the other groups: they all had their own task directly connected to the 3D printer, from programming through to our resilience tests. All of the content they had learned in the initial semesters was covered in the projects.



UNIVERSITY OF HOHENHEIM

FOLLOWING IN THE GIANT FOOTSTEPS OF HUMBOLDT



The University of Hohenheim is committed to a demanding approach that fuses teaching with research. In keeping with this principle, students at Bachelor level who wish to play an active role in research are given the opportunity to do so – regardless of the subject they are studying



With the ease that comes from practice, René Schneider gently opens a valve on a sealed preserving jar, draws a few millilitres of air up into a syringe and empties it into an equally airtight glass tube. "This is going into the gas chromatograph later. What we want to know is the CO₂ level," he explains. On his workbench is a whole battery of similar tubes; Schneider and fellow student Alexandra Camek take another sample every 30 minutes.

carefully guides a small group of students through their first steps in research.

Most universities would not allow students to do lab work within just a few semesters of starting their degree course. However, the University of Hohenheim – with its 10,000 students – wants to make this standard practice: there is an unwritten rule that students pursuing a Bachelor's degree in any subject should be given the



Hands-on research experience: the University of Hohenheim allows Bachelor's students early access to labs

Both students are in their third semester of Agricultural Science and Agrobiography, respectively, and are already involved in hands-on research. The preserving jars contain soil samples that have been sprinkled with a glucose solution. The purpose of their experiment is to find out how quickly the solution is metabolised by micro-organisms present in the soil. The process releases carbon dioxide – hence the air testing. "This is in preparation for a larger experiment the two will be conducting," says Dr Christian Poll, who oversees proceedings and is the students' first point of contact. He is standing in a wing of Hohenheim Palace, where the Institute of Soil Science and Land Evaluation is based. The laboratories are housed in the basement; a corridor is lined on either side with doors behind is a variety of high-tech apparatus. In one of the rooms, Christian Poll

opportunity to gain research experience if they so wish. This scheme, which the University has christened "Humboldt reloaded," is funded through the "Quality Pact for Teaching" initiative and is organised in a highly structured way: across the university's three faculties, a total of 24 research associates were hired to prepare research projects for students and then coordinate them. At the same time, these members of staff are firmly integrated into the structures of the respective departments. "We're not interested in pretend research," says Julia Gerstenberg, who coordinates the scheme. "In other words, rather than recreate research situations, our students will take part in actual research activities." Group sizes are kept small to maximise the benefits to students. In the science disciplines, where laboratory space is a limiting factor, it is not unusual for a scientist



"I've been to a lot of conferences, but the enthusiasm and passion with which everyone here participates in discussions is just extraordinary"

to work with only a couple of students, as with the soil experiments. On business and economics courses, on the other hand, groups can consist of as many as 20 participants. There is no shortage of research opportunities: for the 2013/14 winter semester alone, the faculties prepared no fewer than 140 research projects for Bachelor's students, 108 of which ultimately materialised. While some take the form of block seminars, others are spread over one or even two semesters. The research projects can involve experimental, empirical or theoretical work, with topics ranging from weed control in organic farming to the production of gluten-free amaranth beer, from left-right body axis in the embryogenesis of frogs to the relationship between tax regulations and tax evasion.

"Humboldt reloaded" is the brainchild of Martin Blum, Professor of Biology. From his office, he looks down over the botanical garden adjoining the university. Asked how the idea came about, Blum laughs before saying: "Allow me to take something of a detour back to my own student days." He goes on to tell how, shortly before completing his degree in Biology, he came close to dropping out because he found the content being taught to be impossibly dry.



Spotlight on students

Alexandra Camek is studying Agricultural Science, and René Schneider Agrobiology. Both are in their third semester.

I suppose our first couple of semesters were no different for us than for most students at Hohenheim in that we spent most of the time studying theory. After that, we were obviously glad of the opportunity to gain our first insight into real-life research. The actual project involves taking soil samples; what we're interested in are substrate consumption rates. Microbes in the soil take in carbon, which they use as an energy source. Some of the carbon is then released as carbon dioxide and some converted into biomass. What we want to find out is the proportion of carbon dioxide to biomass and what would happen if environmental conditions were to alter as a result of climate change. For us, this work means we have access to a lab for the first time, which gives us a chance to make some contacts. And who knows, maybe we can revisit the subject for our Bachelor's thesis.

"It was only when I started working on my final thesis that things began to get exciting. I found it very frustrating that students weren't allowed to work on the kinds of topics that really draw you in." After Blum came to Hohenheim, he gave his students the chance to participate in elective research projects as early as their second semester. As he recalls, the response was overwhelming, with participation between 50 and 95 per cent of a given year's students. And more importantly, he says, some of the participants have stayed on at Hohenheim and are now doctoral or post-doctoral students. "It was a little like matchmaking: some people are still working on the subjects to which I first introduced them."

When Martin Blum became Vice-Rector, he and his colleagues decided to apply for funding within the "Quality Pact for Teaching" initiative. The "Humboldt reloaded" scheme is now two years old and enjoys broad acceptance across all faculties, because the results speak for themselves, he says. "We aim to do justice to the Humboldtian ideal of the unity of teaching and research by kindling enthusiasm for the generation of knowledge," says Blum. In his opinion, the main advantage of this approach is that the research projects, while carrying academic credit, are not compulsory, which ensures that all participants are genuinely motivated. Originally, the University of Hohenheim planned to introduce two thirds of each year's students to research work in this way – expectations that Blum admits were somewhat too optimistic: only an average of about 20 per cent participate, but those who do are passionate about their work. The completion of each project stage is marked by a large academic conference held in the state rooms of Hohenheim Palace, where all the working groups present their findings on posters, and where selected students give talks. "I've been to a lot of conferences, but the enthusiasm and passion with which everyone here participates in discussions is just extraordinary," Martin Blum enthuses.

Meanwhile, Dr Natascha Selje-Assmann is sitting in a small meeting room in what were once the servants' quarters of Hohenheim Palace. This is where several scientists from the Institute of Animal Production in the Tropics and Subtropics have their offices. Natascha Selje-Assmann is preparing her latest research project, which has caught the imagination of three Bachelor's students. The research question to be answered is: "How many times does a cow chew its cud?" The casual-sounding turn of phrase belies an interesting research approach: the jaw movements of cattle provide a parameter that will be used in future research projects to analyse the behaviour



Photo: © Itin+Hoch GmbH, Forschungsanstalt Agroscope Reckenholz-Tänikon ART

Data acquisition: digital halter measures the jaw movements of cows

and feed intake of grazing livestock. Natascha Selje-Assmann points to a special halter lying in the conference room: "That's what we'll be doing our experiment with," she says. "Integrated into the noseband is a sensor that detects changes in pressure and so records when and how often a cow chews. The data will be stored and then analysed after the experiment has been completed. Using a special piece of software, jaw movements will be classified into various activities such as eating, ruminating and drinking." The purpose of this preliminary test is to check whether the digital data tallies with the animals' observed behaviour, i.e. whether the method of data collection is reliable. The students are involved in all the main stages of preparing the experiment so that they become familiar with people and places relevant to their subsequent research work: they attend a user group to meet with bioinformaticians and with scientists who are already using the halter in their research work and pay a visit to the cowshed used for experimental purposes so as to be able to adapt the experiment to local conditions. During the experiment proper, they support the scientists working in the shed. "We'd never be able to conduct these experiments as planned if it weren't for all the students helping us monitor every single cow," says Natascha Selje-Assmann.

The University of Hohenheim is conscious of the fact that a cost-intensive scheme such as "Humboldt reloaded" would be impossible without additional funding for staffing costs. Critics warn that all the achievements made in this connection will be at risk once the funding runs out. Confronted with this criticism, Professor Blum shakes his head. "In that event, it goes without saying that the scheme could no longer operate on the current scale. However, our goal is to reshape the university in such a way that this marriage of teaching and research would continue regardless," he says. A goal he is convinced can be achieved: "We're already seeing a new spirit pervade our university."

Impacts at a glance

From an early stage, students gain research experience for themselves – with careful guidance in small groups so that they can familiarise themselves with the scientific method. In turn, the university receives help with research projects that its scientists are working on while also raising the next generation of scientists.



SAARLAND UNIVERSITY

FIRST STEPS IN LABORATORY RESEARCH

Maturing students in the fields of natural and life sciences at Saarland University can enjoy a first taste of research during their Bachelor's degree programmes. This boosts their motivation – and guarantees the next generation of scientists

“We want everyone to have their own set of skills by the time they graduate!”

At first, the biggest question for Dr Martin Simon was whether his idea would work: recently arrived at Saarland University as a junior professor for molecular cell dynamics, he wanted to offer a seminar on his most important research topic – for third-semester Bachelor students. “I work on RNA, a long-familiar substance that fulfils a broad range of functions in the human body,” Martin Simon explains. “We now recognise that it has long been underestimated. And we want to close this gap.”

Normally, Bachelor students do not concern themselves with such complex research issues, which is why the professor was initially cautious. But the gamble was worth it: “The students are extremely interested. We hold long discussions in each seminar and lots of questions are asked – they delve really deeply into the topic to understand the background,” says Martin Simon. That they find the subject matter very difficult only seems to further motivate his students. The seminar gives them an idea of how scientists approach questions, how they design and structure their experiments.

The students do not enter the lab in this first seminar – but they are curious to do so: Martin Simon is now receiving the first requests for

internship positions in the laboratory. And this is precisely one of his intentions: by engaging in teaching at an early stage, he can enlist up-and-coming students for his own research group. Students might spend some semesters with him writing their Bachelor's thesis and continue with the subject during their Master's – and if they subsequently become doctoral students, they will already be familiar with numerous facets of this very specific subject.

