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Epistemic and Learning Cultures at the University of the 21st Century

Praxis is more likely to reveal the odd than theory. If we do not identify science immediately with theory, but consider it as a field of practices – just like other societal fields – we see the unorganized, the non-simultaneous and the contradiction that strikes it (Fleck 1935/1979). Boundaries between sciences and other societal institutions and domains are blurred. Also, for the practice of research, it becomes obvious that the principles of science work differently in each domain and that stakeholders tend to adopt patterns of interpreting and acting that do not originate from the field of science but nevertheless have an impact on it. In “Epistemic Cultures” (1999), Karin Knorr Cetina reveals those patterns and impacts on the basis of her ethnographic studies in the domains of nuclear research in high-energy physics and molecular biology. These studies question that scientific progress would comprise a homogeneous and consistent cognitive process and illuminate that scientific practice entails specific and unique ‘mechanisms’ of producing and implementing bodies of knowledge in a certain scientific domain.

Inspired by this path of self-critical reflection on the terms and conditions of the science system, an international conference on “Epistemic and Learning Cultures at the University of the 21st Century” took place at the Karlsruhe Institute of Technology (KIT) on December 5 and 6, 2013. The conference was funded by the DFG (German Research Foundation) and was part of the project „Lehre hoch Forschung“ (the title refers to the nexus of research and higher education by means of a pun: “Teaching to the Power of Research”) (2012–2016, funded by the German Federal Ministry of Education and Research (BMBF)). Together with Michaela Pfadenhauer and Martin Fischer, it was organized by the recently established Chair for Research on Teaching and Learning headed by Ines Langemeyer. The aim of this international and interdisciplinary exchange was to discuss from diverse disciplinary points of view and from an international perspective the potential of research-oriented teaching and learning methods as well as schemes like the “Teaching Quality

Pact” for higher education funded by the Federal Ministry for Education and Research. Epistemic and learning cultures were not only regarded as a didactical matter, but were also discussed in terms of changing policies in research and science (in Germany, for example, introduced as an “excellence initiative”), as a way of dealing with competitive factors and expectations for universities’ organisational development and as an issue of the emerging academisation of the employment sector.

It is a significant problem to investigate these issues empirically and interpret the observed changes of universities, their cultural and political shifts and the challenges they face not only in terms of either aggravation or improvement but also in terms of sometimes more explicit and more centred, sometimes more implicit and more marginal developments. Without doubt, this is quite a complex and difficult undertaking which is much more contestable than focusing, for example, on the verified political goals of the German Council of Science and Humanities (*Wissenschaftsrat*). With regard to its programmatic objectives, Jürgen Mittelstraß (*Frankfurter Allgemeine Zeitung*, 22.9.2014) recently bemoaned a lack of visions concerning the ideas and programs for the future of the German science system (*Wissenschaftssystem*): “The song of songs for the universities is sung as if their current structure were unproblematic and willed by God; their satisfactory financing is invoked, certainly not in relation to sustainability but to agreements (‘future pacts’) and the science system is certainly recommended in its current state and form as a robust basis at all times”. Needless to add that “it partially needs to be improved.” According to Mittelstraß, the most striking effect of this development, however, is that the university itself is not seeking autonomy and is not protecting its distinctive form in a reasonable manner. “Growth beyond all measure, an education-adverse *Zeitgeist*, an unexpected renaissance of a bureaucratic and economic reason” would be universities’ “disaster” (*ibid.*, our translation). Similar criticism is often heard (Münch 2014; Köhl 2012; Enders/Kehm/Schimank 2015; Sandoval et al. 2011). Their message is sound and significant.

However, another important problem is how to reinvent the university as a project while not only repeating what European educational-sector strategies have promised. The Lisbon Strategy, for example, in a well-intended way interpreted the role of the university against the background of societal needs for innovation and modernization and set aims and objectives – beyond the increase of social cohesion – of stimulating economic growth and excellence. The work to move beyond the current state is more modest and more chaotic and concrete projects often require more staying power than political initiatives.

