A 3 Universities of applied sciences in transition

Universities of applied sciences (UASs; originally called Fachhochschulen, FHs) were established fifty years ago as an independent type of tertiary education institution. In the meantime, they are often referred to as Hochschulen für angewandte Wissenschaften (HAWs) or given names such as Technology University of Applied Sciences or School of Economics and Law.

Alongside the universities, UASs are one of the two pillars of the German higher-education system (cf. box A 3-1).[41] They have a distinct profile and have made a significant contribution to the further development of the German innovation system.

The higher-education acts of the Länder define the UASs' specific tasks primarily as application-oriented teaching and application-oriented research.[42] Furthermore, UASs open up important career opportunities for graduates of apprenticeship training. This is not only important for making vocational education and training more attractive, it also ensures close links between qualified practical skills and knowledge on the one hand, and scientific findings and methods on the other.[43]

Box A 3-1

Review of UASs over the last 50 years

The ‚Agreement between the Länder of the Federal Republic of Germany on standardization in the field of universities of applied sciences' (Abkommen der Länder der Bundesrepublik Deutschland zur Vereinheitlichung auf dem Gebiet des Fachhochschulwesens), signed in October 1968, declared engineering schools and similar institutions such as Höhere Wirtschaftsfachschulen to be institutions of tertiary education. A number of new UASs were founded, especially in the early 1970s. After Germany's reunification, UASs were also set up in the former East German states, where predecessor institutions – such as engineering schools, art colleges and universities of agriculture – were turned into UASs. Many new UASs were established in the 1990s and after the turn of the millennium in both the new and old Länder.

By 2016, there were a total of 217 state-approved general UASs[44] in Germany with a total of 960,000 students.[45] About half of the UASs were state-run.[46] The three subject areas with most graduates were law, economics and social sciences; engineering; and mathematics/natural sciences. Furthermore, specialized professions were increasingly being catered for.[47]

The task of the UASs, as stated in the above-mentioned agreement, was to provide a scientifically based education that prepares students for final state examinations and enables them to work independently in their chosen professions.

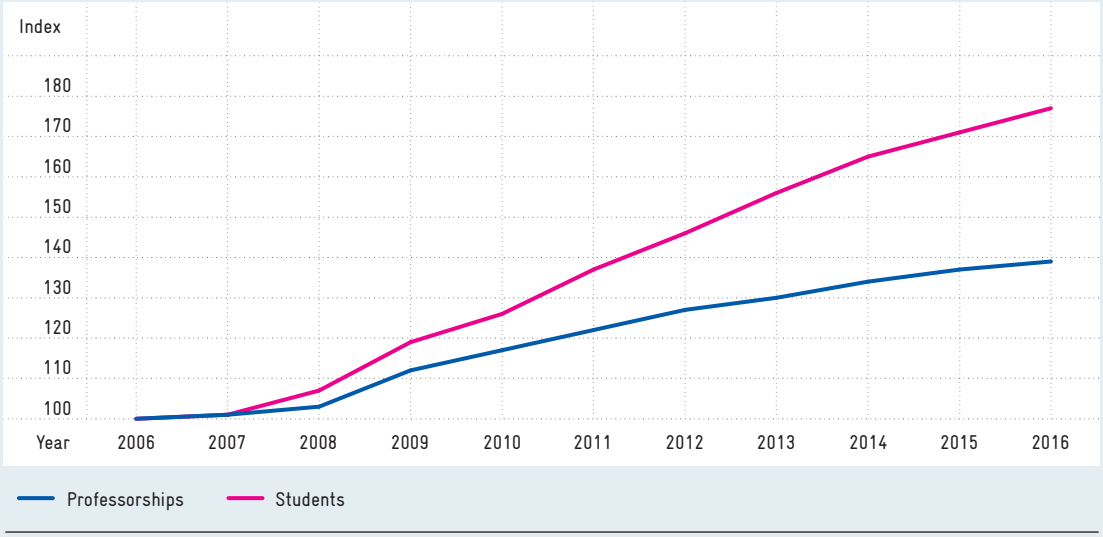
In the 1990s at the latest, the Länder extended the range of tasks of the UASs towards the fields of research and development (R&D).[48] Today, the tasks specified in all Länder higher-education acts include not only the practice-oriented training of students, but also application-oriented and practical R&D, as well as the transfer of knowledge and technology.[49]

The training and qualification opportunities for students at UASs have expanded in the wake of the Bologna process initiated in the late 1990s.[50]

Fig. A 3-2

Download data

Development of the number of professors and the number of students at UASs



Index: 2006 = 100.
Source: own calculations on the basis of Statistisches Bundesamt (Federal Statistical Office), Fachserie 11, Reihe 4.1 and 4.4.

