The Epistemology of Interdisciplinary Knowledge
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Proposal:

(1) Early approaches to understanding scientific knowledge, and practices rarely addressed phenomena of interdisciplinarity. The outstanding feature of late 19^{th} and early 20^{th} century science has been branching into disciplines. The epistemological essence was seen to be observed in paradigmatic disciplines like physics (axiomatic theories), biology (classification and evolution), or history (ideographic description). Forerunners of interdisciplinary thinking can be seen in those philosophers who in face of the diverging forces tried to keep science together. Ontological reductionism, monism (Oswald), unity of science (Vienna Circle), completeness in science (Schlegel), the circular chain of disciplines (Piaget) have been among the epistemological attempts to counteract science's falling apart into disciplinary pieces. Interdisciplinarity came into being as organized goal-oriented research in the contexts of politics and economy. From a philosophical perspective its negligence, therefore, is also caused by looking down at applied sciences and technologies as less dignified fields of research.

(2) Understanding interdisciplinary learning and knowledge raises epistemic questions of a new kind. Questions refer to the goals, objects, methods and representations of knowledge. Interdisciplinary research usually employs disciplinary resources - methods, models, and theoretical concepts. However, interdisciplinary generated knowledge claims to be more than the end product of disciplinary pieces put together on an interdisciplinary assembly line. The chapter assumes that interdisciplinary research can be characterized by two foci. One focus is to produce a knowledge base for constructing, understanding, or simulating a highly specific object. The specifity may refer to a technological artefact (e.g. the construction of a talking humanoid robot), to an essential feature of the real world (e.g. understanding world climate change), or to the singular arrangement of many contingent factors (e.g. solving an environmental problem in which the geography, culture, technology, and economy of a region meet). The other focus is constituted by the scientific interest in aiming at general knowledge. The talking robot is also an agent for generating a complex theory of embodied communication to which linguistics, psychology, behaviour biology, and engineering contribute. Simulating the world climate is also an exercise in understanding and controlling highly complex chaotic systems. Successful ecological problem solving enhances the expert knowledge for tackling similar problems.

(3) In many interdisciplinary research projects and strategies both foci are present. However, their tension as well as their interplay is not well understood. The chapter attempts to do so in three steps. Firstly, a classification of typical relationships between interest in a singular solution and interest in general knowledge is needed. Second a conceptual framework is provided which helps to understand the epistemic characteristics of interdisciplinary research in its various fields. Third a new concept of scientific learning is offered for a better understanding of the mutual repercussions between solving complex problems and searching for more general knowledge. The concept is based on literature concerning the relevance of case studies of transfer learning by analogical encoding.

(4) Special reference shall be made to the epistemic problems constituted by the boundary layers between the natural sciences, the social sciences, the humanities and lay persons' local knowledge. Conceptual frictions between natural scientific 'objectivity', social scientific integration of 'social awareness and self-referentiality', 'value dimensions' added by the humanities, and 'experience' of lay persons are unavoidable. Still, attempts are made to combine these heterogeneous factors in complex models and operation plan. A more sceptical view may consider the factors to be complementary (in the sense of Bohr) so that disciplinary skills and tools cannot be fused in a comprehensive and consistent interdisciplinary method. Still, interdisciplinary research teams are supposed to be able to communicate, negotiate and strategically relate heterogeneous knowledge bases. However, what is the common level of doing so?

(5) There should be a paragraph addressed to implications for interdisciplinary education and training.

(6) A concluding remark advocates a more self-conscious understanding of the epistemic status of interdisciplinary knowledge. Notwithstanding the boundary layer problems it should no longer be borrowed from the disciplinary model but based on its capacity to identifying and solving complex problems as well as shaping complex realities.

In case you prefer English references:

Krohn, W.: Aesthetics of Technology as Forms of Life. In: Hell, R. et al.(eds.) 2007: Tensions and Convergences. Transaction Pub., New Brunswick, 267-279.

Groß, M./Krohn, W.: Science in a Real-World Context. Constructing Knowledge through Recursive Learning. In: (Ed.) Frodemann, R., Mitcham, C., Philosophy Today, Chicago, DePaul University, Vol. 48:5, 2004, pp. 38-50