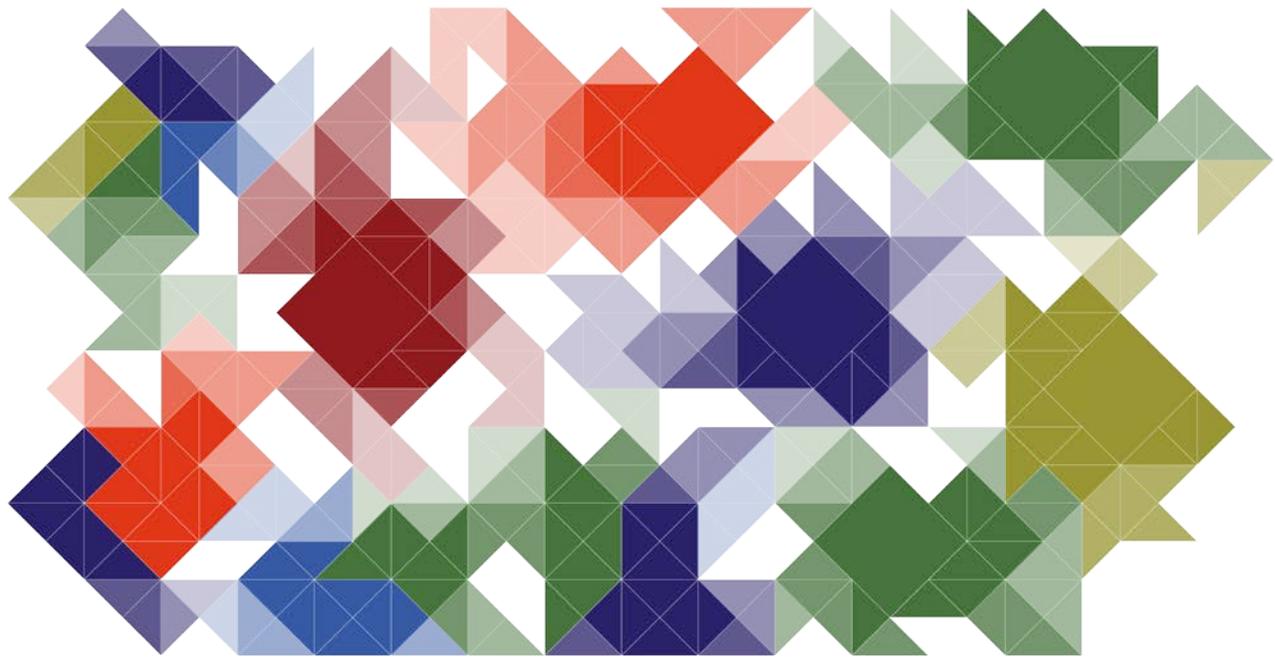# Addressing interdisciplinarity

In the mandatory philosophy of science courses

(Fagets videnskabsteori)

Publications from Interdisciplinary Education at UCPH

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Addressing interdisciplinarity in the mandatory philosophy of science courses (fagets videnskabsteori)

A didactic tools paper for module managers of 'Fagets Videnskabsteori'
at the University of Copenhagen

By Werner Schäfke and Katrine Meldgaard Kjær, 2016.

Publications from Interdisciplinary Education at UCPH
Download from the project website: http://www.ind.ku.dk/interdisciplinarity

Addressing interdisciplinarity

In the mandatory philosophy of science courses
(*fagets videnskabsteori*)

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1   Introduction

Interdisciplinarity is a possibility to scientifically build knowledge beyond the limitations of individual disciplines. It is the necessary complement to the ongoing specialization of disciplines as methods develop and disciplinary knowledge becomes ever more complex.

This tool paper offers advice on how to address interdisciplinarity in the courses on a discipline's theory of science (*fagets videnskabsteori*), which are mandatory component of all bachelor-level study programs at Danish universities. The advice offered here can also be followed when planning other courses on BA- or MA-level that incorporate interdisciplinary elements.