Yet, Mittelstraß is right that the universities have already embarked on the strategy of perceiving themselves as a competitive factor; the fact that they

can contribute to and benefit from more economic-centred policies has changed the institution internally. Thus, it has become obvious how labour market requirements are getting more and more important for the development of curricula and the shape and organisation of academic courses. Academic education has become oriented towards vocational skills, especially in terms of “competence”, “employability”, and “entrepreneurship”. In addition, universities have established different conditions in terms of access and fees and therefore face the challenge of how to attract students both regionally and internationally. Technological advancements have inspired new methods of learning and teaching (partially to escape from teaching in huge lecture theatres) so that universities are no longer institutions of face-to-face interaction but also of forms of distance learning and E-learning, thereby seeking to reach the masses of students more effectively. Additionally, the imperative to apply for research funding has gained significance in principle as well as for the overall financing of the universities. To sum up, universities have developed several strategies which almost ‘naturally’ imply competition with other research centres or educational departments outside the academia.

The change to a competitive educational market is already visible in countries like the UK or the USA, but not so much in other countries with traditionally stronger welfare states. The difference to established educational markets and a changing educational landscape in countries with stronger welfare states as observed, for example, in Germany or Finland, consists in the influence of prestige. While the changing educational systems struggle to improve some selected universities within the international ranking, the UK and the USA already boast some universities with outstanding prestige assuring graduates of success over competitors from other universities on the labour market. The German government currently invests much money in enhancing the budgets of some selected universities by schemes such as the Excellence Initiative, but it is still unclear whether an academic educational market according to the UK or US examples will be the outcome of this development. One reason for this is the fact that tuition fees have been raised for some time by various Länder, but then were abolished again within a short period of time. Resources for safeguarding one’s prestige against competing universities are still limited. In addition, employers have not yet brought their recruitment strategies in alignment with the stratified educational market.

However, given the changes described above, which new ways of generating alternative ideas are available? With the objective of reinterpreting the future of the universities and stimulating new reflections on their societal role with a ‘fresh pair of eyes’, the following questions were discussed at the conference:

Are universities still – or rather already – the places where socially relevant knowledge is mainly developed and sustainably passed from one generation to the next? Is the university as an institution still – or rather already – able to create future-oriented epistemic cultures (Knorr Cetina)? Are the main challenges of our societies identified and comprehended in a reasonable manner so that relevant starting points for invention and intervention can be found? What are the main trends of university development? Will the university of the future split up into departments specialised on certain fields of research and departments ensuring a ‘tailor-made’ supply of courses depending on the demand for academic education or the specific target group? Which methods of learning and teaching will remain, and which will emerge? What developments are already visible? What could be the main purpose of universities in changing societies? Are there developments that resist fragmentation and how can universities ensure their attractiveness for those willing and able to enrol for academic courses in the future? How must the right of freedom of research and teaching be interpreted and how can it be anchored in the changing societies? What are the specific challenges in the trajectories between school and universities as well as between university and labour market? What new ideas, besides Humboldt’s ideal of university and “Bildung” and the model of applied sciences, are there to possibly serve as guiding principles to renew the significance of the university in the future?

The discussions at the conference have confirmed that it is not easy to solve all these questions and that possible answers are hardly conclusive. Nevertheless, such issues need to be considered rigorously when it comes to moving beyond the well-intended assertions – whether in terms of invoking the universities’ indispensable socio-economic role or in terms of revealing their current disaster. To believe that only a return to a longstanding model is needed does not offer a realistic perspective. A new search needs to begin and new perspectives have to be explored. This is what we try to kick off by publishing the conference papers for which the authors have been asked to rethink their argumentation via reflecting the vivid discussions.