Current discussions revolve around the quality of teaching, potential in the field of applied research and in knowledge and technology transfer, as well as staff-recruiting difficulties at UASs. A particularly controversial debate focuses on the extent to which UASs with strong research divisions should be given the right to grant doctoral degrees.

Great importance of UASs for (regional) innovation systems

UASs play an important role in the R&I system.[51] An empirical analysis that was able to examine the causal effect of the staggered establishment of UASs in Switzerland in the 1990s, reveals an increase of up to 14 percent in the number of patent applications in the vicinity of the newly formed UASs relative to otherwise comparable regions. Furthermore, the quality of these patents – i.e. the frequency with which they were cited – also increased in the UAS regions by up to 4 percent.[52] Since students at UASs often study in the district where they acquire the higher-education entrance qualification, establishing UASs accordingly means that greater use can be made of regionally available human resources for R&I activities.[53]

A study conducted on behalf of the Commission of Experts using the microcensus surveys as its database shows that, in Germany,[54] the ratio of UAS graduates working in R&I activities is similar to the corresponding ratio of university graduates. During the study period from 2000 to 2011, approximately 24 percent of the UAS graduates were engaged in mostly R&I-related activities in their work – i.e. activities involving the „research, drafting, designing and developing of products, plans and programmes“.[55] In addition, a survey on scientific research staff showed that research-based companies were looking for UAS graduates for 46 percent of vacant scientific posts – 18 percent for people with a Bachelor‘s degree and 28 percent with a Master‘s degree.[56]

Increasing proportion of students at UASs

The UASs‘ key task in teaching is to provide training in the application of scientific findings and methods, or in artistic skills for professional practice.[57] By contrast, university teaching aims to empower the students more to generate new knowledge and develop new scientific methods. Since it can be assumed that the majority of all higher-education graduates will not engage in independent scientific

activity, it seems in line with labour-market requirements if a larger percentage of students are enrolled at UASs that teach the practical application of scientific findings and methods. The increase in the percentage of students at UASs in the course of the educational expansion is plausible against this background.

The German Council of Science and Humanities (Wissenschaftsrat) notes that the above-average growth of the UAS sector during the expansion of the higher-education system is in line with its repeated recommendations, „although the expansion target – as measured in terms of demand and requirements – has evidently not been achieved yet".[58] Against this background, the Commission of Experts advocates maintaining the increased capacity offered by UASs, or further raising the proportion of UAS students, while simultaneously reducing the proportion of students enrolled at universities, in the event of an expected demographic decline in the number of students beginning tertiary education.[59]

Teaching at UASs is characterized by smaller study groups than at universities; most teaching is carried out by professors.[60] This special feature of teaching should be maintained even if there is an increase in the number of students. However, in recent years the number of students has risen much more quickly than the number of professorships (cf. figure A 3-2). The student-faculty ratio at UASs has worsened from 39 students per professor in 2006 to 50 students per professor in 2016. Student drop-out rates have also risen at UASs in recent years – in both Bachelor's and Master's degree courses.[61]

Growing importance of applied research and the transfer of knowledge and technology

Alongside teaching, research and transfer activities are today also among the most important tasks of the UASs.[62] The amount of third-party funds raised – an indicator of research activities at UASs – has grown markedly in the last few years, although it has recently been stagnating.[63] The development of third-party funding provided by the Federal Government should be emphasized in this context (cf. also box A 3-3). At €246.2 million, it was almost five times as high in 2015 as in 2006. As a result, the Federal Government's share of total third-party funding raised by UASs went up from just under 25 percent in 2006 to 43 percent in 2015. The private sector's share declined in the same period from just under 34 percent to 22 percent. In absolute terms, however, there was also an increase here.

Most UASs have a central office that functions as a coordination and service unit for research.[64] Its job is to support professors who are active in research with setting up, applying for and implementing projects. Detailed information on the extent to which transfer services are a fixed part of the budgets of UASs was not available and could not be analysed by the Commission of Experts.

