Technology Assessment and Education: Introduction

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October 2009

SCHWERPUNKT

Technikfolgenabschätzung und Bildung – Einführung

Technology Assessment and Education – Introduction

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"Theory and Practice" of TA, which is referred to in the title of this journal "TATuP", is usually addressed as a question of TA *research*. But science is more than research: the field of *teaching* requires just as much attention, both practically and theoretically. Therefore, a mere collection of individual teaching experiences and best practice examples does not provide a strong enough basis to discuss questions of TA teaching, these must also be embedded in a theoretical context and discussed in their relation to research. In this special issue, we aim to contribute to a combination of theoretical and practical approaches to the relation of TA and "Bildung".

1 TA Teaching Activities

In the past decades, TA has become a scientific field in its own right, which is why the establishment of TA-related university courses is of growing relevance. Although no specific TA courses at bachelor, master or PhD level have been introduced to date, several developments in the field can be seen:

The number of TA-related *university courses* is quite impressive, as Bora and Mölders showed in their survey on university courses in Germany, Austria and Switzerland, the first documentation in this vein: more than 100 courses in the winter and summer term 2006/2007 can be counted as TA-related courses, whilst another 300 touch upon TA issues (Bora, Mölders 2008 and Bora, Mölders in this issue). The variety of TA courses might even increase in future, as universities create new professorships. This autumn, the Karlsruhe Institute of Technology established a professorship for TA in the Department of Philosophy[1], the Ohm-University of Applied Sciences[2] in Nuremberg recently created a professorship for "Technology Assessment, Sustainable Development, and the History of Ideas".

At *postgraduate* level, a variety of programmes has emerged in the past few years. Within the "Netzwerk TA", the German speaking network for Technology Assessment, the former support for young scientists in the form of regular poster sessions has been intensified to a PhD-network. This cooperative network "TRANSDISS" supports PhD-Students in TA and related fields, focussing on the dilemma of transdisciplinary research in disciplinary qualification structures.[3] The Portuguese Universidade Nova de Lisboa (UNL) has established an international PhD-programme explicitly dedicated to TA. In the United Kingdom, several universities offer post-graduate courses in TA-related fields (Manchester and Sussex being the main ones). Traditionally, in the Netherlands the Universities of Twente and Utrecht support TA-related research activities within their MA and PhD courses – especially in the field of ethics of technology (see Moniz, Grunwald in this issue).

A number of German graduate schools, whilst not explicitly related to TA, deal with similar issues, such as the graduate school on Bioethics in Tübingen and the PhD Network "Biomedizin – Gesellschaftliche Deutungsmuster und soziale Praxis".[4] In one central field of postgraduate education, namely *professional training* for practitioners – either within TA institutions or offered by them – very little is published except a few announcements of internal lectures with guest speakers or project presentations on the respective websites.

Finally, a brief look at *teaching materials* reveals that although these exist, they have yet to be systematically integrated and made readily available: Some documents can be found in typical networks for teaching material exchange such as the regional Ethics-Network of Universities of Applied Sciences in Baden-Württemberg[5], but the majority of teaching materials is scattered on institutional or personal websites.[6] The only exception (at least in

Germany) is the introduction to TA from Grunwald (2004), this textbook is to be followed by a revised second edition in the near future. Other forms of teaching materials, such as databases of lesson plans, e-learning lectures or text collections are not yet available.

2 The Theoretical Reflection of TA Teaching

All these findings show that TA has finally "arrived" in higher education. Nevertheless, the theoretical discourse on educational issues in the TA community is still marginal. The most systematic approach was a workshop in October 1997 in Hamburg tackling the TA concept of the German engineering society (VDI): "Technikbewertung in der Lehre". The results have been published as a VDI-report (Appel et al. 1998) and in several articles (e.g. Jischa 1999, Jischa 2001). Recently, the question of TA teaching under the conditions of the Bologna-reforms has been approached in this journal (Steffensen 2003). Bora and Mölders' survey (2008) can also be seen in this context, just as the more general analysis of engineering education for sustainable development by Mahshid Sotoudeh of the Institute for Technology Assessment, Vienna (see review in this issue).

However, contributions to this discourse have been rather scarce. There has been no continuing discussion on teaching issues within the German speaking TA community. In the past the debate was reduced to only a few TA concepts and usually did not reach beyond single teaching experiences and did not include them into a systematic analysis. None of the books which claim to give an overview on TA discuss TA education in a separate chapter or article (Bullinger 1994, except pp. 25–28; Baron 1995; von Westphalen 1997; Bröchler et al. 1999; Ladikas, Decker 2004). There is no reference to educational theory – which is astonishing, since educational questions are common topics of TA activities (e.g. Revermann et al. 2007, de Haan et al. 2008).