The general course on a discipline's philosophy of science was imagined as a space for reflection on the discipline the students are currently engaging in as well as science more generally.[1] The course should enable students to look beyond the boundaries of their own discipline, and understand it in relation to other ones. The course can in this regard be utilized as the curricu-

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[1] Four course guidelines and further information see Lærergruppe for Fagets Videnskabsteori ved de teknisk-naturvidenskabelige og biomedicinske uddannelser i Københavnsområdet 2006.

lar foundation for interdisciplinary education at UCPH[2], where students are introduced to interdisciplinary research, and how interdisciplinary research relates to their disciplinary research.

However, the official guidelines on the course's structure are vague and not binding. Subsequently, the courses in philosophy of science at the different programs at UCPH are diversely structured, and address interdisciplinarity in various ways, if they do address it at all (Kjær 2014).

2   Definition: types of interdisciplinarity and their benefits

'Interdisciplinarity' and similar terms such as 'transdisciplinarity' and 'multidisciplinarity' are used in a wide variety of meanings. Essentially, these terms refer to some sort of connection between different disciplines when collaborating in research, and there are many ways in which this can happen.

From the perspective of sociology of science, disciplines can be understood as being constructed through a process of *institutionalization*. This means that disciplines are constituted by institutions, departments and professional identities. The corresponding kind of interdisciplinarity is obviously established when

1. researchers from different institutes or with different professional identities (e.g. following different 'schools of thought') collaborate in research.

Theory of science discerns three further points of connection between disciplines when conducting interdisciplinary research. Disciplines can connect on the levels of methodology, ontology, and epistemology. Multiple 'disciplines' can work

2. with a common method,
3. describe the same part of (natural, social etc.) reality, and
4. construct a common set of knowledge about this part of reality.

The reason for the propagation in interdisciplinarity lies especially in the last type of research collaboration. Our research based knowledge, i.e. our *epistemes*, are most exact, if they are not confined to the results of a single method, which would only reflect a fragmented part of reality, e.g. only its natural or social or psychic aspect.

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[2] In October 2013, the cross-faculty 3-year research project "Interdisciplinary Education at UCPH" was launched. The project is funded by the University of Copenhagen as a part of 2016 strategy to support interfaculty cooperation and education, and focuses on strengthening interdisciplinary education at UCPH. It aims to describe what supports and what hinders interdisciplinarity at UCPH, and what can be done to strengthen it in the future. More information can be found at the project's homepage: www.ind.ku.dk/interdisciplinarity/.

An obvious requirement for interdisciplinarity is that a set of disciplines' target fields, i.e. the parts of reality they research, necessarily need to be in contact or overlap.

Furthermore, interdisciplinarity can only work between researchers who are well trained in a set of methods, but also critically reflect them, so that they are open to combining the knowledge generated by their research with that of others. In other words, interdisciplinary researchers need a critical knowledge of their disciplines *methodology*.

This is where the mandatory courses in a 'discipline's theory of science' (*fagets videnskabsteori*) come into play. These courses form the base for interdisciplinary research by enabling the students

1. to reflect the position of their own discipline's *ontology*, i.e. the part of reality it researches,
2. the limitations of its methods, i.e. discussing a critical *methodology*, and
3. how other disciplines can supplement their own discipline's *epistemes* by researching
   a. adjacent parts of reality with the *same* methods (multidisciplinarity), in order to extent knowledge or
   b. the same parts of reality with *other* methods, in order to build more profound and integrated knowledge (transdisciplinarity and interdisciplinarity in the narrower sense).

The last learning goal is obviously the hardest to achieve. But while the other goals only formulate a discipline's limits, it is the last goal that potentially leads to scientific advancement.

3 Questions for reflection

The following questions offer a checklist for addressing interdisciplinarity in a course on a discipline's theory of science (*fagets videnskabsteori*), but can also supplement interdisciplinary courses or any methodological reflection in disciplinary courses.

3.1 Ontology

- Are the research items of your discipline potentially ambiguous or multi-faceted?
- And if so, does your discipline recognize this?
- What is your discipline's methodological take on this?
- Does your course address this?