As part of the accompanying research on the programme ‚Research at universities of applied sciences' (Forschung an Fachhochschulen), UAS managements were asked what measures sustainably improve the framework conditions for research at UASs. This survey showed that, according to UAS managements, the intended results were most likely to be achieved by increasing basic funding for research, improving facilities for research, and reducing professors' teaching commitments.[65]

UAS professorships between the exigencies of practical work and science

In addition to pedagogical suitability and an ability to conduct scientific work, usually an applicant for an UAS professorship must have had several years of professional experience outside of higher education.[66] Especially in the fields of science, technology, engineering and mathematics (STEM), UASs therefore have to compete with private companies and in some cases with other public organizations in their recruitment efforts.[67] Whilst the UASs are restricted in terms of the salaries they can afford to pay, they can offer future professors a certain amount of freedom when it comes to the nature and composition of their tasks and working-time schedules, as well as opportunities for cooperation with the private sector. Recruitment problems[68] characterized by these competing priorities of scientific qualifications and professional experience must be resolved by weighing up these priorities when filling professorship vacancies. In this process, professional experience gained outside the higher-education sector – a unique selling point of UAS professors – should be regarded as the least negotiable aspect.

Box A 3-3

A

Measures to promote research and the transfer of knowledge and technology at UASs

‚Research at universities of applied sciences'

On the basis of the ‚Federal/Länder agreement on the promotion of applied research and development at universities of applied sciences' dated June 2013, the BMBF is continuing the programme called ‚Research at universities of applied sciences', first introduced in 2006, in the period from 2014 to 2018.[69] According to the Federal/Länder agreement, the purpose of the programme is to "promote research at universities of applied sciences and young engineers, enabling the universities of applied sciences to sustainably develop their potential and specific profiles in applied research for the benefit of the economy, and to advance the research-oriented training of young engineers".[70] Key objectives are the advancement of knowledge and technology transfer through collaborations with partners in practical fields, and an intensified integration of teaching and research through research-oriented training in the R&D projects.[71] Within the framework of the programme, the BMBF supports applied research in the fields of engineering, the natural sciences and economics, as well as in social work, nursing and health sciences.[72]

The budget estimates for the ‚Research at universities of applied sciences' programme increased from €42 million for 2014 to €55 million for 2017.[73]

‚Innovative University'

In June 2016, on the basis of Article 91b (1) of the Basic Law, the Federal Government and the Länder signed an administrative agreement – entitled ‚Innovative University' (Innovative Hochschule) – to promote the research-based transfer of ideas, knowl-edge and technology at German tertiary education institutions. The programme is aimed primarily at UASs as well as small and medium-sized universities, enabling them to „continue the strategic development and implementation of their idea, knowledge and technology transfer profile".[74]

Funding is provided for „projects to implement the transfer strategy to enhance the profile of the tertiary education institution as a whole, or in thematic priority areas, in the transfer of ideas, knowledge and technology".[75] State-run tertiary education institutions are eligible to apply for funding; several institutions can file a joint application.[76] A total of up to €550 million has been made available for the funding initiative over ten years; 90 percent is financed by the Federal Government, 10 percent by the Länder where the institutions are located.[77] On the condition that applications of sufficiently high quality are received, at least half of the funding cases and half of the funding itself must go to UASs or to consortia coordinated by an UAS. One of two selection rounds was already carried out in 2017.[78] Predominantly UASs were selected for funding.[79]

‚Project academies'

The DFG funds project academies (Projektakademien) lasting for up to two years, whose purpose it is to enable UAS professors to launch DFG-funded research projects.[80] Applications for the establishment of a project academy can be filed by designated scientists at UASs, universities or other research institutions with experience in the acquisition of third-party funding. An application for a project academy can include up to two project-related workshops in which the participants enter into a scientific exchange and are prepared for the application to the DFG.

The coordinator issues public and national invitations to participate in the project academy. Applications can be made by UAS professors whose first appointment was no longer than six years prior to the application. They must describe and justify their research interest in the field of the project academy.[81] Building on the experience gained, the participants in a project academy can apply for funds to carry out pilot studies or initial preparatory work aimed at subsequently enabling them to apply for research-project funding according to the DFG's individual procedures.

In 2016, the German Council of Science and Humanities drew up measures aimed at getting more potential candidates interested in UAS professorships.[82] Among other things, it recommends designating more professorships as ‚special-focus professorships'[83] with a reduced teaching load, enabling part-time professorships and shared professorships with non-university partners, and approaching potential candidates at an early stage to create a close relationship with the UAS. The German Council of Science and Humanities also proposes career-accompanying measures and support structures. These include, for example, tandem programmes,[84] preferably incorporated into cooperation platforms.[85]

In 2016, the Senate of the German Rectors' Conference (Hochschulrektorenkonferenz) came out in favour of launching a Federal/Länder programme to attract professors to UASs.[86] Decisions on the funding of UASs would be taken in a competitive procedure in which the individual UASs describe their strategies and detail the measures derived from them.