Combined with a short introduction to her conceptual and methodological approach to “epistemic cultures”, Karin Knorr Cetina (*University of Chicago*) and Werner Reichmann (*University of Konstanz*) present the approach to “epistemic and knowledge cultures” in relation to changing professionalism. As mentioned above, this approach stimulates a productively irritating reflection on today’s competition among universities, especially of how it influences “epistementalities” in science and expertise. „Epistementality“ is defined as a mentality that determines convictions about the correct distribution, handling, and application of knowledge. This idea can be taken to disciplines of science as well as to adjacent domains such as financial markets. In her key note presentation at the conference, Knorr Cetina’s comparisons

between these fields thus provided us with new insights for “how we know what we know” (Knorr Cetina 1999, p. 1): Whilst stock brokers – similar to scientists – are not confronted with definite and verified information, the significant value for them is not so much in the knowledge itself. It is rather the fact that the information is *new* that makes it relevant to the stock exchange trading. Consequently, not the history of this knowledge and the experience behind it but the mere difference of pieces of information (‘knowledge’) is crucial. Thus, the distinction between scientifically proved knowledge and announcements, false reports or rumours is levelled. The mere information advantage of anticipated movements of money in the markets provides benefits to the respective party. Regarding the institution of the university, the question becomes significant as to what kind of power, for example, the constantly promoted scientific indicators exert within scientific practice (beyond a possible neutral gain in knowledge) and which epistemic cultures they promote: Since they have been formed and used to measure scientific achievements to stir up competition between universities and their research activities, don’t they create a ‘dispositive’ (Foucault) for scientists just like the flow of (true or false) information for exchange dealers?

The volume is divided into four parts which are dedicated to four different themes: The first part deals with epistemic cultures as they interfere or intersect with academic learning cultures. The second discusses the governance of epistemic and learning cultures and their (unintended) effects on the university as an institution. The third part provides a closer look at academic teaching and learning and encompasses reflections on didactical innovations. The last part scrutinises the relation between university education and labour markets. These four parts are not independent but intend to inspire readers to skim through different topics and discover interrelations that may have been neglected in the current discussion.

The Topic: Epistemic and Learning Cultures

As outlined above, the conference focuses on epistemic and learning cultures, which thus constitute the first section of the proceedings.

In their chapter, Knorr Cetina and Reichmann show the potentials of this approach in various professional fields. They explore the historical example of the building of the Canal du Midi when an intelligentsia of local people and experts was formed, and the contemporary example of “cultures of listening” with regard to the technological recordability and reproducibility of music. More generally, investigating epistemic cultures is shown more clearly as an engagement with the “merging of life-worlds – and the alignments, conflicts, and reshapings that such cultures involve”.

Empirical findings illuminate some facets of other cultural challenges in university education. *Cathrine Hasse (University of Aarhus)* reports about how universities adopt elements from everyday culture by illustrating how science fiction is used by university teachers in natural science to motivate students and how motives from books and movies constitute the subjective meaning of learning contents. Teaching the “hard facts”, lecturers even go as far as to deliberately pass on elements from everyday culture to the students. By taking the case of legal education as a point of departure, *Karen Jensen and Monika Nerland (University of Oslo)* discuss how the emergence of new arrangements that run parallel with formal schooling may help universities to deal with some of the challenges they face. Adopting Knorr Cetina's approach, they analyse how “off the record” trainee arrangements have become a new loop in the epistemic machinery of law – growing both in number and scope. Thereby, the question is brought up as to what role they play in students learning but also in shaping the epistemic and learning cultures of the new generation. Using the example of their study about cultures of studying under the conditions of ‘Big Science’, *Michaela Pfadenhauer, Stefanie Enderle, and Felix Albrecht (KIT)* illustrate another problem related to the constitution of universities that comes up if science and teaching are detached from each other. The study deals with the merger of “Forschungszentrum Karlsruhe” (a research centre in the Helmholtz Association) and Universität Karlsruhe into the “Karlsruhe Institute of Technology” (KIT). By using this example, the question of how to integrate Big Science in the courses of study is brought up. While the main focus of the KIT has been on integrating research centre scientists into teaching, Pfadenhauer et al. use a different approach by analysing the factors that constitute “studying” today and investigating whether there is (still) a way to link studying to research and science. By introducing the term “cultures of studying”, not only the heterogeneity of studying is highlighted, which reaches – unlike the empirically investigated business sciences, mechanical engineering and physics – beyond the borders of a single discipline. Therefore, a theoretical supplement to the concept of “epistemic cultures” that is postulated for the latter seems to be limited to the creation and assertion of knowledge. It is suggested to expand it by knowledge transfer and acquisition of knowledge – in a word, by “learning cultures”.