Despite its marginal role in the debate, we believe the relation between TA and teaching to be highly relevant for TA – both in research and in teaching.

3 Our Approach: Links between TA and "Bildung"

To understand the role of teaching in TA it is worthwhile to take a step back and consider the more fundamental relation between TA and "Bildung". Using the more common term "education" instead of "Bildung" could easily lead to a focus on individual aspects: learning, subjectivity or competencies. Within the concept of "Bildung", these aspects are addressed as linked to societal issues: competencies are not just individual capabilities, but have to be seen in their social relevance; education systems cannot only be understood as facilities for learning, but also as part of social power structures; even the theory of "Bildung" is not distanced from society, but part of it.[7]

We assume that this form of reflexive theory, which includes reflecting one's own theoretical perspective whilst at the same time applying it, is ideal for discussing TA, with its constant questioning of its own role between science, politics, economy and other fields of society. Besides its theoretical value, the concept of "Bildung" can be employed as a means of transdisciplinary integration, as it offers a variety of potential links to TA. The four links we suggested to the authors of this special issue were chosen specifically to address a wide range of approaches from down-to earth practical experience to fundamental theoretical reflection:

1) "Regeneration" of the TA community

The time of "TA pioneers" has given way to a new stage, which is characterised by evolving methodological concepts and the development of common quality standards. These theoretical foundations need to be passed to the following generations of technology assessors, either in informal (e.g. within TA institutions) or formal settings (e.g. study modules, graduate or postgraduate programmes). Although this question arises again and again in activities in the community[8], there is no consensus on what should be "passed on". This first link refers to the discussions within the TA community.

2) Theoretical development through teaching

TA teaching requires active technology assessors to explicate their basic assumptions, methods, aims and strategies. Perpetuating these theoretical foundations may serve as a means to develop them by assessing their compatibility and validity in the process of teaching. This is especially important for TA due to its transdisciplinary character: the established practices of disciplinary science are not sufficient, neither in research nor in teaching. Teaching can be seen as an opportunity for "Bildung" for everyone involved, not just for students. This idea was the core of Humboldt's idea of "Einheit von Forschung und Lehre" (the unity of research and teaching). Even though the current reforms in higher education do not work along these lines, it is still one of the most demanding concepts on the relevance of "teaching". This link between TA and "Bildung" therefore focuses on the potentials of higher education *for* TA.

3) TA-related competencies as public understanding of and engagement in science

The need for TA-related competencies is much wider than the relatively narrow field of TA itself: including TA perspectives is necessary not only in similar academic fields (e.g. science and technology studies, sustainability studies), but also in technology-related politics, in innovation management, in the work of NGOs and research institutions. Wherever one tackles problematic issues arising from or related to technological development, TA-related competencies are of great value. In technology-based societies[9], this ability to consider the consequences of technology-related decisions is a structural necessity.[10] It should be part both of professional competencies of specialists and part of public understanding of and engagement in science. This perspective takes up a *societal view* on technology development as a context of both TA and "Bildung".

4) TA as "Bildung"

TA is an attempt to support decision-makers, scientists and the public to develop a well-founded understanding of science and technology in their decisions. The TAMI project defined the impact of TA as "any change with regard to the state of knowledge, opinions held and actions taken by relevant actors in the process of societal debate on technological issues" (Ladikas, Decker 2004, p. 61). This perspective reveals the inherent character of "Bildung" in TA. This insight could be used both to develop new forms of TA teaching and to use perspectives from the philosophy of "Bildung" for the methodology of TA (and vice versa).[11] Similarities between TA courses and different TA activities (e.g.: research, assessment, consultation) could form the starting point for both attempts. This last link offers a new approach for the theory and methodology of TA based on the philosophy of "Bildung".

These four links between TA and "Bildung" – regeneration, theory development, TA-related competencies and TA as "Bildung" itself – refer to approaches at many different levels, but show all the more the close relation between both. The basic thesis we put forward in this issue is that it would be useful to focus on these interrelations between TA and "Bildung" in the TA discourse, in order to better understand research and teaching and to identify new ways for their development. With this special issue of TATuP, we want to establish a starting point for this discussion. The collection of examples of TA in educational contexts is therefore not only meant to be a best-practice collection for broader implementation – which might well be a positive side effect – but mainly as a basis for theoretical analysis of the relation between TA and "Bildung".

