

Transdisciplinarity: Science for the public good

Transdisciplinarity was discussed publicly 50 years ago at an Organisation for Economic Co-operation and Development (OECD) international seminar in France. Today, the term *transdisciplinarity* is still being debated and is often contested. However, private foundations and public agencies are funding transdisciplinary projects intended to respond to complex societal conditions.¹

In 1970, transdisciplinary contributions were defined as those establishing a common system of axioms using systemic logics and the synthesis of higher-order disciplinary relationships that distinguish transdisciplinary from multidisciplinary and interdisciplinary contributions. The proceedings of the OECD seminar confirmed there was no agreed terminology that distinguished transdisciplinarity from interdisciplinarity.²

Although the development of transdisciplinarity will not be presented here, key concepts and principles that were discussed 50 years ago are recalled as the foundation on which the future of transdisciplinary contributions would be created. Notably, questions discussed at the OECD seminar included:

- What is the purpose of scientific research?
- Should scientific research have a social purpose?
- What is the contribution of science to defining and implementing public policies?
- What knowledge is pertinent for addressing societal problems?

I argue that these questions are pertinent today and posit that how they are answered now will determine the future of transdisciplinarity.

Different definitions and interpretations of transdisciplinarity coexist.³ The idea of *transdisciplinary discipline-based contributions* was described and discussed at the OECD seminar; it denotes the collaboration and integration of contributions from several disciplines to organize existing scientific knowledge and create new knowledge by concerted action between researchers educated in different disciplines. This thinking was clearly expressed by participants at the OECD seminar, including Erich Jantsch, an Austrian physicist, and Swiss psychologist Jean Piaget. Both were concerned by the fragmentation and specialization of disciplinary knowledge; their approach has since been endorsed by academic and scientific institutions, including the U.S. National Academy of Sciences.⁴

A second notion includes *transdisciplinary coproduction of knowledge*, which posits that knowledge about societal conditions is not only produced by aggregation of scientific research; professional competencies and skills are also necessary to understand and respond to extant situations that cannot be understood comprehensively by disci-

plinary thinking only. This approach builds on contributions during the OECD seminar; for example, Erich Jantsch asked the audience to consider whether “science is an autonomous cultural expression,” which challenged the conventional interpretation of science founded on individual curiosity and creativity, or whether science “is a social overhead investment,” assuming that science “underlies *all* the purposes of society, and is therefore to be carried out in an organisational structure which is patterned on the conceptual structure of knowledge.”⁵ This second approach gathered momentum during the 1990s and included a seminal contribution titled *The New Production of Knowledge*.⁶ Coproduction of knowledge often refers to knowledge production in which experts (researchers and practitioners) jointly formulate a research problem and project design, as well as generate, apply, and evaluate results.

A third type of transdisciplinarity transgresses the knowledge domains of scientific research and professional expertise to combine and synthesize many different types of knowledge, including what Michael Polanyi described as “knowing-in-practice.”⁷ Valerie Brown extended this interpretation beyond the domain of rational knowledge to five knowledge cultures, including individual knowledge (lived experience, personal reflection and introspection); community knowledge (contextual, shared and place-based); specialized knowledge (professional and scientific knowledge); organizational knowledge (recorded by private enterprises and public institutions); and holistic knowledge (grounded in the interrelations between all types of knowledge that form a coherent synthesis).⁸

Statistics confirm that publications on transdisciplinarity have increased since 2000.⁹ In addition, the diversity and scope of collaborations between disciplines has increased. What is the purpose of these contributions?

Notably, the development of transdisciplinarity followed the recognition of the fundamental limitations of scientific contributions to resolve societal problems, including public health challenges. Horst Rittel and Melvin Webber discussed this subject at a meeting of the American Association for the Advancement of Science in December 1969 when they stated:

The search for scientific bases for confronting problems of social policy is bound to fail, because of the nature of these problems. They are “wicked problems,” whereas science has developed to deal with “tame” problems.¹⁰

This distinction between tame and wicked problems is pertinent for debate about the purpose of science and the capacity of

transdisciplinary contributions to respond more effectively to ecological problems and societal conditions than conventional discipline-based contributions. Although scientific research is often assessed by answering questions that are assumed to be correct and definitive, Dan Nutbeam explained this custom can include “the right answers to the wrong questions.”¹¹ A recent example is the nonrecognition for 2 years by scientific experts appointed by the World Health Organization that SARS-CoV-2 could be transmitted through the air.¹²

In 2018, the strategic roadmap for implementing the Declaration on Research Assessment (DORA)¹³ aligned with the discussion at the OECD seminar about the social purpose of scientific research. Authors of DORA indicated that the assessment of academic credibility should no longer be limited to the number of publications by their peers in their discipline because the societal impact is increasingly important. This concern—about the social purpose of scientific research and its contribution to societal benefit—has been supported by growing criticism of the quality of scientific research.¹⁴ This general criticism about shortcomings in the conventional contract between science and society, grounded heavily in peer assessment, has recently been associated with the proliferation of scientific publications about the coronavirus pandemic and Covid-19 disease that will have limited societal impact.¹⁵

I posit that the future of transdisciplinarity will be influenced by how it is positioned in a broad philosophical and societal context that itself influences the connections between research, public policies, and professional practice. This will require rethinking the contribution of science to respond effectively to problematic situations and persistent problems. I propose that transdisciplinary futures should acknowledge the pertinence of diverse types of knowledge and ways of knowing to enact concerted action that includes a plurality of ways of knowing about complex societal challenges and agreed responses to them.

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