Saarland University intends to expand its research focus to its Bachelor's and Master's programmes, particularly in areas such as natural sciences and life sciences. “This is very closely connected to our local conditions and priority programmes,” says Professor Manfred Schmitt, Vice-President for Academic Affairs. “We have numerous affiliated institutes at the campus that have always had close links with our university. With the current initiative, we intend to integrate them more strongly into our study programmes as well.” Support from the federal “Quality Pact in Teaching” makes this possible.

Within this framework, several new professorships and junior professorships have been set up that create links between the natural and the life science research disciplines and also offer



Photo: © Michael Ehrhart

Ready for testing: in Saarbrücken, the students also get their hands on the petri dishes

the capacity to enable students to learn through research. Even new Master's degree programmes have been installed; at the Bachelor level, the new offerings have been incorporated into the existing study programmes. Manfred Schmitt admits that some effort was initially required to convince the affiliated institutes of the merits of such a model – "but they are also intrinsically interested in gaining the attention of up-and-coming students at an early stage."

The Saarland model does not aim to turn all graduates into researchers. And this is why the programme behind the innovations is entitled *Study with profile – competence in research and practice*, because it also builds bridges with companies and industry. New industrial partners have been acquired and a special contact point has been set up at the university campus. This means that each student can individually judge which offer is best suited to their situation, be it research or practice oriented. Vice-President Schmitt: "We want every student to acquaint their own set of skills by the point of graduation!"

To ensure that this is the case, the Bachelor degree programmes of Saarland University include both, general and group internships. Some of these can be completed at companies, or at

the university and the neighbouring research institutions. Martin Simon, junior professor for molecular cell dynamics, is convinced of the merits of the principle. It works, he says, if the current research topics fit in well with the basic teaching modules. And the extra work he has to do when teaching within the Bachelor's degree programme? Martin Simon shakes his head. In the long term, he says, it is time well spent: "I see it as the ideal combination of meaningful teaching and research that benefits me."

Impacts at a glance

The students gain an early insight into scientific research and receive a motivational boost especially in their first semesters. They also recognise their professional prospects at an early stage. Both the university and the affiliated institutes can enlist interested and informed early career scientists.

Learning with a view to the job market

Universities are not responsible for training students to match a specific job profile; this is a key element of the academic self-perception. However, they are responsible for equipping their graduates with the tools to hold their own on the job market, and this includes both sound subject knowledge and a mastery of important working methods. Institutions meet this responsibility in very different ways depending on their profile and the instruments relevant to the subject area in question: some work with simulation games, some incorporate practical phases and others offer guidance that enables academics to specialize at an early stage. But they all have the same goal: to prepare their students at a high academic level to employ their knowledge and skills in their sub-sequent careers.







TU BRAUNSCHWEIG | BEUTH UNIVERSITY
OF APPLIED SCIENCES BERLIN |
UNIVERSITY GÖTTINGEN

VIRTUAL REALITY LEARNING

Computer-assisted simulations allow us to tackle complex matters through game playing. Used as the basis for flight simulators, for example, this principle is now moving into higher education, too

“It is simply a matter of finding the right mix of media and putting them into play in the right situation”

The students swap roles at the very start of the semester. “Welcome to you, the management team of Big Motors, our automotive manufacturer,” a voice booms from the video screen in the lecture hall. The man greeting them is the boss of a fictitious vehicle corporation on the brink of bankruptcy. “We have therefore moved you onto a four-month project to develop a new strategy. Our partner in this endeavour is the Technische Universität Braunschweig and the department led by Professor Christoph Herrmann.”

At this moment, Herrmann appears before the 200 or so students. He consistently talks to them as though he were a manager, giving his lecture on *holistic life cycle management* in the style of a management event. The students are to imagine themselves in a world in which they don't just cram their brains with theories, but take decisions that will have wide-reaching consequences. “The students are often a bit irritated to begin with, some might find it a

bit stupid,” says Christoph Herrmann with a grin. “But they all immerse themselves in the scenario very quickly.”

A professor at TU Braunschweig, Herrmann is one of the pioneers of *game-based learning*, which sees students placed in a situation in which they are to work under real-world conditions. They use the knowledge they have previously gained and must find missing information for themselves. They are working within a simulated reality. We call it “reality” because their decisions and actions are depicted realistically, and “simulated” because it is only a game, and mistakes will not have any fatal repercussions. This new form of knowledge transfer is therefore also known as *serious games*; it is becoming increasingly popular at German higher education institutions and is used in a wide range of subject areas.

The company Big Motors, which exists only in Christoph Herrmann's lecture hall,



Photo: © TU Braunschweig, Holistic, Florian Röske

A good hand: the simulation game called 'Holistic'



Under pressure: Braunschweig students in the simulation game

is an example of a case study for budding engineers. "The task lies somewhere between engineering and business studies," explains Herrmann, who holds the chair in *Sustainable Manufacturing and Life Cycle Engineering* in the Institute of Machine Tools and Production Technology. "But we focus on technically sound decisions, for example on developing products, the manufacturing process, and efficient service measures." His course is compulsory for budding environmental engineers, and mechanical engineers and economists can also choose to take part. They are all in the fourth semester of a Bachelor's degree or, in some cases, the first semester of their Master's. The course culminates in a whole-day simulation. The students divide up into the four departments of the automotive company – product management, production management, after-sales management and end-of-life management – and work in small groups to develop a new direction for their company. "The aim is to find a coherent strategy for the department in question and to agree it with their colleagues to form a sensible whole," explains Christoph Herrmann. The staff

and budget are, of course, limited: for example, if the development department decides to design battery-operated vehicles but the production department invests in manufacturing economical diesel engines, the money goes down the drain because the innovative battery engines cannot be produced and therefore no income can be generated. The schedule is also important: which department will receive how much money and when – should everything be invested in development first and in production only afterwards or should service be improved first so that existing customers stay loyal to the brand?

The game is based on sophisticated technology: as in a traditional board game, the participants have a large game plan that represents an office scenario. They move between meetings in their respective departments and the company as a whole to refine their strategies. After each round, they enter their decisions into the computer, which calculates the impact on the company – for example, how much money remains from the development budget or how customers respond to the new developments. A number of possible game variants are stored in the software designed specifically for this purpose. "This is not just about economic key figures, but also about the socioeconomic background of technical decisions," says Christoph Herrmann. This is why the process does not end with the sale of a vehicle, but continues to include end-of-life management and, ultimately, the disposal of worn-out vehicles. In addition, Herrmann and his colleagues include sudden changes in situ-

Impacts at a glance

Students are introduced to the content of their subject area in the form of a game and can link several fields of knowledge in complex scenarios. Teaching staff awaken enthusiasm, boost practical relevance and receive direct feedback on how well their students have absorbed the content.



ation throughout the different rounds of the game: an environmentalist might start a major campaign against gas guzzlers, a raw materials crisis may occur or the prices of required materials might change. The students must plan so that they can accommodate all possibilities flexibly.

Christoph Herrmann and his team have been working on the simulation game, which he has named *Holistic*, for six years. It has now become so sophisticated that it has its own toy money, playing cards with barcodes and an animated computer interface with a barcode scanner so that the effects of decisions can be quickly calculated. Herrmann designed the game together with colleagues and students from the Media Studies department at Braunschweig University of Art (HBK). The big

simulation day, for which the students have been preparing all semester, sees participants immerse themselves in the game for six or seven hours. "When they start in the morning, they are a bit red-faced after half an hour," says Christoph Herrmann. "But after an hour, they have forgotten that it is just a game. And by the evening they are completely exhausted from their efforts and the excitement."

It is this enthusiasm that makes *game-based learning* so attractive. It has now been established that the immense outlay required not only boosts students' motivation, but also has real educational value. "All media have their merits, from essays to these animated games," says Professor Felix Gers, who teaches in the *Computer Science and Media* department at Beuth University of Applied Sciences Berlin.

"We want to introduce the students to the subject area in an integrated manner by presenting interconnections, not just isolated content"

Virtual reality: the microbiology lab on screen



Photos: © Beuth HS Berlin



Down to the last detail: cufflinks create the business look and the simulation game brings reality into the lecture hall

“It is simply a matter of finding the right mix of media and putting them into play in the right situation.” He himself has proven how useful it can be to incorporate computer-based simulation into teaching together with his colleague Professor Steffen Prowe from the biotechnology degree programme in the *Life Sciences and Technology* department. Here, students conduct their own experiments in the microbiology lab from an early stage, from preparing cultures and day-long incubations right through to biochemical tests. “The difficulty is that some students already have some experience, while others have never set foot in a lab before,” explains Felix Gers. “They stand there in front of their own first experiment as though on a spaceship not knowing which button to press.”

It occurred to Gers that it must be possible to train in a virtual laboratory before putting your skills into practice. He then worked together with a games development company to program a computer application to realise this very idea. The monitor shows an image of a real laboratory bench with all the equipment, allowing users to find their way around this alien environment. They have at their disposal all chemical substances that would be available to them in real life and can set things in motion at

the click of a mouse. Mixing various substrates and processing them in devices such as centrifuges; they can do it all in a virtual world. “It’s not just about doing the right thing, but about doing the right thing in the right sequence,” Gers explains. He likes to compare this procedure with cooking. “If you want to make potato salad, you start by peeling the potatoes. Once they are boiling in the pan, you prepare the cucumber. It’s the same in the lab: some steps are better done first so that you don’t spend a long time waiting around.” The computer allows students who are initially unfamiliar with these procedures to internalise the information – saving valuable working time in the real laboratory later on. Since then, Felix Gers has presented the program at numerous conferences and finds resonance every time: “People teaching dentistry or chemistry have the same problem, and waste a lot of instruction time in the lab,” he concludes. It is therefore conceivable that his software could be revised specifically for these subject areas.