4 The Articles in this Special Issue

The contributions in the special issue will offer different views on the relation of TA and "Bildung". The starting point will be an empirical overview on TA in higher education in German speaking countries (Bora, Mölders) moving on to international examples of postgraduate courses (Moniz, Grunwald). Several contributions offer a theoretical reflection of specific TA courses and modules (Beusmann, Kollek; Hummel, Stieß; Renn). The special issue concludes with two analytical perspectives on the

relation of TA and "Bildung" (Schmidt; Beecroft, Dusseldorp).

In their paper *Alfons Bora* and *Marc Mölders* (Bielefeld University) present the results of their empirical research which for the first time provides a comprehensive collection of data of all TA-related courses in Germany, Austria and Switzerland for the academic year 2005 / 2006. They use the data not only to give an empirical overview of the area of TA teaching, but particularly for drawing conclusions about the inter- or transdisciplinary structure of TA research. They point out that – according to their findings – at present, TA should rather be considered to be a form of multidisciplinary instead of transdisciplinary research.

António Moniz from Universidade Nova de Lisboa (Portugal) and *Armin Grunwald* from Karlsruhe Institute of Technology (Germany) give an insight into the field of TA in higher education internationally. They focus on the „TA and education" landscape in these two countries in more detail, leading on to new and emerging forms of cooperation between Portugal and Germany in this field. These might serve as an example for further cooperation between other research universities in the future.

Volker Beusmann and *Regine Kollek's* contribution presents insights into the educational activities of their research centre for Biotechnology, Society and Environment BIOGUM (Forschungsschwerpunkt Biotechnik, Gesellschaft und Umwelt) at the University of Hamburg. Besides an overview of the different courses offered, they illustrate the specific TA teaching concepts they apply in their courses. Finally they reflect some more general topics concerning TA and "Bildung", such as problems that teachers and universities have to deal with in the field of TA, and how these problems could be tackled.

Diana Hummel and *Immanuel Stieß* from the Institut für sozial-ökologische Forschung, Frankfurt, present their teaching co-operation projects with the Goethe-University in Frankfurt and Darmstadt University of Technology, based on different forms of institutionalisation. Their research programme on "social ecology" has several similarities with TA. One of them, the problem of integration in transdisciplinary settings, will be discussed in detail.

Ortwin Renn from Stuttgart University presents his experience with the use of TA methods in teaching. Value-tree-analysis, multiple criteria decision making and the group delphi method can be combined to tackle exemplary technological questions. In this way, students learn about the ambiguity, complexity and ambivalence related to all technological issues and they gain methodological competencies to tackle them.

Jan Schmidt sketches out the pedagogical concept for interdisciplinary teaching at the University of Applied Sciences in Darmstadt, "Interdisziplinäre Technikbildung". With this new approach, different competence fields (cognitive knowledge, instrumental knowledge, orientational knowledge) and several theoretical traditions can be used to frame a higher education programme. The analytical view provided by technology assessment forms an integral part of this didactical approach.

Richard Beecroft and *Marc Dusseldorp* argue that TA itself can be understood as "Bildung", as it provides support for its addressees in understanding science and technology related problems. An analytical view on TA based on philosophy of "Bildung" and didactics can shed light on the differences between various TA concepts. This view can be made useful for the methodological self-reflection in TA, e.g. as "learning process". Finally, new approaches to the teaching of TA are being suggested.

Notes

1) See http://www.philosophie.uni-karlsruhe.de, Prof. Michael Decker.
2) See http://www.ohm-hochschule.de.
3) See http://www.netzwerk-ta.net/transdiss/TransdissV2.pdf.
4) For Tübingen see http://www.izew.uni-tuebingen.de/kolleg and for the PhD Network see http://www.psp-biomedizin.de.
5) See http://www.rtwe.de/pdfs/te-mater/06nachent.pdf.
6) E.g. from Prof. Steffensen (http://www.suk.h-da.de/index.php?id=ta), Prof. Renn (http://ortwin.gingedas.net/de/node/14) and Prof. Schebeck (http://www.iwar.bauing.tu-darmstadt.de/ISK/Deutsch/lehre/lehre.htm).
7) See Euler 1999; also Beecroft, Dusseldorp and Schmidt both in this issue.

8) E.g. the focus of the last ITAFORUM in Berlin; http://www.itaforum09.de.
9) For a critical view see Bulthaup 1973 and Habermas 1976.
10) See Euler 1999. – Working on scientific issues does not solely provide a platform for the training of autonomous thinking, as it has been discussed in the theory of Bildung some decades ago (cf. Kerschensteiner 1952).
11) See Ahrens 2005 and Ackermann et al. 1988.

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