

THE TRANSDISCIPLINARY APPROACH TO KNOWLEDGE

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The universal and the particular coincide: the particular is the universal appearing under varying circumstances.

Johann Wolfgang Goethe

Johann Wolfgang Goethe is reputed to be “*the last true polymath to walk the earth*”, but today, the universal human being deserves to find their own space within each of us scientists, and the theme of universality must be brought back to the attention of every modern mind and organization.

Nowadays, all scientists, all intellectuals in the Aristotelian sense of the term, are expected to make a paradigm shift in their thinking: from a multidisciplinary, or even interdisciplinary, approach to a transdisciplinary one.

Assuming that, in this context, the term discipline means doctrine, subject of study, and teaching, the topic of transdisciplinarity is still not sufficiently considered.

The history of science, especially medical science, has proven how disciplinary specialization has brought knowledge. Nonetheless, recent evidence shows how this knowledge exhibits growing limitations in grasping multidimensional problems that increasingly entail global implications, tending to become fundamental to modern science and the foundation of new knowledge.

Furthermore, the disciplinary ways of thinking to solve the most serious problems of our planetary era constitute the most complex challenges. The more multidimensional the problems, the less specialized they become, and consequently, the greater the inability to think about their multidimensionality; the more relevant and complex crises become over time, the less we are able to outline their essential features. In fact, the more global the problems become, the less different specialized disciplines are able to depict them.

What do we refer to when we talk about “transdisciplinarity”? Transdisciplinarity can be defined as the ability to integrate fields of knowledge beyond the levels of multidisciplinary, in which several disciplines operate simultaneously, or interdisciplinary, by bridging them together¹.

The notion of transdisciplinarity first appeared in the 1970s and has developed into several branches corresponding to different communities and contrasting research practices. In the context of unfolding and often unprecedented global crises, transdisciplinarity is increasingly referred to as a promising way to produce further knowledge and make good decisions on core issues. Transdisciplinarity is often characterized by including nonacademic stakeholders in the process of knowledge production and in developing shareable choices.

Transdisciplinarity, whether theoretical, phenomenological, or experimental, expresses the need for research and training paths capable of crossing subject boundaries without merely overlapping different disciplines (multidisciplinarity) or partially contaminating them (interdisciplinarity).

The underlying idea is a profound reorganization of the dynamics of knowledge construction. This is an essential aspect of reforming our knowledge paradigms to meet the challenges and overcome the crises typical of contemporary times. All challenges and crises of humanity (democratic, environmental, energy, pandemic, economic, geopolitical, educational, etc.) are equally those of knowledge and cognition. The obstacle to understanding, and thus to overcoming challenges and crises, lies in our contingent ignorance and unpreparedness and, more importantly, in how our knowledge is produced, organized, and conveyed.

Awareness of problems, whether local or global, cannot exist without a reasoning approach capable of connecting still disjointed notions and overly compartmentalized thoughts (hypotheses and theses). To address these problems, we need a new form of thinking. In other words, we need a reform of thinking and, inseparably, a reform of education.

Today, medical science is also being called upon to revisit how it addresses and teaches complexity. The concept of complexity in medicine is the result not only of mere chance but also of scientific and technological development. It is also connoted by its peculiar characteristic: new technologies, especially in the biological and medical fields, have primarily an anthropological novelty scope, meaning they affect the profound nature of humans. The human sciences have manipulated bodies in a way that was never possible before cloning, altered foundational social relations such as parenting and childbearing, and radically transformed the life stages shared by all human beings, such as procreation, illness, and death; in fact, an urgent revisiting of study methods is required. Ours is a new world in which the automatic processing of networked information has accelerated new relational dynamics in terms of space-time dimensions, both as the amount and speed of information available, while creating new knowledge and repurposing old problems in radically different ways.

New knowledge grows and develops rapidly, especially in universities, which are irreplaceable and primary venues for research and education. In this environment, we witness the proliferation of increasingly specialized and sophisticated disciplines. However, we have also become aware of how the fragmentation of knowledge often prevents us from grasping the connections between the various fields, making collaborations between different experts more arduous.

The consequences become even more obvious when we move on to the governance of the new phenomena. The latest techniques of genetic manipulation, big data, and artificial intelligence (AI) in the various, endless possible applications passing through precision medicine have so much social and anthropological impact that they raise regulatory problems beyond the narrow scope of domain specialists; this results in new questions for justice and politics. The problem of governance of new technologies cannot be eluded; nonetheless, the tools of our democracy increasingly seem inadequate: they are too slow for the speed at which the dynamics associated with technological innovations are developing. This is how new questions that arise remain unanswered in the contemporary legal and regulatory framework, as they are founded on previously undisputed paradigms emerging as an endless list of disturbing and extraordinary potentials that are hardly manageable autonomously by specialists.

Therefore, our universities should be able to offer adequate training to deal with this complexity through the paradigm of transdisciplinarity. The fragmentation of disciplines needs to be overcome, moving toward the institutionalization of diverse knowledge that goes beyond the comparison and exchange between disciplines – although essential and yet too often lacking.

It is not only about a fusion of expertise in science but also cross-disciplinary knowledge: the necessary scientific training of the biotechnologist, the chemist, and the physician cannot lack comprehensive views of the complex systems in which the individual student, indeed the future professional, will become involved. This is certainly not a matter of taking a law exam or adding a bioethics module to the basic science subjects. This is about the possibility, at the level of higher education – bachelor's degree, doctorate, postdoc, master's degree – of offering a different perspective on how the whole human body, in all its parts (organs, cells, tissues) can be studied, treated, transformed as an instrument of research and simultaneously as a resource, in our economic and social context, and how all this can be transferred to the web. It could be conceived as a “problem-solving” key. When confronting a biotechnology issue, possible keys to interpretation may be identifying nodes and proposals for solutions, communication, storytelling, governance, and politics, where “politics” is intended at its deepest *raison d'être*: governing human complexity by deepening its understanding.

Transdisciplinarity is particularly relevant in medicine as a field that lies at the intersection of the biological and social sciences. Medicine deals with a complex object of study that cannot be investigated and treated as if it were a set of mechanical components. Addressing this complexity requires a holistic approach to problems, which can only be achieved through transdisciplinarity.

Transdisciplinarity in medical research is an approach that involves the collaboration of different scientific and non-scientific disciplines to address and solve complex problems.

Besides research on climate change and the global health crisis, transdisciplinarity is being applied in medical practice and research in various ways. A priority role is given to research on chronic diseases and palliative care, defined as comprehensive care of the patient's body, mind, and spirit. Research on chronic diseases, especially genetic ones, involves experts in clinical and laboratory medicine, nutrition, and psychology, as well as patients, bioethicists, computer scientists, sociologists, economists, and legal experts who are open to religious beliefs and belief systems, knowledge, and values considered relevant to the task. This transdisciplinary concept can contribute to the beginning of possible solutions for the real needs of chronically ill patients in different care settings and promote greater awareness of health and wellness in civil society.

To summarize, transdisciplinarity is clearly distinct from other forms of academic collaboration (such as multi- or interdisciplinarity) and does not imply any new super-theory, new epistemology, or revolutionary methodology. Nevertheless, it allows a different approach to addressing complex social problems in their context. The most crucial difference in this new methodological paradigm lies in the conception and role of the various partnerships involved as they work together to seek mutually recognized solutions that fit the purpose and respect basic conceptions of social values ("value-landscapes").

I believe that transdisciplinarity in medical practice and research can lead to new, unimaginable, more effective, and comprehensive solutions to our complex challenges.

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