Simulation games are a special form of *game-based learning*. In the field of business and economics, Topsim is one of the best-known examples. The highly complex software was created by a commercial provider and is



Photo: © istockphoto

used by many companies for internal training. "We are one of the largest users among higher education institutions," says Professor Matthias Schumann from the Georg-August-Universität Göttingen, who for many years has been using a digital simulation game in a first-semester introductory course. "We need to involve a large cohort of 600 students," Schumann explains. "It is important to us to introduce the students to the subject area in an integrated manner by presenting interconnections, not just isolated content." And the game enables them to teach the participants about academic work; at the end of the course, they are required to write a final report that meets academic standards.

The simulation game is structured such that the students are confronted with increasingly complex decision situations over the course of five weeks. The students become the bosses of a bicycle company and must decide, for example, whether they would prefer to concentrate on mass models or develop innovative electric bikes, how much advertising they want for their products, and how the products will be priced – tasks are included from all areas of business administration. "The students sit at their computers and are faced with a 'management cockpit'," explains project leader Janne Kleinhans. "It's like a virtual desk that gives you access to the company's most important documents and key figures." Balance sheet figures, charts with overviews of market developments and rival companies, break-even analyses: these dry lists of numbers all become part of the fictitious bicycle company and provide the basis for the students' decisions.

The specific scenario in which they find themselves is described in text format rather than a video. "Our experience has shown that the simulation should not seem like a computer game to the students," says Matthias Schumann. "If this were the case, they would make more aggressive decisions because other video games have taught them certain behavioural patterns." In his simulation game, the computer does not generate a virtual reality; it simply acts as an information medium. It also helps with evaluations: if five different bicycle companies (each run by one group of students) compete on the same market, the decisions made by each company will directly affect their rivals. For example, if one company starts a price war, its competitors must respond accordingly or be left sitting on surplus stock.

In Göttingen, the simulation game has become a fixed element of the business and



Piles of paper to help make the right decision: dry lists of figures suddenly become exciting

economics curriculum. Schumann and his colleagues have redesigned the entire first semester: five weeks are structured as a block course in which he and seven other professors from the subject area provide introductions to the various aspects of the field, from strategic management to marketing, production, logistics and financial management through to economics. Intensive support is provided by tutors, and once a week the students practise what they have learned in the simulation game. What makes the game particularly attractive is that – although 600 students take part each year – special support can be given via the simulation. "If we have groups who have progressed particularly well, we can raise the level of difficulty just for them," says Matthias Schumann.

Like Christoph Herrmann in Braunschweig and Felix Gers in Berlin, Schumann is convinced that the work involved in *game-based learning* is paying off. "We have a very high approval rating at our university," he says, "and not just among the students, but among the teaching staff too."

"The students are often a little confused to begin with. But they all immerse themselves in the scenario very quickly"



BIELEFELD UNIVERSITY OF APPLIED SCIENCES

SPECIALISTS IN PRACTICE

Bielefeld University of Applied Sciences closely involves local companies in its courses. It has tailored its practice-orientated approach to the needs of the region and offers dual degree programmes that are more flexible than most

“As teachers, we find it immensely motivating when students learn with real interest and enthusiasm”

Two students stand by the screen at the front and describe a special type of low-voltage electrical power supply network. “TN-C systems use a PEN conductor,” they explain. Their fellow students listen attentively and Professor Philipp Boysen, an electrical engineer, poses the decisive question: “Do any of you use this system in your operations?” he asks, triggering a lively discussion.

“It is always a special moment,” he tells us afterwards, “when they compare their new knowledge with their practical experience.” Boysen spent four hours this morning discussing the merits and drawbacks of various interconnected systems with his students, who are in their seventh semester of a Bachelor’s degree in electrical engineering. “The students are excellent at organising themselves,” says Philipp Boysen in praise. “They are extremely willing to learn because they can see that they need to know this stuff.” The teaching model Boysen uses is called practice-orientated study:

his students regularly apply their theoretical knowledge at a slightly later stage to work at a real company. Similar practice-orientated or dual degree programmes are now offered at all universities of applied science in North Rhine-Westphalia. However, the model employed by Bielefeld University of Applied Sciences is specially tailored to the needs of the region and is particularly aimed at small and medium-sized companies, who serve as cooperation partners.

This particular focus has quickly made the practice-orientated studies at the east Westphalian institution a success: 524 students are currently enrolled in a total of five degree programmes and this number is growing rapidly. The study concept is also proving extremely popular among regional industries – more than 200 companies collaborate with the university and around 30 new firms sign up each year. The procedure for the collaboration is precisely defined: the company offers future students an internship or training contract lasting for the



Photo: © Susanne Freitag

At work: electrical engineers in the lab at Bielefeld University of Applied Sciences



duration of their studies. The students study at the university during the semester and then apply the knowledge they have gained when working at the company. These alternating practical and theoretical phases continue until they complete their Bachelor's degree, with 12 weeks at the university followed by 11 weeks at the company.

Practice-orientated study has become an important factor in the region of Ostwestfalen-Lippe. A number of global market leaders are based in the area, which often appears unattractive to graduates of other higher education institutions – large metropolitan areas such as Cologne and Hamburg are too far away, and most of the companies are not exactly household names. Largely unnoticed, a cluster of automation companies has formed in the

area, which are excellently positioned in their segment. By getting involved in regional degree programmes from the outset, companies can convince the next generation of students of the strengths of the region from an early stage.

In Minden, a good 50 kilometres from Bielefeld, the campus is bursting at the seams. The former barracks at the edge of the city centre, the nucleus of the higher education institution, have been unable to cope with the influx of students for some time now. A new building is currently being constructed in the courtyard for the new subject area – until then, many courses are relocating to two rented office buildings in the neighbourhood.

“The underlying plan is to extend our practice-orientated studies to include the MINT subjects,” explains Marcus Miksch, who manages the coordination centre for the new courses and who, in 2009, launched the model together with the university management and local companies. This initial year saw the start of the practice-orientated industrial engineering degree course with ten students and nine participating companies. Marcus Miksch travelled the region asking companies to join. “We held a number of discussions to figure out a way of ensuring both the academic quality of the study programme and that the companies’ needs were met as far as possible,” he says. Finally, the university realised that the solution lay in achieving the greatest possible flexibility. And this is what distinguishes the Bielefeld model from most other dual degree programmes: the companies can closely align the practical element with their operational practices. Miksch explains: “We would have struggled to find any companies in the region at which students could directly use their theoretical knowledge of physics, for example. Therefore, we were not able to insist that partners make close links between their work and individual study modules as a prerequisite for cooperation.”

The agreement between the university and the company states that the practical phase must naturally be connected to what the participants are studying, but must also take into account what the company can offer. “We collaborate with engineering firms that have five members of staff and thus no technical sales department, for example. This means that students cannot gain any insights into this area, but learn significantly more about other aspects,” says Marcus Miksch. The close connection between theory and practice is ensured through practical projects that are agreed with

Spotlight on students

Maik Titze is a fifth-semester student of mechanical engineering.



I knew I wanted to do the practice-orientated course the moment I saw the advert: the company RK Rose+Krieger was looking for an intern who would study mechanical engineering at the same time. The company has around 570 employees worldwide and is a full-service provider with products ranging from linear technology to profile assembly technology, and connecting and modular technologies. I managed to get a place, which was a stroke of luck because the combination of practice and theory is exactly what I was looking for. At the start, I spent eight weeks completing a general mechanics internship in the training workshop, after which I headed to the university for the first theoretical phase. Since then, I have always returned to the company in between theoretical phases and have taken on roles with an increasing amount of responsibility – first in production, then quality assurance, and, finally, in the development centre itself. Each time I have rediscovered topics we discussed at the university. For example, I was able to quickly apply what I had learned about dimensioning components using the computer. When I finish my studies, there is a good chance that I will be taken on by the company – tremendous motivation to do well.



Motivated: student Tim Zudrop at his company (left), programme coordinator Marcus Miksch (right)

the professor and carried out at the company. The advantage of this flexible structure is that small and medium-sized companies in the region have become the backbone of practice-orientated study. Ten per cent of the companies involved have fewer than ten employees, around a third have between ten and 100 staff members, and a further third employ up to 500 people.

The range of practice-orientated degree programmes available has become much broader over time. The Minden and Gütersloh locations offer Bachelor's degree programmes in industrial engineering, electrical engineering, mechanical engineering, and mechatronics/automation. After the first few years, Marcus Miksch is certain that this orientation towards professional experience does not have a negative impact on the academic components of the study programme – quite the opposite. "While other degree programmes require students to complete a prior internship that has hardly anything to do with the theoretical content, we make sure that the practical phases are well integrated," he says. This is boosted by the three binding practical projects that are coordinated with the students, professors and companies. Lasting around 150 hours each, these projects see students tackle problems typically experienced by the company and are adapted to their increasing level of knowledge. "This is an excel-

lent introduction to academic work," comments Marcus Miksch. "When the students then come to write their Bachelor's dissertation, they can use what they have learned from their previous experiences."

Philipp Boysen, professor of electrical engineering, emphasises the success rate of previous years, which is remarkably high for engineering disciplines. Only ten per cent of first-semester students fail to complete their studies, and of the remaining 90 per cent, the vast majority are finished within the standard period of study. "As teachers, we too find it immensely motivating when students learn with real interest and enthusiasm," says Boysen.

