Transdisciplinary research: When science and society shape the future together

Energy transition, transport transition, climate change mitigation, resource savings and sustainable consumption patterns – the challenges are major, the problems complex, the actors and stakeholders diverse. In response, and starting in the environmental and sustainability realms, new forms of knowledge production have been developing since the 1990s, marking a departure from the classic forms of single-discipline scientific research. Moreover, they go beyond interdisciplinary research, which moves across the boundaries between the scientific disciplines. In transdisciplinary research, actors in both science and society work closely together.

Transdisciplinarity involves various sectors of society, seeking to mobilise their very specific forms of knowledge generated by everyday practical experience. New knowledge coalitions can thus emerge that are better able to cope with the challenges facing society. Collaborative – indeed communal – activities by academia, civil society, policy-makers, industry and state and non-state institutions are at the forefront.

In this process, science takes up impulses from stakeholders and builds upon them, while simultaneously transmitting its own impulses to practitioners. Thus, ideally, transdisciplinary and transformative processes have effects upon both science and practice, initiating change in both areas. Close linkage between the scientific and social systems is a hallmark of transdisciplinary research; reciprocal learning processes stimulate and facilitate change.

Adapting design, permitting evolution

Transdisciplinary projects can be designed in a multitude of ways. The formats and methods used are being refined continuously. It is vital that researchers remain flexible in their research design and process. Regular exchanges with the partners in the practitioner realm are needed to reflect on the direction a project is taking, adjust methods accordingly and develop shared solutions.

The challenges are particularly great during a project's start-up phase: Which formats and methods are appropriate to meet the goals set? Which actors must be involved? Does a shared understanding of the problem exist? How can measurability be achieved? It is also essential to build mutual understanding and trust among the researchers and practitioner partners.

Furthermore, scientists involved in transdisciplinary research processes often find themselves having to fulfil several roles simultaneously: On the one hand, they initiate and coordinate the

research. On the other hand, the research team must mediate between science and practice and must keep reflection and evaluation in mind. A combination of different methods that is tailored to the context and is embedded in a format appropriate to the project and to those taking part in it greatly assists the scientists' work.

Real-world labs – testing novel approaches, finding sustainable solutions

Real-world labs are one of the best-known transdisciplinary research formats. Under real-life conditions – and often in a spatially limited area – new approaches are trialled, for instance in order to test service or product innovations and to involve and engage citizens, local authorities or private-sector actors in the process. Local actors are included as equal partners.

Participation encompasses the thematic and spatial design of research approaches (Co-Design), the joint framing, implementation and trialling of the services or products chosen (Co-Production) and the evaluation and dissemination of outcomes (Co-Evaluation and Co-Dissemination) with input from all actors involved in the process. Modes of work are experimental and reflexive, with a long-term focus.

Real-world labs often aim to achieve environmental, social and economic sustainability for the common good. Participants need to reconcile the sometimes conflicting interests of the research goal, which is concerned with generating scientific knowledge, and the practical goal, which is concerned with practical applications and sustainability.

Research on transdisciplinarity – the meta-level

Which formats are suited in which contexts? Which potential combinations of methods are expedient? And how can transdisciplinary research best inform practice in order to initiate sustainable transformation? These are the questions addressed by research on transdisciplinarity at the meta-level.

This type of science systematises new formats and refines them – of course in turn adopting a transdisciplinary approach that involves both the scientific community and actors in the field.

The results and findings put researchers and their real-world partners in a position to select the formats and methods that best match their specific contexts. In addition to numerous "grassroots" transdisciplinary projects, the Oeko-Institut's researchers also engage in such meta-level research on transdisciplinarity.

tdAcademy – Research and community platform for transdisciplinarity: A project of the Oeko-Institut, the Institute for Social-Ecological Research, the Leuphana University Lüneburg, and the Center for Technology and Society (ZTG) at Technische Universität Berlin

Transdisciplinary projects involving the Oeko-Institut

Energy projects

ENSURE the power grid of the future – A Kopernikus project: Transdisciplinary cooperation among scientists, industrial enterprises and civil-society organisations, on behalf of the German Federal Ministry of Education and Research

Urban and regional development projects

s:ne – system innovation for sustainable development in fields such as mobility, urban development, global supply chains and cooperative heat supply. The Oeko-Institut is one of seven project partners of Darmstadt University of Applied Sciences.

TRASIQ: Transformative development of urban neighbourhoods – Concepts and options for swarm cities (website only available in German): Cooperative project involving six research partners, coordinated by the Oeko-Institut and funded by the German Federal Ministry of Education and Research

Mobility projects

WohnMobil – Innovative forms of housing and mobility services (website only available in German): A joint project involving five research and seven practitioner partners, on behalf of the German Federal Ministry of Education and Research

MobiQ – Sustainable mobility through sharing in the neighbourhood: A project involving the Oeko-Institut, the Centre for Sustainable Urban Development (ZNS) at HFT Stuttgart, and the Nürtingen-Geislingen University of Applied Sciences (HfWU), with funding from the Baden-Württemberg Ministry of Science, Research and the Arts

Selected publications:

Lam et al. 2021: Transdisciplinary research: towards an integrative perspective (article in GAIA, Volume 30/4)

Contact

Dr. Melanie Mbah
Research Coordinator for Transdisciplinary Studies
Nuclear Engineering & Facility Safety

Oeko-Institut e.V., Office Freiburg
Phone: +49 761 45295 237
Mail: m.mbah@oeko.de

Dr. Manuela Weber
Senior Researcher
Resources & Transport

Oeko-Institut e.V., Office Berlin
Phone: +49 30 405085-382
Mail: m.weber@oeko.de

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