The Governance of the Universities

The second part on the governance of the universities begins with the methodological problem of how achievements in academic teaching could be recognised as a competitive factor. Then we discuss what kind of competition

cultures can be regarded as fruitful or how one can understand and identify developing problems of governance.

In their paper, *Bernhard Schmidt-Hertha*, *Veronika Thalhammer*, and *Margarete Müller* (*University of Tübingen*) illustrate one aspect of the problem of measuring achievements in teaching: They see the insufficiency of performance indicators that focus on the procurement of third-party funds, on the acquisition of research awards, and the like when it comes to evaluating and ranking ideal locations for studying. The quality of teaching, on the other hand, is largely neglected. Furthermore, the relationship between research performance and teaching quality is hardly investigated which is why the stimulation of excellence in teaching remains a problem. Their research project “QualRep” (funded by the German Ministry of Education) investigates the situation with an interdisciplinary approach. Another aspect with regard to governance of the universities is brought up by *Jochen Gläser* (*TU Berlin*). Against the background of an international comparative analysis, he points out differences in subsidy policies and their significance regarding innovation processes. In particular, the maintenance of an institutional variety is emphasized to be conducive to innovation. However, this variety might suffer if universities adjust to New Public Management and to a stronger orientation towards external funding. A comparison between the Netherlands and Germany showed how the smaller country restricted the variety of research activities and, as a result, created less innovations in important research activities such as the Bose-Einstein condensate, evolutionary biology, computerized corpus linguistics as well as Large Scale Assessments. At the same time, the bigger neighbour country – despite the competitive pressure – managed to maintain a greater diversity. *Uwe Wilkesmann* (*TU Dortmund*) focuses on the impacts of university governance, using a comparative analysis of transactional and transformational leadership. A regression analysis about motivations and orientations of lecturers revealed that the typical corporate management that is based on performance incentives and control (such as transactional leadership) instead of on trust, respect, and intellectual stimulation (such as transformational leadership) has very little impact on the improvement of teaching quality. Learning cultures are therefore better supported by transformational than by transactional leadership styles. *Kari Kantasalmi* (*University of Helsinki*) refers to Luhmann’s contingency formula to investigate matters such as research, development, and innovation in the context of possible modifications. In doing so, he stresses the different perspectives on universities being either structures of a knowledge society or, in a broader sense, something that should be taken into account as learning cultures and learning environments. *Jesper Eckhardt Larsen* (*University of Aarhus*) reflects on the historical role of humanities with regard to the self-awareness and self-concept of modern societies and their epistemic cultures. He

applies to his historical analysis Knorr Cetina's concepts of "knowledge cultures" and "epistemic cultures". Whereas the first concept addresses the larger societal change of a culture, the second focuses on local epistemic practices. Thus, Larsen compares three corresponding views (respectively phases) concerning the role of the humanities seen from the research councils in Denmark: The development of knowledge cultures since World War II which can be described as one from a "kulturnation" (1945–1960) to a society (1960–1980) through to a knowledge economy (since 1980).

Academic Teaching and Learning

The third part presents new approaches to designing, fostering, and evaluating methods of academic teaching and learning. It ends with an outline for a programmatic strategy of empirical research on the processes of academic teaching and learning which has hitherto mainly been a matter of university didactics.

Gerd Gidion, Simone Löffler, Sandra Drechsler, and Albert Albers (KIT) investigate the competence development in engineering studies at the KIT. Within mechanical engineering, a closer relation between theory and practice is gained, and the KIT has made efforts to foster among its engineering students methodical skill, social skills, and self-competences with regard to job-related qualification. Nevertheless, generic competences have been comparatively neglected. The presented study therefore investigates central aspects of students' self-competencies by means of a monitoring system with individualised feedback on learning strategies, time management, coping strategies, and expectations of self-efficacy. Ultimately, the study will determine significant methods of how students' learning can be enhanced more effectively. *Isa Jahnke (University of Umeå)* introduces an approach to teaching-learning research by using an investigation about digital and mobile media (iPad). The methodology is based on the design approach and is used systematically to ask when and why such media is used. The results show that particularly by leaving learning objectives open to more than just *one* possible answer, the formally designed teaching is more flexible to embrace informal learning processes (including surface and deeper learning). Furthermore, by visualizing learning processes, such learning activities have increased students' motivation. *Ernst Schraube and Niklas Chimirri (University of Roskilde)* discuss the practices of a learner-centred approach by investigating the curricula of Roskilde University and the changing cultures in studying via using new media in teaching. Their request is to develop learning technologies and learning conditions in a consistent manner from the standpoint of