Impacts at a glance

Students apply the knowledge they have gained in a practical context – and apply their practical experiences to the theory in return. Despite their distance from metropolitan areas, companies in the region find qualified new employees.



TESTING THE PROFESSIONAL WATERS

Students are being given the opportunity to narrow the focus of their Bachelor's degree if they already know what they want to do after graduation. Many institutions are now offering careers guidance early on, including the University of Kassel and the Free University of Berlin

"We want our students to remain competitive on the job market for their entire working lives, so we are striving towards better integration with practice"

The board at the front of the seminar room is almost completely covered in small yellow cards, yet students are still taking it in turns to go up and add more. Shortly beforehand, Professor Ernst Hoff had told the group, "Write down the projects you want to do!" Standing at the front, he is observing the array of projects that have amassed on the board: 'Work experience abroad' says one card, 'Apply for a Master's' says another, and someone has written, 'Learn Greek'.

This is one of the students' first seminars on the course, and around 30 people are gathered here in the room at the Free University (FU) of Berlin. The seminar topics and assignments vary from week to week, and they are intended to help the students decide which path they wish to pursue after graduation. The concept is called the *Kompass zur beru-*

flichen Kursbestimmung und Selbststeuerung ("Compass to determine professional course and for self-orientation"). Programme Director Ernst Hoff is a professor of psychology and has designed the seminar together with his colleagues; the aim is for students to gradually understand the mechanisms influencing how and why they make decisions, as well as how they can actively guide the decision-making process. This exercise with the yellow cards is part of the process. "Today's session is about goals and about steering our actions in everyday settings and on guiding the course of our lives," explains Larisa Kolmans, who is a *Kompass* project manager and member of the teaching staff. The *Kompass* course lasts two semesters. Students should take part in both semesters so that the individual modules can build upon one another, which is a point that is stressed in the mandatory introductory seminar.



Course determination

Self-direction





Regular attendance is essential for building the trust that is needed to speak openly in the seminars.

In 2008, Ernst Hoff offered the *Kompass* programme for the first time. "At first I had humanities and social sciences students in mind. In fact, students come from a range of different subject areas," Hoff says. At that time, it was the first guidance programme of its kind offered to students in Germany. Past experience has shown that the average participant age is 23, and that he or she is likely to be on a Bachelor's course. The different subject areas represented include history and cultural studies (25%), social and education sciences, psychology and philosophy (25%), economics (20%), and the various natural sciences (30%). A book has also been published on the *Kompass* model. It states, "the methodological approach is designed to develop personal strengths and resources, to take into account heterogeneity amongst individuals, as well as to support the participants' creativity, curiosity and 'discovery learning'. What motivates the participants? Ernst Hoff identifies two main factors: "Some have fundamental questions about their role in the world, whereas others are looking for concrete strategies for optimising their actions." A participant's subject background also influences his or her motivation.

In the meantime, a number of German HEIs have started offering courses that offer a similar service to *Kompass*. They are especially aimed at graduates from degree programmes that are not oriented towards a specific profession. The courses are intended to help them to gain an overview of their opportunities and start working towards a defined goal at an

early enough stage. This may mean narrowing the focus of their course, choosing an appropriate second subject, or practising a certain skill that is advantageous in their desired field. According to experts, the orientation course can even benefit business studies students who already have a range of job options, as it can help them identify their individual wishes and requirements when searching for employment.

"The requests we receive are remarkably varied," says Jens Behrmann from the University of Kassel. He is Director of the Careers Service, which is a department within the central facility 'UniKasselTransfer'. Under Behrmann's leadership, a programme has been developed with the aim of integrating practical skills into degree courses. Its scope alone is impressive: every student from the humanities, arts and cultural studies, social sciences, business studies and fine arts can take part in special orientation courses. Moreover, the new Study Regulations now include a mandatory work placement. "At the University of Kassel, 12,000 young people are studying towards a Bachelor's," Behrmann says. This will require a tour de force of him and his colleagues. To ensure its success, the university established a new structure with the support of the Quality Pact for Teaching federal funding initiative: a 'Practice Coordinator' has been appointed for each of the relevant subject areas; he or she is to assist students with subject-specific questions and queries. The resulting project team is coordinated by the central Careers Service, and has an important overview of the subject-specific components of practice-relevant teaching thanks to its direct line to the academic departments. The project team also ensures that the practical requirements in the Study Regulations are met. "We are not interested in vocational training, but rather in performance skills," Behrmann emphasises, and adds, "We want our students to remain competitive on the job market for their entire working lives, so we are striving towards better integration with practice – this is why we believe that work experience should be firmly anchored in the degree courses".

The 'practice couch chats' with university graduates is one example of innovative seminar formats in Kassel. Alumni have often landed the dream jobs of current students; in the informal chats, they explain the path they took and advise on the prerequisites for a particular profession. Other seminars cover topics such as working in museums, with NGOs, gaining professional experience at a newspaper, and working in PR for large companies. The

Impacts at a glance

The students consider their career prospects at an early stage of their course. This allows them to fine-tune their skill set and thereby improve their chances on the job market. And employers benefit from graduates who have prepared academically for their future profession.



Photo: © Uni Kassel



Open: The University of Kassel is counting on more practical experience for its students

university has organised over 150 such events since 2010, and the 4,000 participants have proven that the approach is successful. Most importantly, the students' positive reactions show how helpful they find the programme: in a 2010 survey, a number of Bachelor's students criticised the lack of practice-oriented teaching content, Jens Behrmann recalls, and says proudly: "In 2013, the feedback has already improved significantly!"

Meanwhile, in the seminar room at the FU Berlin, psychology professor Ernst Hoff is deep into the theory part of the session. An 'objective tree' is projected on to the screen – a diagram showing the different levels of goals organised above and below one another. From weekly targets ("hand in coursework") and longer-term goals ("complete degree"), all the way to the objectives at the top of the tree ("find dream job"). "The students are expected to think about the bigger picture and what they would like do in the future," says Hoff. "And they should identify which ideas are their own, and which goals their parents or partners may have set on their behalf". This exercise was successful thanks to the lively discussion amongst the students: "The different perspectives that

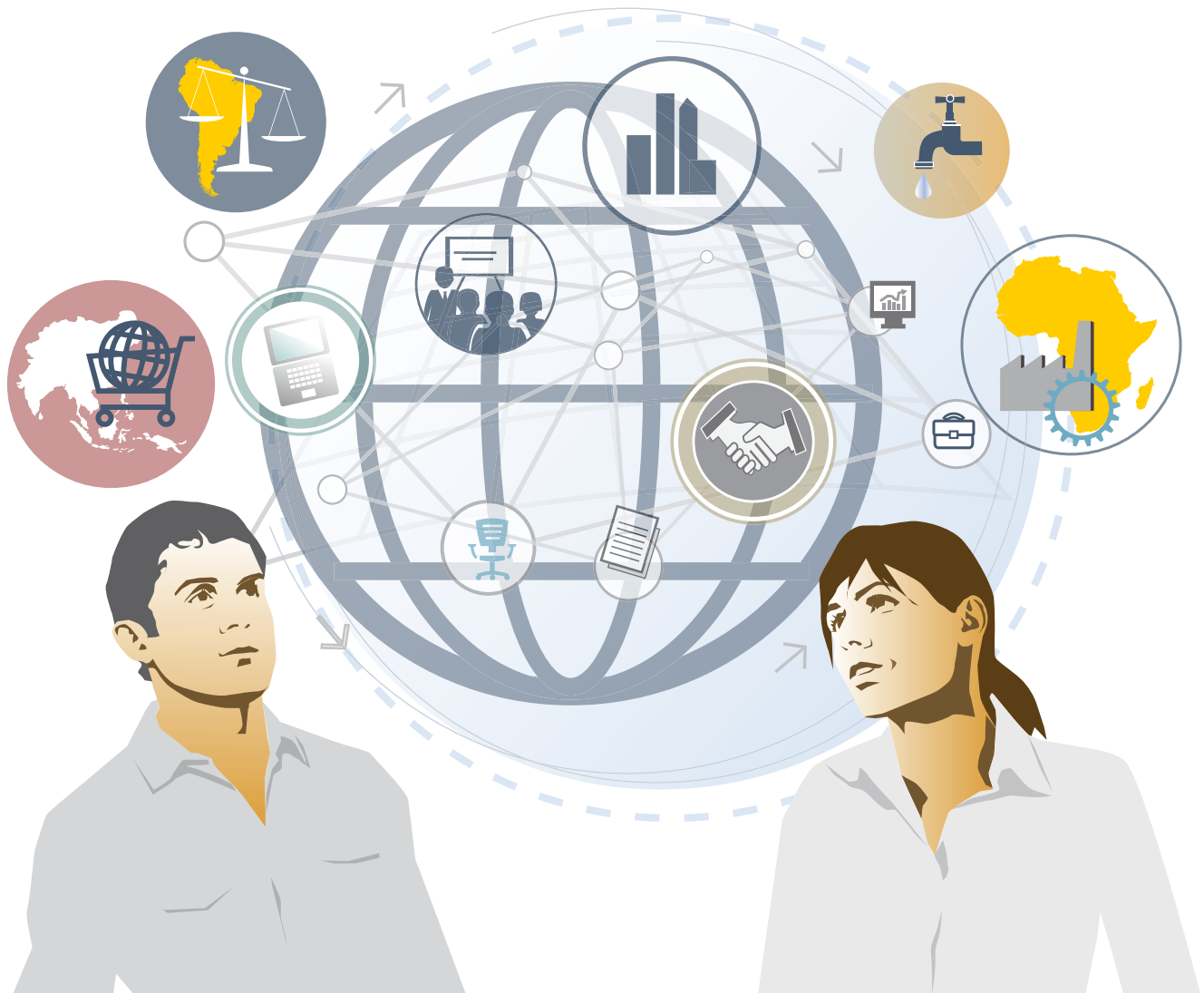
they each bring to the conversation are eye-opening for many participants."

