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Linking Interdisciplinary Approaches: Key to Integrated Knowledge

Re-formulation of the problems of knowledge

THE HISTORY of science shows in what directions we may move to open fruitful new paths in scientific research. One of the most attractive is the one that leads to the re-formulation of the problems affecting knowledge, and involves the re-conceptualization of study objects and the development of new strategies (of discovery and invention) to resolve them.

This re-conceptualization, which might be the subtle stroke that adds a new element or, conversely, the construction of a complex object, requires a revision of not simply the relationships between the different domains of science, but also of all that is incorporated into, and all that is left out of each disciplinary perimeter.

This sort of scrutiny concerns the core problem of questioning the science that produces fragmented knowledge that is not only insufficient to take on many problems that face humanity on differing scales, from global to local, but also contributes to modelling a view of the world from which those problems (famine, poverty, war, violence, climatic change, the energy and water crises) emerge, and that are characteristic of the so called civilization crisis.

When speaking of these problems we generally say they are multidimensional, that is, they are the result of the interaction of various natural and social processes, and their study requires, in consequence, interdisciplinary research.

Multiple references to interdiscipline

Given the high epistemic and practical value attributed to interdiscipline, it has been incorporated into the creation of new scientific institutions worldwide. These initiatives must be consistent with the critical vision that serves as their

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moving principle, and this implies exploring the significance of interdiscipline for the advancement of knowledge and for overcoming ancestral problems.

The liberty to question and propose that is required to undertake the intellectual challenge of this critical examination, is amply fulfilled in universities, which represent the maximum expression of unity within diversity. Accepting this challenge as a permanent commitment, CEIICH proposes to encourage greater familiarity with the theory and practice of interdisciplinary research, as well as its dissemination.

Notwithstanding that there exist studies in this sense carried out in this institution, some of them resulting from national and international academic events, efforts have been made to resurrect reflection on this approach to research, hoping to congregate experts on the matter on a continuous basis within the format and time frames afforded by a scientific journal.

An undivided view of interdisciplinary approaches

The initiative, therefore, is accompanied by a wide-ranging collaborative proposition, that consists of congregating several conceptions of the integration of knowledge, to analyze, question and compare them, in other words, study and comment upon them, but always in terms of research questions, that is, problems of knowledge. Thus, the distinction between effective and possible ways to relate the disciplines, which has led to multiple typological classifications, can generate a research agenda on overarching problems in interdisciplinary studies (considering specific ends and contexts), as well as an integrating vision of this research strategy.

To this effect, we present papers on studies related to interdiscipline, written in various parts of the world. The purpose of thus starting to build a complete as possible overview of the approaches to interdisciplinary research stems from the premise that, on the one hand, each historical and cultural context spawns valuable conceptions of the integration of knowledge, as well as important insights on its viability and relevance, and on the other, that the conceptions and visions do not exclude, but rather complement each other.

Precise meaning of interdisciplinarity in differing contexts

Far from seeking a consensus concerning the concept of interdisciplinarity — notwithstanding the presentation of kindred notions culled from multiple definitions — we aim to achieve a precise meaning in the varied contexts in which its use is pertinent, that is, a correct assessment and impulse of the concurrence of different fields of knowledge, in harmony with the recognition and stimulus

which have been accorded to specialized knowledge with which it becomes possible to achieve the dialectic process of differentiation and integration in the development of science.

The distinctive description of contexts contributes to achieving precision in defining the meaning of this term. Among other factors, research, educational and professional practice environments acquire special relevance. Even when the conception of discipline itself isn't the same in each of these contexts, and its articulation doesn't accomplish the same mission (so that its specific study is justified), it is important to delve deeply, for example, in the relationship between pluridisciplinary education and interdisciplinary research, interdisciplinary teaching and multidimensional problem-solving professional practice, or the generation of knowledge in hybrid domains and its transmission in the classroom, among other issues.

Concerning the context of interdisciplinary research, it is also important to examine the challenges and requirements posed by the institutional frameworks within which the research is carried out, primarily considering universities, governments, non-governmental organizations, and the productive sector, without omitting the analysis of converging efforts that might be generated in this field, notwithstanding their differing objectives, values, and types of problems they are trying to resolve.