the learning subjects instead of merely subordinating the latter to technological requirements and other institutional conditions.

Ines Langemeyer and *Ines Rohrdantz-Herrmann (KIT)* present a program for the research on academic teaching and learning and contrast it to empirical research that has widely been established with respect to schools. Although parallels between education in schools and academic teaching and learning seem to exist, differences are to be taken into account. Systematically, these differences are outlined on the level of knowledge acquisition and creation, of relationships between teachers and students as well as with regard to the learner's personality. With regard to each dimension, their argument is that significant issues need a strong empirical and analytic foundation that exceeds a didactical framework. Therefore, the research on academic teaching and learning cannot be subsumed to university or higher-education didactics.

University Education and Labour Markets

The fourth part deals with the relation between university education and labour markets, with how transitions take place between one and the other, with the expectations towards relevant academic qualifications, and with the question as to what aims and hopes with regard to universities seem reasonable and why.

Martin Fischer and *Eike Zimpelmann (KIT)* discuss the question of whether and how universities can refer to the professional realities of their graduates. For this purpose, a controversial debate that has been discussed for many years in the context of vocational school teacher training was unfolded: Should prospective vocational school teachers in the industrial-technical sector study traditional engineering sciences – even though these courses do not include the actual work or the training of skilled workers? Or should the job-oriented study courses that have been established at some German universities be favoured? These courses focus on professional work and on skilled workers' learning. For the students, this curriculum brings along a minor polyvalence compared to the established engineering science courses. However, up to now these approaches have been rather isolated examples. Even though there is a considerable amount of reasons that plead for the last-mentioned alternative, knowledge inherent in academic disciplines follows a different logic than professional knowledge that is inherent in jobs on the labour market. *Walter Jungmann* and *Anne Schreiber (KIT)* explore and discuss the change of learning cultures that is to be fostered when two different strands of education meet: The vocational and the academic strand. What needs to be done to attract more students who have vocational qualifi-

cations only? In an exemplary way, the authors reflect on the matching problems at the KIT, where a very small amount of students are enrolled with a vocational background. *Rita Berger (University of Barcelona)* investigates the transitions between universities and labour markets in Spain and Germany. Her analysis shows how the economic crisis in Europe has different outcomes in this field. However, the problem in Spain is not comprehensively understood if only the labour market is considered as a causal factor. Spanish universities also have significant deficits with regard to developing the competences that are required of graduates by employers. A tragic facet of this situation is that it is their graduates' overqualification that has a negative impact on the competitiveness of the Spanish economy and that influences the career paths negatively. *Ines Langemeyer (KIT)* and *Andreas Martin (DIE-Bonn)* focus on general changes of society in the course of its technology developments and use this perspective to rethink the role of universities in the 21st century. The extensive use of information and communication technologies (in combination with other technological components and the sciences) nowadays serves as the 'backbone' of society. In their opinion, the power that is thereby formed causes problems none of the modern institutions are hitherto clearly responsible for: Firstly, the question of the absent societal legitimacy of technological (partly and fully) automatized expert systems that today make a number of relevant decisions, secondly, the doubtful independence or neutrality of technological development with regard to private and political interests, and finally the significance of these areas of practice for the unresolved development and formation of corresponding competences (such as new cooperative and scientified types of agency) that have a provably high impact on sustainable development. It is argued that the universities could reclaim expectations and responsibilities on these levels, win a new mandate, new legitimacy, and new societal strength in the competitive set with other institutions.

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