Like Kassel, the *Kompass* programme at the FU Berlin, also places emphasis on building ties with industry. The so-called "practice days" are designed to be more flexible than a work placement: the students have to identify a profession that might interest them, and then organise an interview with someone who is already successful in their chosen field. "You would not believe some of the ideas that people have!" Hoff enthuses. One art history graduate is now considering a career as a stage designer for film and theatre productions, and a political scientist has decided to turn his interest in Israel into a new job. He gained so much knowledge through the practice days with specialist journals, trade organisations and cultural associations that he eventually landed a top position in the field.



UNIVERSITY OF AUGSBURG

HEADING OUT INTO THE WORLD



To prepare future business economists for a career abroad, the University of Augsburg has set up a degree programme with a consistent international focus. The aim is to equip graduates with the tools to help shape globalisation



When Augsburg first came up with the idea of a Bachelor's degree programme to prepare students for a career in international management, many other professors of business economics were sceptical about its approach. Today, just six years later, Global Business Management is one of the most sought-after business economics programmes in Germany – not least of all because of its direct connection with the university's international research focus.

"Here there is a close collaboration between business economists and legal experts on issues relating to globalisation," Professor Erik E. Lehmann explains. The joint research programme with the law school is called Global Business Management and Law. When Lehmann was appointed Professor of Corporate Management and Organisation at the Department of Business Administration in 2005, he was keen to align the department's teaching more closely with its research activities. With three of his colleagues, he designed a separate programme to do just that. The basic concept was something he had long had in mind: "I am convinced that globalisation is a real opportunity. We just have to prepare graduates well so that they can contribute to shaping the process." Lehmann sees an understanding of theory as integral to this preparation. For example, conferences involving international experts on the theory and practice of management are normally open to Bachelor's degree students as well, to keep them in touch with current debates. And, of course, Augsburg's in-house teaching staff routinely pass on along the latest findings from their own research to the students in their classes.

The programme itself combines knowledge of management with legal topics, reflection on moral philosophical questions and specialist soft skills. Around one third of the programme deals with general principles of economics and business administration, while another third is specifically tailored to reflect the programme's international focus; work done by students abroad accounts for most of the final third. To sharpen graduates' awareness of potential pitfalls, legal issues are touched on repeatedly within the curriculum.

Classes on companies' international activities address moral as well as purely economic aspects of business conduct, such as how to deal with refugee issues in some countries, or with child labour, environmental problems and demands for bribes. "Every manager has scope for decision making," says Erik Lehmann. "We prepare our graduates to handle that – even

though most of them are unlikely to come across these issues right at the start of their careers." At the students' request, social entrepreneurship has now been added to the programme, as many of them can envisage working for social enterprises specifically dedicated to addressing social problems.

Cultural understanding is an important aspect of the curriculum, which includes compulsory language training. Visiting lecturers from abroad emphasise the cultural practices of their region, as well as providing an introduction to the peculiarities of its economic system. Students are then required to spend a semester studying at higher education institution abroad or, alternatively, to gain practical experience by working in a foreign company for three months. "We are a real management programme – we don't prioritise cultural studies and languages," Lehmann emphasises. The programme's combination of teaching, research and social responsibility has been widely acclaimed, earning it an award from the Kurt and Velicitas Viermetz Foundation in 2012.

The University of Augsburg runs the third largest business administration programme in Germany, and the Bachelor's degree in Global Business Management is one of its most sought-after degrees. The Global Business Management programme accepts 70 students a year, but attracts 1,800 applications from all over Germany and from abroad; the candidates are selected by interview. "Many of the students go on to take a Master's at prestigious universities here in Germany or abroad – or embark on a trainee programme with a big company," Lehmann says. Graduates from the first few years of the programme who have since left university have often been sent abroad first by their companies, before returning to head office with new experiences.

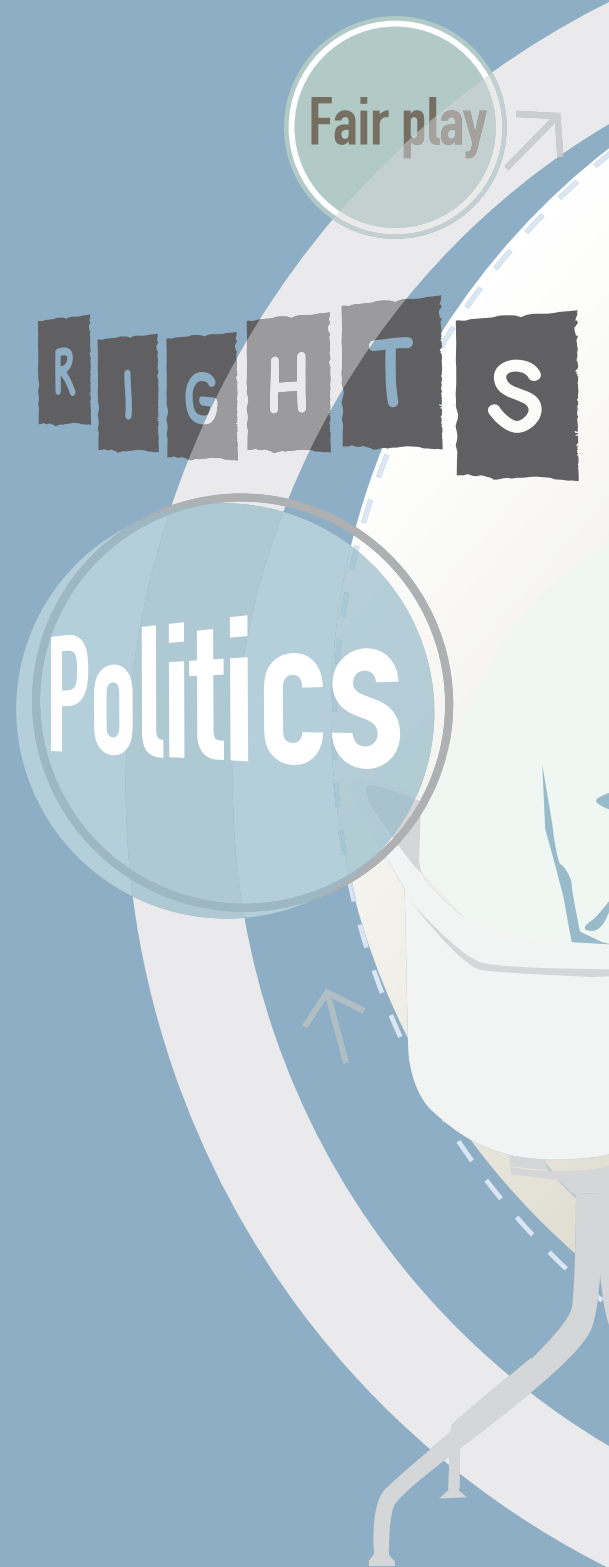
"We are a real management degree programme – we don't prioritise cultural studies and languages"

Impacts at a glance

Students gain experience abroad and benefit from involvement in an interdisciplinary programme. The university has created a programme able to compete with the best Germany has to offer. Since graduates have international experience, many future employers can appoint them directly to positions of responsibility.

Learning for society

The central task of higher education institutions is to educate those who will later shape society as self-dependent graduates inspired from a variety of sources, be they in industry, the civil service or in research. Traditionally, responsibility for society has played a major role in university teaching, although this has tended to be implicit. The other aim of knowledge transfer was not always as pronounced; it is a relatively new phenomenon for students to leave their institution and learn in social settings. In the meantime, it has become a valuable addition to classical teaching formats because students can apply what they have learned to practical situations and also gain impressions that prompt them to ask new questions. Opening up universities to society is no longer a postulated aim, but is increasingly becoming a reality.



Democracy

Equality

GLOBALISATION

Ethics





UNIVERSITY OF HALLE | UNIVERSITY OF COLOGNE | SOCIAL ENTREPRENEURSHIP AKADEMIE MUNICH

POSITIVE EXPERIENCES INCLUDED

With “service learning”, students leaving their higher education institutions to work at non-profit organisations. This allows them to use their specialist knowledge to help society and take valuable insights back to the lecture hall

“Simply gaining an insight into workflows and the complexity of practical tasks is extremely educational”

“If we hadn’t received help from two students,” says Mirko Petrick, “we simply wouldn’t have had the capacity for our project.” As a child and youth worker for the City of Halle, Petrick has been fighting against right-wing extremism for over ten years, first as a street worker and then as one of the initiators of the *local action plan* against right-wing extremism. “Over the years, we have launched almost 100 projects and, in doing so, have gained valuable experience. But what we lack is a compact overview of our activities, a way of summarising the results,” he says. Two students from the Martin Luther University of Halle-Wittenberg have now read through the old documents in the archive and written a brief portrait for each project. The results should be on the homepage soon.

Annamaria Fliege, a budding educationalist and one of the students involved, praises the project: “I had absolutely no experience in PR work, so this was a great opportunity for me.”

At the same time, she has gained an insight into work against the far right – and a valuable contact in the field. Mirko Petrick is convinced that the students’ efforts have paid off. “Now that we have brought everything together, we can better draw on our experiences in subsequent projects – and, of course, show the outside world how diverse our work can be.”