Even interdisciplinary research carried out in a university needs to be dissected and characterized according to two initial criteria. The first refers to placing emphasis on the integration of disciplines *vis á vis* theoretical issues, or stressing articulation of knowledge to study multidimensional problems with practical relevance. The second criterion refers to the range of domains, both theoretical and practical, that converge in specific projects, and which can be concentrated in natural sciences, social sciences, or bridging both, including the possibility of incorporating other types of knowledge.

The idea is to outline an integrated study program of interdisciplinary research on the basis of the contribution of specialists in the field congregated for this issue.

Guidelines for outlining an integrated study program on interdisciplinarity

Each practice conceived as interdisciplinary research offers an opportunity to define precisely what processes or activities belong to the interdisciplinary field, such as integrating or articulating (that can, in turn, be described by other terms: *unify* or *conjugate* in the first case; *link* or *relate* in the second). While the notion of *integration* seems to be reserved for the creation of hybrid domains,

that of *articulation* is associated principally with the convergence of knowledge contributed by various disciplines for the study of complex problems. The relevant matter in both cases is to know how to integrate or articulate disparate domains, a matter which is linked to the subject of the epistemological underpinnings of interdisciplinary research.

Answering the question of how relatively autonomous fields of knowledge can become related requires incisive reflection on the criteria for distinguishing domains, especially concerning the notion of study object, which is what confers specificity. In this sense, it is mandatory to approach the concept of discipline, although without insisting on definitions that could lead to essentialisms, but identifying the phenomena and processes that comprise the study objects of those domains that have been constructed historically in specific social and cultural contexts.

Articulation / integration of study objects in different disciplines

The challenge of integration or articulation is to get to know the relationships between the processes that comprise the study objects in different disciplines. The explanation/comprehension of complex study objects and their processes relies, then, on getting to the bottom of these intelligibility relationships (not only in terms of causality or functional links, but also of interdefinability and significance).

The multiple approaches to interdisciplinary research that are presented in this issue reveal varied ways of conceiving this challenge, but taken as a whole they contain guidelines for overcoming it. The key is to tackle it in an integral way. For example, it is important to know the link that exists between the way we define the intelligibility relationships of heterogeneous processes and the communication problems that emerge between researchers trained in different disciplines. From familiarity with this connection, criteria for selecting the members of multidisciplinary groups required by this work strategy may emerge. These criteria should be integrated with those that emerge from studies on styles of collaboration. This integral vision enables us to approach core problems of interdisciplinary research and thus avoid being distracted by false dilemmas (like, for example, deciding if this project requires group work or can

Each historical and cultural environment spawns valuable conceptions of the integration of knowledge, as well as important visions of their feasibility and pertinence, and the fact that they do not exclude, but rather complement one another

be carried out individually). Beyond whether it is the result of individual effort or the work of a group, interdiscipline is achieved in the intelligibility relationship between heterogeneous processes.

Primary interest in promoting collective work

This interest is sparked by two reasons: on the one hand, because the conceptualization of problems in society as complex systems (which can involve natural and social processes), implies the establishment of multidisciplinary groups

To imbue knowledge with a deep sense of people-friendliness expresses the will to strive for a notion of wisdom conceived as a guiding principle for decisions in favor of the common good, born of collective intelligence

and, on the other, because the working dynamics of such groups involves intense discussion and a much greater demand for reflection and flexibility on the part of its members than that exhibited by those who participate in disciplinary or multidisciplinary projects, apart from the need to display collaboration abilities plus capacity for integrating knowledge, that requires the creation of appropriate programs for the development of researchers that stimulate the acquisition of these skills.