Opportunities for UAS graduates to study for a doctorate

All Länder higher-education laws in principal allow UAS graduates to access doctoral studies.[87] Cooperative doctoral studies – i.e. procedures in which universities and UASs cooperate but the right to grant doctoral degrees remains with the universities – are enshrined in all Länder higher-education laws in the meantime. Different models of cooperation are to be found both in the Länder higher-education laws and in practice. Furthermore, different measures have been developed to promote cooperative doctoral studies.[88] There is a consensus that cooperative doctoral studies must be further strengthened.[89]

In the last few years, there has been a controversial discussion on whether research-intensive departments at UASs should have an independent right to grant doctoral degrees.[90] Up to now, only universities have had this right. In some Länder, legislators have recently restricted this exclusivity to a certain extent;[91] however, up to now only Hesse has made use of the legal possibility to give UASs the right to grant doctoral degrees. Four doctoral centres had been approved by the end of 2017.[92] Of course, the consequences of this development cannot yet be examined and evaluated empirically.

Supporters of giving UASs an independent right to grant doctoral degrees believe this right gives the UASs an opportunity to „carry out their core tasks better in teaching, research and transfer in order to strengthen the innovative capability of society under reliable framework conditions".[93] Critics of the proposal, by contrast, see the risk that giving UASs the right to grant doctoral degrees would lead to „a blurring of the different types of higher-education institution and their different tasks […] and thus to a weakening of the German science system as a whole."[94] There is also a fear that an independent right of UASs to grant doctoral degrees would have a negative effect on the quality and reputation of doctoral studies as a whole.[95] The Commission of Experts shares these concerns.

Recommendations

The Commission of Experts emphasizes that the UASs play a very important role both in the German higher-education system and in the innovation system. It recommends that both the UASs and the universities retain their distinct profiles, and that each of them continues to develop in its own specific way in line with changing requirements over time.

- The Commission of Experts believes the existing distribution of students between UASs and universities is currently not in line with labour-market requirements. The proportion of Bachelor's-degree students enrolled at universities is too high compared to the number of students enrolled at UASs, i.e. a larger proportion of Bachelor's-degree students should study at UASs in future. The UASs will need adequate staffing levels to manage this.
- UASs need better basic funding in general to enable them to perform their tasks appropriately in teaching, research and the transfer of knowledge and technology. This is primarily the responsibility of the Länder. Furthermore, the Commission of Experts again recommends that the Federal and Länder governments initiate a follow-up programme for the Higher Education Pact (Hochschulpakt), in which the Federal Government continues to support the Länder in financing university teaching, especially in the UASs.[96]
- The Commission of Experts supports the overall goal of the programmes ‚Research at universities of applied sciences' and ‚Innovative University' in order to boost the contribution

to innovation made by UASs. The Commission regards discussions on expanding or realigning the funding of application-oriented research and knowledge and technology transfer as premature at the present time.[97] The performance potential of the UASs can only be increased step by step. In the future, the UASs can also increasingly participate in the specialized programmes of the Federal Government.

– The Commission of Experts is convinced that the formal conditions for appointments to UAS professorships – i.e. combining pedagogical suitability and special skills for scientific work with experience from professional practice – should be maintained. The criterion of professional practice at UASs promotes the orientation towards applied teaching and research and offers starting points for knowledge and technology transfer.
– In order to counter current problems with the recruitment of UAS professors, appropriate measures compatible with the specific objectives of the UASs need to be taken in the field of personnel recruitment and development. The Commission of Experts is in favour of experimenting with the instruments proposed by the German Council of Science and Humanities and to systematically collect and evaluate the experience gained. It advocates launching a Federal/Länder programme to promote the creation of suitable structures for personnel recruitment and development at UASs, as well as the identification of best-practice examples.
– The Commission of Experts has repeatedly pointed out the advantages of a highly permeable two-tier education system and welcomes giving UAS graduates general access to doctoral studies. Against this background, however, it believes the solution lies not in giving the UASs the right to grant doctoral degrees, but in strengthening cooperative doctoral studies with universities. Strengthening cooperative doctoral studies simultaneously promotes interaction between the two pillars of the research system and contributes to increasing permeability in the education system. In the Commission of Experts‘ view, the right to grant doctoral degrees should therefore remain exclusively with the universities. It recommends continuously monitoring and evaluating the development of the increasing number of collaborations and the different models of cooperative doctoral studies and their funding. The Commission of Experts believes that the tried-and-tested division of labour between universities and UASs should be maintained and no further UASs should be given an independent right to grant doctoral degrees.