The students joined up with Mirko Petrick via the university’s service learning programme. The principle of service learning is for students to volunteer their skills and gain practical experience in return. Christiane Roth, a member of the academic staff, is responsible for this area at the University of Halle-Wittenberg. “This approach combines three elements,” she explains: “Academic content, a task focusing on the common good and, finally, reflection.”

Entitled *International Engagiert Studiert* (which translates as “International and involved study”), service learning at Halle is now a fixed





Photo: © Social Entrepreneurship Akademie

Noting good ideas: gathering results at the Munich Science Days in November 2013



element in the curriculum. All students must acquire key skills in an optional compulsory area, and the service learning projects are one such option. Interested parties can choose from a huge selection because several dozen associations and organisations are now involved in the programme. They are all linked by the Halle-Saalkreis volunteer agency, which has an extensive network throughout the region and brings the university together with civic organisations. The students' commitment is often urgently required: for example, IT students can programme a database for a disability association or improve the website of a hospice, while social scientists can develop a concept to help a hospital association attract more volunteers. There's something suitable on available for all subject areas.

The range of activities on offer can be viewed with awe during a small celebration. For Annamaria Fliege and around 50 of her fellow students, this is one of the highlights of their service learning time. Champagne glasses and snacks are laid out in the Volksbank conference room and the rows of chairs are well occupied. "This is not supposed to be a formal event," says Christiane Roth, making the welcoming speech at the front of the room, "so feel free to ask questions and let's have a discussion!" Some of the students then present their projects and experiences to the public.

The audience includes not just the participants themselves, but also the mayor, representatives of local associations and initiatives, and University Pro-rector Professor Christoph Weiser. This broad collaboration aims to show that the importance of service learning extends far beyond the university. "It is a very good opportunity to anchor our university firmly in the region," praises Pro-rector Weiser, who teaches in the Faculty of Economics. "We can show that we really are enriching the city, even in areas that previously had no firm contact with the university."

Creating this bridge between universities and society is one of the key concerns of service learning. Rather than an object to be examined by the social sciences, society becomes an integral part of overall academic teaching. As in Halle, where service learning has become one of the most prominent offerings in Germany, an increasing number of institutions are adding it to their curriculum. In the meantime, 25 higher education institutions have joined the nationwide *Education through Responsibility* network (see interview on page 68). Service learning has become a common concept at American higher

Interview



"At higher education institutions, too, there is growing sensitivity to social responsibility"

Professor Wolfgang Stark, a psychologist from the University of Duisburg-Essen, was one of the first to introduce service learning in Germany. Today, he is one of two spokespersons for the higher education network "Education through Responsibility". Here, he talks about the social responsibility boom, American role models and what the financial crisis has to do with higher education teaching.

Professor Stark, some of your inspiration for setting up the Uniaktiv service learning programme at the University of Duisburg-Essen (<http://www.uni-aktiv.org/en/uniaktiv/about-us/>) came from the USA. What does the renowned Massachusetts Institute of Technology (MIT), of all places, have to teach us about the social sphere?

To be honest, when I travelled to MIT I was convinced that service learning would have a hard time there – why would an elite, technically-orientated university be interested in social responsibility? But my scepticism was completely misplaced. Not only do they have a large department that supports this area, but 60 per cent of its students take part in service learning activities.

What specific ideas did you bring back to Germany?

I can think of three things: first, our American compatriots recommended that we get two or three of the university's well-known professors involved from the outset; this would make it easier to convince others to join. Second, we followed MIT's example and offered a service learning award. And third, we saw how useful a service learning network could be: 1,100 universities and colleges are involved in the USA.

Germany is still a long way from achieving such numbers.

Our network has only been around since 2009, while Campus Contact launched in the USA in 1985! In the past 18 months, we have grown from 12 to 30 member institutions and are constantly receiving new enquiries. We are currently expanding our network to cover the entire German-speaking region and are also in talks with Austrian higher education institutions. We have seen a continuous rise in interested parties.

How do you explain this?





Photo: © Umi Köln, Alice Vento Lidell

Social marketing: students present ideas on how to increase awareness of non-profit initiatives

Interview

» This is certainly also due to the public debate triggered in the years following the financial crisis. Values are increasingly emphasised. For us, this means that more students and more teaching staff are interested in service learning activities. Higher education institutions are becoming more aware of social responsibility.

But higher education institutions have always had responsibilities; after all, their role is to educate the people who will shape the society of the future.

The social task of higher education institutions has inadvertently moved towards preparing young people for a career as quickly as possible. This has a very strong economic focus and has pushed something into the background that was always the role of the university: shaping society. Higher education institutions educate the managers of the future, but not just for commercial enterprises – civil society needs them too. A degree programme alone cannot do this. Studies have shown that the willingness to assume societal responsibility develops from relevant experiences, not from attending ethics lectures. And this is exactly the kind of experience that service learning offers. It is valuable not just for the students and teachers, but also for higher education institutions that want to follow these examples. This is why we are

presenting specific service learning examples and experiences at www.campus-vor-ort.de.

The service learning network is currently drawing up a memorandum to outline this responsibility held by higher education institutions. Do you get the impression that institutions' perception of their social role is actually changing?

Service learning is, of course, just one small part of the process; we also need a discussion about higher education policy. And current research programmes indicate that this has already started, as they are increasingly aimed at sustainability and social responsibility. We want to use service learning to make these aspects an integral part of teaching. We believe this will help drive the whole discussion forward.



education institutions and alludes to the service that the students provide through their work.

Students in Munich have also dedicated themselves to the good of society and are currently setting up a company they have named *nearBees*. As their homepage explains, more than 80 per cent of honey comes from abroad: "But the main function of bees – pollinating plants – cannot be imported." They therefore want to use their company to get people eating honey from the region again and thus to boost environmentally friendly economic activity. Some of their fellow students have set up an internet platform on sustainability management, while another group has founded a consulting company for intercultural skills. This approach is unique in Germany: together, the entrepreneurship centres of all four of Munich's universities have founded the *Social Entrepreneurship Akademie*. Here, students learn social entrepreneurial skills so that they can set up small companies that, like *Quartierbiene*, want to do something good. "We want to provide inspiration while also showing how effective such projects can be," says Professor Klaus Sailer, who teaches at the University of Applied Sciences Munich and is one of the board members of the Social Entrepreneurship Akademie. The *Social innovations* certificate programme starts here once a year, and students from all fields and all participating institutions can apply by submitting a letter of motivation. The programme always starts in autumn and although it cannot be counted towards their studies, the high-calibre line-up makes it worthwhile; professors and practitioners teach together on topics such as social innovations and entrepreneurial conduct. "In the first year, we aim to lay the foundations, and in the second year we deal with different issues," explains Sailer. While some develop ideas for their own social enterprises, others specialise in corporate social responsibility in large corporations, and a third group prepares itself for managing social organisations. Everyone is closely involved in practical work and is supported by experienced professionals. Klaus Sailer relates how infectious the resulting creativity can be: "Last year, for example, the students developed five ideas for social enterprises," he says, "and all five ideas have now led to actual companies being formed."

The skills the students gain on the way are truly interdisciplinary: it requires not just team work and communication skills, but also the ability to convince fellow students of your own ideas. Basic economic concepts naturally

Spotlight on students

Lerdy Yulissa Renteria Palacios is a fifth-semester business economics student at the University of Halle-Wittenberg.



Photo: © Marcus-Andreas Mohr

Studying at a foreign university can sometimes be frustrating when you're talking in a foreign language all day and worrying about making mistakes; well, that's what I've found. I come from Colombia and want to do something here at the university to help other students with the same problems. This is why I set up an *English Tea Time*. Every other Tuesday, we met for two hours in the students' union, with people from all over the world and a few Germans, of course. We talked in English for two hours and I prepare a topic each time. For example, one week we talked about music and each person presented a song from their country. I definitely think that our *English Tea Time* helped most of the people there. And me? My preparations helped me to make friends with fellow German students. After all, the service learning programme is called "*international and involved*" because it helps bring together students from different countries.

Svenja Steinborn is in her third semester of educational sciences; Sebastian Meier is a ninth-semester student of mathematics and physics for the teaching profession. Both are enrolled at Halle-Wittenberg.



Photo: Kilian Kirchgöbner

When we walked through the heavy gate of the detention centre for the first time, we both took a deep breath. We wanted to organise a leisure programme for the inmates: males aged between 14 and 23 who had been sentenced to between one and four weeks for their offences. We want to work with children and young people later on, so this was good training for us. For example, how do I remain calm when trying to enforce rules of behaviour during a confrontation? We watched a film with them, played table tennis and pool in the detention centre's leisure room, did a creativity exercise together and baked biscuits at Christmas. All in all, we were surprised by the prisoners: most of them were open, broad-minded and willing to talk. And they were really pleased that we had spent time with them.



Exchanging ideas in Munich: business game looking at corporate social responsibility (left), discussion with an experienced social entrepreneur (right)

also play a role, although as Sailer emphasises, the certificate programme is not a compact business studies course: "Quite the opposite. Management is about directing a process towards a goal. Here, we focus on identifying the goal before actually initiating a process." The participant numbers alone show that the

Munich-based academics have hit a nerve – in the second year, there were three times as many applicants as places.

