

CHAPTER 2

Discipline-based research and inter-/transdisciplinarity as mission

Bernhard Eitel

FOREWORD

Disciplinarity and interdisciplinarity are no contradiction. Both are interconnected pillars of outstanding research and the related infrastructures, and both belong to the essentials of research universities. In order to strengthen the university's impact, it is necessary to foster awareness for the potential of multidisciplinary under one institutional roof in contrast to program-oriented research institutions.

Research profiles the research university. It is central part of their mission. Providing new knowledge, they contribute to an outstanding education and training of the next generation of researchers, to the welfare of humans and societies, and supply insights into the complexity of so called global “grand challenges” as prerequisite for the successful tackling of problems we face. In most countries on Earth, Research Universities in particular are the backbone of the academic system due to the symbiosis between research and academic teaching. Discussing strategies on “research” needs a common ground of what we call research. Therefore some brief remarks about that.

BRIEF DEFINITIONS

We call an academic process “research” if it is the search of unknown knowledge (in German: *Erkenntnis-gelieitet*). We see that this process is in general curiosity driven. In contrast to so called applied research, which is rather

“processing” on the basis of consolidated knowledge, fundamental research is not assessable, it is a product of creativity. And creativity needs freedom and an environment that supports pollination of open-minded individuals by new ideas, questions or challenges.

An academic discipline is at least defined by a special topic with a corona of challenging questions. Disciplinary research is like drilling into well-defined ground in order to explore the unknown depth. The new knowledge itself profiles again the discipline, provides new special questions and justifies the status of the research field as its own discipline. Thus history teaches us how new disciplines emerged in particular by extremely increased and expanded research activities in the past two centuries.

The attractiveness of disciplinary knowledge for intramural and external third parties is bound to irreplaceable disciplinary expertise. This expertise is generated and further developed by on-going discipline-based research. It is obvious that at the disciplinary rims in contact with other disciplines the integration of adjacent expertise (a) can foster or enable own disciplinary research, or (b) can be used for interdisciplinary research, which is often of more complex character. Just to supplement: we often hear of trans-disciplinary research. We want to stress, that we understand transdisciplinary research as an interdisciplinary research process encompassing expertise of different institutions.

What we see is that two things are necessary: Interdisciplinary research depends on disciplinary expertise and therefore on disciplinary research. And more: Interdisciplinary research cannot substitute disciplinary research, and disciplinary research cannot tackle cross cutting issues of high complexity. So, what we learn is that a research university must provide excellent conditions for doing both to fulfil its obligations, or: to follow its mission!

CHALLENGE FOR RESEARCH UNIVERSITIES: STRENGTHENING DISCIPLINE-BASED RESEARCH WHICH IS CHARACTERIZED BY INTERDISCIPLINARY AND INTERGENERATIONAL BRIDGES

Following the research mission, it is necessary to strengthen monoclinal disciplinary research and disciplinary teaching, on one side, and to foster the mechanisms to entangle them under the institutional roof facing higher complexity on the other. At first that sounds contradictory, but taking a second look we see that its realization requires different measures and instruments.

Particularly in a globalized world with increasing amounts of research outputs and the danger of data jungles, research quality becomes more and more important. Often measuring or quantifying research quality is misunderstood. This becomes obvious if we look at approaches to evaluate and compare the

individual quality of the research of our academics. Such attempts are highly difficult because of different disciplinary backgrounds and possible long-term effects of the research, regardless of them being published in prominent journals or not. And, more and more research is not done by individuals, but by teams of outstanding experts.

In our discussion to increase “research quality”, and this includes output quality of research and teaching, as well as time-relevant productivity, it is the obligation of the university government to provide best conditions for research by excellent creative milieus and infrastructures. This is of increasing importance if we consider the increasing complexity of research topics and the growing size and diversity of data. Therefore we have to focus on the quality of creative milieus and the technical and administrative facilities available. That is what should be (re-)evaluated in order to make research in our universities even better.

In order to realize the potentials given by the multidisciplinary comprehensiveness of a research university, creative milieus should get optimized in a discipline-based environment, as well as in interdisciplinary contexts. It is to emphasize that the allocation of such creative milieus, as well as a competitive infrastructure, belongs to the tasks of a university government. But how to do that better in the future, that means more consciously and planned, rather than the way it was done more intuitively as in the past? With regard to the increasing research complexity and to the globally accelerating speed of generating research results, academic institutions must provide spaces and institutional structures to make it possible or more efficient to filter, to exchange, to recombine and to generate information, data and new knowledge across the disciplines.

What we learn by studies of creative academic milieus, knowledge spaces, geographies of sciences etc. (e.g. Meusburger & Schuch, 2012; Malecki, 2013; Gregory *et al.*, 2015) is that creativity needs not only time and research shelters, but also spaces to communicate, to meet, to discuss and dispute very different topics informally. In such situations, it becomes easy to entangle the disciplinary expertise intra-institutionally. Our academics get acquainted with their colleagues, they learn about their thinking and language, and they make contact with new ideas and emerging research fields earlier and often more sophisticated than in other places. For about ten years Heidelberg University strategically has been using a set of tools and measures to foster intramural exchange in order to realize the potentials of its comprehensiveness. A selection of some exemplary and successful measures should be briefly illuminated.