Although it is important to argue in favor of certain guidance styles within

work teams, related to administration, coordination and horizontal functioning, other aspects, like collaborative styles (assertiveness, communication, commitment), and the decentralizing processes still remain to be studied in greater detail, in such a way that they may enable us to overcome the problems of collective work, such as difficulties in sharing a vision of the work in hand, or the lack of symmetry in professional experience, that may inhibit cooperation. Based on our experience with the Professional Updating Courses on Interdisciplinary Research, held regularly at CEIICH, we have realized that the desire to show academic authority at the expense of group learning, can cause resistance and fractures within the group. When work is built up around a process of dialogue, characterized by intense discussion and flexible positions that enable agreements, there is a better disposition towards actually fulfilling them, thus laying the groundwork for serious commitments. All this favors the process of integrating knowledge.

In this *dossier* we can also perceive a reticular outline of the challenges facing integration and articulation of knowledge in its diverse contexts: those of

interdisciplinary research are linked to those of implementation of interdisciplinary practices in the educational field, for example.

To deepen the analysis of the relationship between science and society

The potential of this integration/articulation process isn't restricted to the academic sphere, as it is, simultaneously, an instrument for deepening analysis of the science-society relationship. To what degree can an answer to the social problems that emerge from interdisciplinary research include guidelines to design viable strategies that might allow us to overcome the obstacles that impede its execution, such as the high concentration of riches and power at global and national scales, which generally give rise to interests that are contrary to the common good?

Just as the accumulation of knowledge is clearly insufficient to understand the complex processes that pose practical problems, the integration and articulation of knowledge don't guarantee better achievements if these are exclusively technical. In what way is the hybridization of disciplines better than specialization if it doesn't examine the meaning of its results in the light of social conditions and all that which affects humans, embrace symbolic contents, value judgments and, above all, the meaning of life?

These questions require an intellectual exercise that could be fascinating, because it would reach the very fibers of the mesh of knowledge, where the natural sciences and the humanities converge and, with them, technologies and the arts, which implies the study of the relationship between different orders of reality.

To enrich the ethics of knowledge

This is an analysis that, from the beginning, must distinguish different ways of conceiving this relationship. Even when the relationship between the natural sciences and the humanities can't be considered independently from the matter of intelligibility relationships between heterogeneous processes, it clearly can't be limited to this topic, because to relate interdiscipline with processes of emancipation and well-being, it must be included in the domain of ethics, both in terms of the process of generating knowledge and its results.

The ethics of knowledge is enriched In this convergence, and the distinctive values of scientific activity are reinforced; while this activity is not dissociated from the process of permanent adjustment and critical questioning, it can be considered an act of liberty and responsibility, of choice of its own values and

objectives: is the criterion of achievement restricted to accumulating publications, in other words, to fulfilling institutional demands of obtaining sanction for work carried out based on certified knowledge? Or is it accomplished in the aspiration to make the natural and social world intelligible, without excluding any part of what is human?

In the measure that interdiscipline extends its scope of knowledge, it can begin to incorporate those contributions generated in the everyday experience of different social participants who, based on this integration and articulation of knowledge, can become the effective driving force of transformation processes, in and from their respective activities.

To aspire to wisdom on the basis of collective intelligence

The attempt to imbue this heterogeneous knowledge with a profound humane content expresses a search for wisdom conceived as a practice guided by the right decisions to protect the common good, as a result of collective intelligence.

This endeavor is rooted in the idea that it is feasible to conjugate research strategies which, in different latitudes, have been significant for interdisciplinarity: integration or hybridization of fields of knowledge, articulation of knowledge concerning heterogeneous processes for the resolution of practical problems, dialogue of different strains of knowledge, participative dialogue and practical knowledge, among others; all of them considered as an expression of critical thinking.

The proposal to encourage an integrated program for interdisciplinarity put together in this *dossier* shows the feasibility of achieving the convergence of these strategies, examining possible epistemological, institutional and political obstacles that the construction of knowledge with a great transforming power is bound to encounter. This implies the pertinence and necessity of approaching this from an interdisciplinary point of view. The papers presented in this issue are an essential road map for approaching the challenge rigorously, systematically and critically.

The suggested reading that is attached to this *dossier* shows the range of possible approaches to interdisciplinary research that have been developed since the last third of the twentieth century. They are representative texts that suggest a way to explore the fertile work of specialists with ample prestige in their respective fields, including those who participate in this issue. ■