The Munich Social Entrepreneurship Akademie also exhibits a key characteristic of service learning. "Each higher education institution organises its programme specifically to best match its profile," says Christiane Roth from the Martin Luther University of Halle-Wittenberg. "This diversity is what makes it so attractive!" Together with sociologist and public administration specialist Holger Backhaus-Maul, Roth has penned the first study on the state of service learning in Germany, surveying all German higher education institutions in the process. "Some universities emphasise its academic nature and focus on the transfer of specialist knowledge, some concentrate on teaching soft skills, and others place value on taking social responsibility and practising democracy," Roth says, summarising her observations. "In all of these cases, it is important that higher education institutions regard service learning as an integral part of teaching."

Impacts at a glance

Students can test their skills in practical situations, make contacts and do something good. Social organisations benefit from volunteer helpers. Higher education institutions gain an attractive teaching instrument and strengthen ties in their city.



One of the newest members of the network, the University of Cologne, is also forging its own path. Here, service learning has been developed at the *ProfessionalCenter*, which collates activities to help students negotiate the job market and gain vocational qualifications. "We are using service learning to expand these courses," explains Mariam Bigdeli, who is responsible for service learning. Gaining practical experience, making contacts, contributing to society, trying out something new and collecting credit points in the process – for many participants, this is the most important motivation. Bigdeli is consciously creating a wide network of contacts outside the university to make the activities as varied as possible. And they range from PR work for fair-trade chocolate through to a mentoring programme in which students work with children and young people in Cologne's schools. After a launch event at the start of the semester, participants form groups to work on their tasks. "Milestone meetings" are held four times each semester and are adapted to the project in question, such as social marketing, event and campaign management or child and youth work. "The students come with extremely high expectations," ob-

serves Bigdeli, "and then they realise that they cannot, for example, single-handedly organise a music festival such as *Rock am Ring* in the space of a semester as part of the event and campaign management section. Simply gaining an insight into workflows and the complexity of practical tasks is extremely educational."

Often, however, service learning leaves the students with a lot more than just practical experience. Take the group of Cologne students who shot a video for the *pro familia* organisation in Chorweiler, which was to focus on life-like baby dolls that must be changed and fed regularly and cry as often as real babies. The organisation uses these dolls for sex education projects in schools and lends them to pupils for a few days at a time. The students knew immediately how they wanted to structure their video – without further ado, they took the dolls into a lecture and filmed the results. The clip they produced is to be used in advertising for several years.

"Each higher education institution organises its service learning programme specifically to best match its profile. This diversity is what makes it so attractive"



Photo: © Marcus-Andreas Mohr



Photo: © Marcus-Andreas Mohr

Spotlight on students

Svenja Hofsäb studies political science and international linguistics, while Natalie Ebel is reading Japanese and Jewish studies; both are in their third semester at the University of Halle-Wittenberg.

For our project, we visited a refuge for female asylum seekers. Our task was to design a German course and then teach the women there. It was a real culture shock. Not because the women come from all over the world, but because most of them have been through absolute hell. They have all experienced violence, and because we developed a good rapport, they told us all about it. This opened our eyes to worlds which we previously had known nothing about. The content aspect was also very educational for us: we are both studying languages and can apply our knowledge to a practical situation. We are also determined not to simply return to everyday life at the end of the semester. We will continue to visit the women and help them to practice their German.



UNIVERSITY OF WÜRZBURG

SEMINARS TO BROADEN HORIZONS

The University of Würzburg regards interculturality as a key qualification – and teaches it in a special programme involving a number of subject areas ranging from biology to law

“Our programme helps make the university more international”

Professor Eric Hilgendorf has heard the same questions raised in seminars over and over again: how does German law deal with honour killings, animal slaughter or the wearing of headscarves? “The whole of criminal law,” says Hilgendorf, Professor of Criminal Law, Criminal Justice and Legal Theory at the Julius Maximilian University of Würzburg, “is highly culturally charged.” Hilgendorf then reasoned that dealing with other cultures should really be part of the programme offered throughout the entire university – and launched an initiative that remains unique in Germany to this day.

This idea resulted in what the marketing literature calls “a sophisticated and academically sound curriculum for acquiring intercultural skills” that involves ten institutions from six faculties across the university. The curriculum ranges from a seminar on the educational integration of children from immigrant families, to an Ethics in religions course, through to an introduction to India as an economic region. Since the programme was founded in 2008, several dozen seminars have taken place each semester and between 1,000 and 1,500 students regularly sign up from all subject areas,

most of them Bachelor’s students. “Our most important principles are openness and general understanding. All courses are open to students from any discipline, and the content ought to be comprehensible without the respective specialist background knowledge,” says Eric Hilgendorf.

Entitled *Global systems and intercultural competence* (GSiK), the programme is now a permanent fixture at the University of Würzburg. Credit points are awarded for all activities and can be easily accredited to most degree programmes – after all, as the programme managers point out, intercultural skills are one of the key qualifications of the 21st century. However, the broad acceptance of the programme at the university is primarily due to the involvement of a wide variety of subject areas, from biology to economics and Slavonic studies, theology and Chinese studies. Part of the concept is for researchers to bring their personal perspective to the particular topic: “The economists tend towards questions that can be applied to specific situations, such as the right way to negotiate in China. By contrast, many cultural studies students scrutinise concepts



and modes of conduct at a theoretical level,” explains Eric Hilgendorf.

Most GSiK seminars involving applying theory to practice, with a wide range of options depending on the focus: from visits to old people’s homes to workshops at companies specialising in the India or China market . This has even led to partnerships with foreign universities – for example, the legal specialists regularly give talks on German criminal law in Istanbul, and their Turkish counterparts travel to Würzburg for guest lectures. “Our programme helps make the university more international,” says Eric Hilgendorf with conviction.

The concept is designed so that anyone who takes a systematic approach to choosing from the courses on offer can compile their own “studium generale” degree programme. And it is this option that attracts many of the participants. Only around half obtain credits for their work; the rest come out of pure curiosity. Special certificates are now being awarded to record students’ in-depth understanding of globalisation, migration and multiculturalism.

The GSiK initiative was built from the ground up: most of the teaching staff are non-professorial and are paid from a separate budget that was financed from tuition fees until they were abolished. For some participants, the project has shaped their later lives: for example, one law student who participated in GSiK in his very first year wrote his post-doctoral qualification to become a professor on culture and criminal law. He now has his own chair in this subject at another university.

Impacts at a glance

Students gain key qualifications that are relevant for their later occupations. They also receive insights into other subject areas. The project promotes the closer exchange of ideas and information between the faculties, and new international partnerships have developed.



BERLIN SCHOOL OF ECONOMICS AND LAW

THE LAWYERS IN THE UNIVERSITY LIBRARY

At the student legal advice service at the Berlin School of Economics and Law (HWR), budding lawyers help their fellow students – and gaining an early insight into legal practice in the process



Photo: © Sylke Schumann/HWR Berlin

In the name of the law: budding lawyers from the student legal advice service at the Berlin School of Economics and Law



The consultation hour takes place in a sparsely furnished room with a table and chairs in the middle and metal shelves lining the walls. “I have a problem,” the student explains as she takes a seat. Opposite her sit three budding lawyers: Nora Burmeister, Désirée Drost and Muhedin Ramic. They take careful notes as their client talks about the workmen renovating the flat next door who accidentally flooded her bathroom. “I think I’m entitled to compensation because I couldn’t work at all that day,” she says, “but how do I get the money?”

The students, who work every Thursday, often hear stories like this. For one hour, they offer legal advice at the Berlin School of Economics and Law, quickly turning a room in the library into their consultation space. They are presented with two or three cases each time, sometimes relating to tenancy law, sometimes to problems with a leasing contract or insurance policy.

“It is important that the students learn about real life,” says Professor Dörte Busch, who teaches civil and social law. “It puts human faces to the paragraphs we discuss in our seminars.” Dörte Busch supervises the student legal advisors and, in a weekly plenary assembly, discusses all cases brought to the consultation hour to help her students make the right call. Often, she says, the questions are of profound importance to the students: what claims can you make if your father stops paying your allowance? If your housemate owes several months’ rent? “We have even seen exchange students whose new credit cards have been stolen from the post boxes in their halls of residence and their accounts emptied,” Dörte Busch recalls. Her students are particularly committed to resolving such issues – although the combination of civil and criminal law makes them especially complicated.

When Professor Hans Paul Prümm (who taught public law until his retirement) suggested back in 2004 that the Berlin School of Economics and Law take a trip to America, he was one of Germany’s pioneers. “No other higher education institution had ever awarded credit points to its students for their work for the legal advice service,” he says. To achieve this, Prümm combined two approaches common in America: students give advice in the *legal clinics*, while *legal aid* sees their university provide them with emergency legal support. In Berlin, he used these to create a model in which participants provide legal advice to their

The trend for student legal advice

In most legal faculties, students regularly swap the lecture hall for advisory services; many higher education institutions have identified the educational potential of early contact with practical work. Meanwhile, around 25 student legal advisory services have set up their own Federal Association, which includes projects at the most prestigious universities. Professors sit on the board of trustees for the association because the students must be supported by their teaching staff – they cannot offer legal advice by themselves and their advice is not legally binding because they cannot replace qualified lawyers. “The projects often target students, low-income social groups, foreigners and refugees to fulfil the pro bono aim of making a valuable contribution to society,” says Tino Wäscher, who studied at the Berlin School of Economics and Law and sits on the management board of the Federal Association. Wäscher explains that this approach aims to kill two birds with one stone: clients are less inhibited in seeking legal advice, and the students can apply their theoretical knowledge to practical situations for the first time.

fellow students. This model has now been in place at the Berlin School of Economics and Law for ten years, and is more popular among budding lawyers than ever before. With around 40 students offering regular advice (including a nearby service for socially disadvantaged citizens), the project has almost reached capacity. All participants come from Bachelor’s degree programmes in Public Administration (B.A.) and Law (Ius LL.B.)