Since 2007 Heidelberg University has been following the concept of “Bridge-Professorships”. Such professorships are disciplinarily bound, but additionally and reliably financed by two or more so-called Budgetary Units with their own endowment (different institutes, centres or faculties of the

university). It is clear, that, as a side effect, this model also supports the university's recruitment by providing additional equipment. Meanwhile more than 10% of the full professorships form such bridges between the disciplines. On one side, they are well rooted in their discipline, develop and create disciplinary expertise, but, on the other side, they contribute to cross cutting issues by maintaining staff and infrastructure in other university subunits. This guarantees sustainable collaboration across disciplinary borders, adds adjacent expertise to institutes and makes them fitter for the competition to contribute to new or emerging research topics. Such bridging structures also support students and young researchers, helping them to discover new fields and to realize the potential of a comprehensive university.

Ten years ago in Germany, we took the risk of requiring, by law, that professors aged 65 or over retire. The mainstream agenda was to focus on young researchers and to offer job positions at professor level earlier than before. We combined the training of young academics with the introduction of strategic Senior Professorships in order to strengthen inter-generational exchange in research and teaching. A Heidelberg senior professor gets equipment and an additional salary generally in arrangements of up to three years (renewable depending on quality and efficiency of the arrangement). The idea itself is not new, but was new for Germany where we have used only traditional Emeritus status. We combined our support for the young with the experience of the well-established. This led to an increase of research performance and optimized processes in the competition for third-party funds. An added value is given for a globally acting institution because it opens up opportunities of informal/collegial mentorships for incoming foreign researchers to socialize into the academic community and to get familiar, faster than before, with the university mission and instruments to entangle disciplines. Again, this supports the research efficiency of the university as a whole.

An important tool to generate and handle data across disciplinary borders are core facilities. Often, and in particular during recruitment negotiations, researchers ask for their "own", exclusively available instrumentation or data access. From a bird's eye perspective, this is inefficient, expensive and supports ivory towers. The implementation of core facilities admits access to top infrastructures to every university member with costs, opens the awareness of interdependencies between shared expertise, creates space to meet and to communicate and reduces the costs. Such core facilities though should not become too big, because they should provide appropriate research-oriented services and should not mute into a simply administered, but instrumentally very complex service unit. This seems to be optimized if the facility is driven with scientific/disciplinary competence and in economic responsibility by a university Budgetary Unit or as a lean central institution endowed with own finances.

Another tool to solve the possible conflict between discipline-based research and interdisciplinarity is our Marsilius Kolleg (Marsilius was the first rector of Heidelberg University in 1386). Here we bring strongly selected groups of outstanding experts of the university and its extra-mural Heidelberg partner institutions together in order to discuss and develop new emerging interdisciplinary issues. The researchers get an extra sabbatical for that, but they do not leave the university. The university fellows stay in their research environment at Heidelberg and get additional time to develop new ideas and to filter and select information and knowledge while the research routine is ongoing. So, the university has no loss in research efficiency, on the contrary, we support research quality, and the best researchers stay in contact with the young academics in their departments.

Past topics were, for example, Climate Engineering, Human Dignity or EURAT, which is a codex developed by lawyers, ethicists, computer scientists and physicians for the use of human genome data in clinics and elsewhere. In a stimulating new building the Kolleg provides a creative milieu for research. Meanwhile a lot of research projects have come out of the Kolleg's debates.

Besides the traditional Studium Generale, the Kolleg is very attractive even for the students. They suggested the so-called Marsilius Studies, lectures given by Marsilius fellows on their interdisciplinary topics, which can be integrated in the individual disciplinary curricula. Again, this makes it obvious how research and teaching form a unit, not only as a propagated purpose but in real life.

It is to emphasize that the added value of this type of intra-mural centre for advanced studies is that more and more colleagues know each other, take notice of research in their neighbourhood and are more open for interdisciplinarity without losing their disciplinary expertise. And, from the rectorate's perspective, an important side effect is diagnosable: the Kolleg works as an engine to integrate newly recruited colleagues in the academic community. The internal cross-disciplinary exchange in the Kolleg, in concert with other measures, fosters the corporate spirit, supports a more coherent university self-understanding and strengthens identification with the university's mission, its strategic goals and ambitions.

CONCLUDING REMARKS

Universities are complex and they face more and more complex situations in our times: ongoing globalization with more and more globalized identities, the acceleration of research speed and resulting obsolescence, and increasing numbers of students of very diverse origins are major challenges in modern, knowledge-based societies. Given their multidisciplinary character,

comprehensive research universities are the backbone to tackle the challenges and to permanently renovate our societies. Therefore we have to realize the potential of our institutions. With regard to the challenging questions we face and the complex data sets we generate, we must avoid universal dilettantism in research and teaching programs by continuously strengthening disciplinary strengths, but we also have to entangle disciplinary expertise in view of the general complexity the modern globalized society faces.

Our mission is to optimize research and research-oriented teaching quality, an increasing field of activity for a modern university, and this field is linked with disciplinary competence and interdisciplinary orientation. It becomes more and more an academic obligation to filter the reliable and case-dependent suitable knowledge and information out of the pure data. And it will not become better by citizen science approaches! Again, this knowledge and information assessment should be better done by interdisciplinary collaborations than with mono-disciplinary view, because, in a complex world, simple answers do not consider feedback-impacts which are not limited by disciplinary borders. This counts not only for basic research but also for transformative and applied research in order to translate research and find innovations for the benefit of humans and society, which remain a central part of the mission and a noble obligation of a research university.

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