3.2   Methodology

- What methodologies does your discipline typically use in approaching its objects of study?
- Are disciplinary traditions and identities a decisive factor in the choice of method?
- What can these methods *not* shed light on? What do they potentially miss?
- How are methodic limitations addressed in your discipline's methodological discourse?
- Is this discourse limited by disciplinary traditions or institutionalization?

3.3   Epistemology

- Are there multiple schools of thought in your discipline?
- And do their respective sets of accumulated knowledge exclude each other?
- Does the course introduce different epistemologies in a way that grants them equal esteem and status, deeming them viable as well?

4   Practical experience

There is no "one size fits all" solution to addressing interdisciplinarity in the varying disciplinary contexts of all study programs offered at UCPH. The courses that offer students fruitful interdisciplinary outlooks answer the questions posed above in accordance to their own disciplinary situation.

Interdisciplinary study programs need to enable students to harmonize the different perspectives offered within the program, and necessarily do so (Kjær 2014). Study programs that traditionally are designed to educate practitioners, such as physicians, usually address ethical issues raised by their work. The same holds true for programs in life sciences. Ethical issues, however, are underrepresented in social sciences and the humanities. In how far non-interdisciplinary study programs address their discipline's relation to other disciplines varies, but entails the challenge for the course manager that these relations have sometimes not yet been thoroughly reflected.

5   Recommendations

Possibilities for interdisciplinary research can best be demonstrated following a problem based or case based approach to a discipline's research objects. These objects usually are more complex than a single discipline's traditional set of methods, and thus offer the course participants to actively engage in reflecting the limitations of their discipline and how other disciplines might come into play to supplement their discipline's knowledge.

This practical approach to addressing interdisciplinarity also presents interdisciplinarity as an unfinished story, opening up many possibilities for future research to the students and simultaneously trains them in creatively asking novel research questions.

6   Further reading

6.1   On interdisciplinary research

Klein, Julie Thompson (2010): A Taxonomy of Interdisciplinarity. In Robert Frodeman (Ed.): *The Oxford Handbook of Interdisciplinarity*. Oxford, New York: Oxford University Press, pp. 15–30.

Lattuca, Lisa R. (2001): Constructing Interdisciplinarity. In *Creating Interdisciplinarity. Interdisciplinary research and teaching among college and university faculty*. Nashville: Vanderbilt University Press, pp. 78–118.

Schmidt, Jan C. (2008): Towards a Philosophy of Interdisciplinarity. In *Poiesis & Praxis* 5 (1), pp. 53–69. DOI: 10.1007/s10202-007-0037-8.

6.2   On interdisciplinary research management

Petrie, Hugh G. (1976): Do You See What I See? The Epistemology of Interdisciplinary Inquiry. In *Journal of Aesthetic Education* 10 (1), pp. 29–43. DOI: 10.2307/3332007.

6.3   On interdisciplinary didactics

Haynes, Carolyn (Ed.) (2002): *Innovations in Interdisciplinary Teaching*. Westport, CT: Oryx Press.

6.4   On the course fagets videnskabsteori

Christensen, Ole Ravn (2005): Fagets videnskabsteori. Et større alment perspektiv. In *Matematik- og Naturfagdidaktik* 1, pp. 44–55.

Gamborg, Christian (2009): Pædagogiske udfordringer ved undervisning i (fagets) videnskabsteori. In *Improving University Science Teaching and Learning* 2 (2), pp. 97–107.

Lærergruppe for Fagets Videnskabsteori ved de teknisk-naturvidenskabelige og biomedicinske uddannelser i Københavnsområdet (2006): Almen information om Fagets Videnskabsteori. Webstedet for undervisere i Fagets Videnskabsteori. Available online at http://www.nbi.dk/~natphil/FVT/i_Alment.html.

Kjær, Katrine Meldgaard (2014): Fagets videnskabsteori? Tracking interdisciplinarity in the mandatory philosophy of science course at the University of Copenhagen. Cross-disciplinary Education at the University of Copenhagen. Copenhagen. Available online at http://www.ind.ku.dk/english/interdisciplinarity/results/fagets_videnskabteori_-_mapping_interdisciplinarity.pdf.