Meanwhile, the person whose bathroom had been flooded by the workers next door has presented her case and answered all questions. Her three fellow students will investigate further: they will discuss the case in their seminar with Dörte Busch, work out strategies to resolve the matter, and then present these to the student in the next office hour. If all goes well, she will then receive the compensation she is hoping for.

Impacts at a glance

Students can apply theory directly to practical cases and gain an initial impression of their potential profession. The university can build on these practical experiences in its teaching activities.



A NEW DESIRE FOR ACTIVE COMMITMENT

Society's demands of graduates are subject to constant change. This necessarily commits the entire higher education system to a process of ongoing optimization. Currently, a range of methods are being tested which aim to make degree programmes more research-focussed, practical and of greater variety

By Peter A. Zervakis



You have to be there: for many students, it goes without saying that you need to be actively involved in society



Many students commit themselves full of enthusiasm and idealism to the broadest range of causes and initiatives – both within and outside their institution. For the past few years, young people have increasingly been looking to volunteer for tasks and projects that have a limited time frame and which – where possible – fit in with their personal career plans. This recent trend creates new challenges also for higher education institutions: businesses and society are now looking not just for highly specialised, well-educated and trained subject experts; university graduates should now be equally aware of the importance of values and responsibility and have received a rounded academic education that enables them to work independently and consciously apply research methods to acquire new knowledge on their own initiative. Furthermore, they should, with a citizen’s sense of public spirit, become actively involved in applying their skills for the common good.

The term “active involvement” has thus been afforded new status – for universities as well as for the students themselves. As a result, the subject content of degree programmes has been enhanced over the past few years with the teaching of transferable skills, research-relevant project work and practical applications. Student volunteering, too, whether as part of the degree course or extracurricular has found a new structure within the Bachelor’s and Master’s degree programmes, and from the perspective of higher education institutions has, if anything, increased in significance.

This brochure reports on impressive examples of how – across the length and breadth of the country – higher education executives, teachers and students are committed to continually improving the conditions of learning and teaching. These cases also show that universities are seeking their own individual ways of using the creative scope offered by the European reform of higher education to the best effect. Equally, the examples offered here counter the many negative preconceptions about the supposed non-academic quality of German Bachelor’s degree programmes: At the University of Hohenheim, for instance, every student has the chance to become actively involved in research (p. 42); at the TU Darmstadt, the first phase of a degree programme includes a thrilling interdisciplinary applied project (p. 22); Bielefeld University of Applied Sciences skilfully combines a practical teaching approach with regional business development (p. 56). At an increasing number of higher education institutions in Germany, the concept of “Service Learning” trialled at many US elite universities is strength-

ening the connections between students, civil society and active social involvement (p. 66).

With reference to the title of this publication, the idea of “Committed Universities” should by all means be considered a programmatic statement, as the examples here demonstrate. They inspire courage to abandon the initial reticence and the persistent prejudicial opinions regarding the Bachelor and to deal in an unbiased manner with the broad scope of the reformed degree programmes for creating innovative structures at our higher education institutions, and also with the potential of students to affect change. Naturally, it is not our intention through the examples shown here to deny that there are some places



Biography

Since July 2010, Dr Peter A. Zervakis has been head of the HRK’s Project nexus – Concepts and good practice in Higher Education.

From 2006 until June 2010, he was head of Bologna projects at the German Rectors’ Conference in Bonn. Following a degree in History and Social Sciences with study periods in the US, he completed a PhD in 1992 at the University of Hamburg. From 1999-2004, he was employed as a research assistant at the Center for European Integration Studies, University of Bonn, and from 2004-2006 he headed the European projects at the Bertelsmann Foundation in Gütersloh, Germany.

where the right impetus is still needed. The work required here will undoubtedly take a good few years more. The effort will, however, pay dividends – for universities as they become better in fulfilling their evolving social role; but above all for students, who will enjoy the long-term benefits of their university studies.

Ultimately, the examples gathered here in this brochure also prove that it is worthwhile for students to become actively involved on behalf of their fellow students. Over time, this creates a culture of recognition for committed students – the future pillars of the oft-invoked European civil society.

Dr Peter A. Zervakis is head of the German Rectors’ Conference (HRK) Project nexus.



Explanations of abbreviations and terms used

► **Affiliated institute**

A research institute that is independent from an organisational and legal perspective but that is affiliated to a university. Researchers at affiliated institutes often also hold a chair at the university in question.

► **Certificate courses**

Seminars given in related subject areas (modules), each of which covers one particular topic and for which a university certificate is issued on completion. Certificates may sometimes also be awarded for successful completion of individual seminars.

► **Credits**

During the Bologna Reforms, a European system was introduced for recording students' achievements: the European Credit Transfer and Accumulation System (ECTS). The aim is for achievements to be comprehensible and comparable around the world. Credit points (or credits) are awarded for eligible learning content. One point equates to a workload of 25 – 30 hours, while a semester is made up of 30 credits. The ECTS does not replace the previous grading system in Germany, which, on the one hand, is complemented by the credits, which indicate how much work a student has put into a particular achievement. More points are awarded for larger learning workloads; different numbers of points are available for different classes completed successfully. On the other hand, students receive a performance record in addition to their grade (1 to 5).

► **Diversity**

Diversity in degree programmes and teaching relates to higher education institutions and faculty cultures dealing productively with the variety of individual student biographies and requirements, particularly in the initial phase of study programmes (see nexus *Impulse für die Praxis*, No. 3/2013)

► **Dual degree programme**

Dual degree programmes always combine higher education studies with vocational practice. There are various models, the most popular combining practical training at a company with academic foundations at a higher education institution. The students work through both parts at the same time and usually complete the training element with a trade test before the German Chamber of Commerce and Industry and the degree programme with a Bachelor's qualification.

► **E-learning**

Learning, communication and interaction supported by electronic and digital media. This includes, amongst others, online study materials, videos of lectures and online interaction between students and lecturers.

► **Employability**

Higher education institutions train their graduates in certain skills (beyond subject knowledge) on the basis of a diverse and broad range of academic education (by integrating specialist, methodical and cross-discipline skills and vocational qualifications) to meet the changing requirements of academic and non-academic careers (see nexus *Impulse für die Praxis*, No. 1/2012, 4/2013 and 5/2014).

► **Federal Training Assistance Act**

The Federal Training Assistance Act (*Bundesausbildungsförderungsgesetz*, BAföG) regulates support for young adults during their time in school and higher education. They receive a monthly amount based on their individual financial situation; only part has to be paid back. This is intended as a means to increase equal opportunities in the education system.

► **Initial phase of study programmes**

Refers to the structure and content of the transition from school to higher education and includes the first two semesters.

► **Key skills/Core competencies**

Interdisciplinary qualifications such as communication and team work, foreign language and IT skills and conceptual and organisational abilities. In addition to a well-founded specialist education, integrated communication is playing an increasingly important role in graduate entry into the job market.

► **MINT**

Acronym for subject areas Mathematics, Informatics, Natural Sciences and Technology.

► **Non-professorial academic staff**

Academic staff and lecturers at universities.

► **Preparatory course**

This prepares students for their academic area, both in terms of terminology and academic working methods.

► **Quality Pact for Teaching**

The Federal/state programme for better study conditions and increased quality in teaching ("Quality Pact for Teaching") aims to improve student supervision and the quality of teaching at higher education institutions. Between 2011 and 2020, the Federal Government is making available around two billion euros for this purpose. Support is being provided to 186 higher education institutions from all 16 Federal states.

► **Research-based learning**

In research-based learning, students conduct independent work or collaborate on an extensive project, thereby helping to shape and experiencing and reflecting on the learning process involved in a research project – from developing questions and hypotheses through to selecting and implementing methods and testing and presenting the results.

► **Service learning**

Refers to the general approach of a higher education institution as well as a teaching method that awakens students' interest and involvement in specific social issues and tasks and reflects on this from an academic standpoint to acquire new experience-based knowledge ("learning"). In this way, students also help to solve social problems ("service").

► **Skills orientation**

This concept describes a change of perspective that focuses teaching and learning on acquiring individual skills on the basis of learning outcomes when tackling content-related problems in a subject area ("knowledge and skills") (see nexus *Impulse für die Praxis*, No. 1/2012 and No. 4/2013).

► **"Student life cycle"**

An integrated approach to the study process, from advice prior to starting a degree programme through to the transition to the job market. This particularly emphasises the possible and desired flexibility in degree programmes and greater separation of Bachelor's and Master's courses to encourage students to develop their own personal educational biographies.

**Links & references**

Overview and links to further information for the programmes and degree programmes presented in this magazine in the order that they appear

Page 12: Ars legendi Prize
www.ars-legendi-preis.de

Page 16: The Coburg way, Coburg University of Applied Sciences and Arts
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Page 22: KIVA, TU Darmstadt
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Page 32: *Universitätskolleg*, Universität Hamburg
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Page 36: TU projects and project workshop, TU Berlin
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Page 38: Product workshop, Aachen University of Applied Sciences
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Page 42: Humboldt reloaded, University of Hohenheim
www.studium-3-0.uni-hohenheim.de

Page 46: Studies with profile, Saarland University
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Page 50: Game-based learning
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Page 56: Practice-integrated degree programme, Bielefeld University of Applied Sciences
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Page 78: Law Clinic, Berlin School of Economics and Law
www.hwr-berlin.de/studium/studentenleben/studentenprojecte/studienrechtlicherechtsberatung/
www.b-s-r-b.de

Page 80:
www.hrk-nexus.de

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Strong in research, involved in practice, active in society**

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