THE NEED FOR TRANSDISCIPLINARITY IN HIGHER EDUCATION*

Prof. Dr. DrHC Basarab Nicolescu

CNRS, Paris, France, 19 Villa Curial, 75019 Paris, France

University Babes-Bolyai, Faculty of European Studies, 1 Emmanuel de Martonne Street, 400084 Cluj-Napoca, Romania

Stellenbosch Institute for Advanced Studies (STIAS), 19 Jonkershoek Road, Stellenbosch 7600, South Africa

nicol@club-internet.fr

* Keynote speaker talk at the International Higher Education Congress "New Trends and Issues", Istanbul, Turkey, May 27-29, 2011.

Abstract

A viable education can only be an integral education of the human being. Transdisciplinary education is founded on the inexhaustible richness of the scientific spirit which is based on questioning, and of the refusal of all a priori answers and all certitude contradictory to the facts. At the same time, it revalues the role of the deeply rooted intuition, of the imaginary, of sensitivity, and of the body in the transmission of knowledge. It is only in this way that the society of the twenty-first century can reconcile effectivity and respect for the potentiality of every human being. The transdisciplinary approach will be an indispensable complement to the disciplinary approach, because it will mean the emergence of continually connected beings, who are able to adapt themselves to the changing exigencies of professional life, and who are endowed with a permanent flexibility which is always oriented towards the actualization of their interior potentialities. If the University intends to be a valid actor in sustainable development it has first to recognize the emergence of a new type of knowledge: transdisciplinary knowledge. The new production of knowledge implies a necessary multidimensional opening of the process of learning: towards civil society; towards cyber-space-time; towards the aim of universality; towards a redefinition of the values governing its own existence.

Keywords: Higher education, Transdisciplinarity, Levels of Reality, Logic of the included middle, Nature, Epistemology

1. Multi-, inter- and transdisciplinarity

The unprecedented increase of knowledge in our era raises the challenging question of how to adapt our mentality to being, how to decide in a given situation of life when there are today more than 8000 disciplines, how to adapt to the fast changes in knowledge which require to change jobs once or even several times during human being's lifetime if we want to face unemployment. The University is one of the central places to overcome these challenges.

Harmony between inner being and outer knowledge presupposes that these known facts would be intelligible, comprehensible. But can such comprehension exist in the era of the disciplinary big bang and relentless specialization?

The indispensable need for bridges between the different disciplines is attested to by the emergence of multidisciplinarity and interdisciplinarity around the middle of the twentieth century.

Multidisciplinarity concerns studying a research topic not in just one discipline but in several at the same time. For example, the Blue Mosque can be studied not only within the context of art history, but also within the contexts of the history of religions, European history, or geometry. The topic in question will ultimately be enriched by incorporating the perspectives of several disciplines. The multidisciplinary approach overflows disciplinary boundaries while *its goal remains limited to the framework of disciplinary research*.

Interdisciplinarity has a different goal than multidisciplinarity. *It concerns the transfer of methods from one discipline to another*. For example, one transfers the methods of nuclear physics to medicine, and this leads to the appearance of new treatments for cancer. Like multidisciplinarity, interdisciplinarity overflows the disciplines, but *its goal still remains within the framework of disciplinary research*.

As the prefix "trans" indicates, *transdisciplinarity concerns that which is at once between the disciplines, across the different disciplines, and beyond all discipline*. Its goal is the

understanding of the present world, of which one of the imperatives is the unity of knowledge. The word itself is quite recent: it was first introduced by Jean Piaget in 1970 (Piaget, 1970).

In the presence of several levels of Reality, the space between disciplines and beyond disciplines is full, just as the quantum void is full of all potentialities: from the quantum particle to the galaxies, from the quark to the heavy elements that condition the appearance of life in the universe.

Transdisciplinary research is clearly distinct from disciplinary research, even while being entirely complementary. *Disciplinary research concerns, at most, one and the same level of Reality; moreover, in most cases, it only concerns fragments of one level of Reality*. In contrast, transdisciplinarity concerns the dynamics engendered by the action of several levels of Reality at once. The discovery of these dynamics necessarily passes through disciplinary knowledge.

The transdisciplinary knowledge corresponds to an *in vivo* knowledge, concerned with the correspondence between the external world of the Object and the internal world of the Subject. By definition, the transdisciplinary knowledge includes a system of values, the humanistic values. It leads to a new type of education – the transdisciplinary education (TE), distinct from but complementary to our present disciplinary education (DE).

Table 1. Comparison between disciplinary education DE and transdisciplinary education TE

Disciplinary education (DE)	Transdisciplinary education (TE)
IN VITRO	*IN VIVO*
One level of Reality	Several levels of Reality
External world - Object	Correspondence between external world (Object) and internal world (Subject)
Accumulation of knowledge	Understanding
Analytic intelligence	New type of intelligence - harmony between

	mind, feelings and body
Binary logic (absolute truth / absolute falseness)	Included middle logic (relative truth)
Oriented towards power and possession	Oriented towards astonishment and sharing
Exclusion of values	Inclusion of values

It is important to realize that the disciplinary knowledge and the transdisciplinary knowledge are not antagonist but complementary. Both their methodologies are founded on scientific attitude. *Building the transdisciplinary mind* at the University is our main challenge today.

In order to explore the new, transdisciplinary education, we have to understand what is the transdisciplinary methodology.

2. The transdisciplinary approach of Nature and knowledge

The methodology of transdisciplinarity is founded on three postulates (Nicolescu, 2002):

i. The ontological postulate: *There are, in Nature and in our knowledge of Nature, different levels of Reality of the Object and different levels of Reality of the Subject* .

ii. The logical postulate: *The passage from one level of Reality to another is insured by the logic of the included middle.*

iii. The epistemological postulate: *The structure of the totality of levels of Reality is a complex structure: every level is what it is because all the levels exist at the same time.*

The first two postulates received, in the 20th century, experimental evidence from quantum physics, while the last one has its source not only in quantum physics but also in a variety of other exact and human sciences.

The key concept of the transdisciplinary approach to Nature and knowledge is the concept of *levels of Reality*.

Here the meaning we give to the word “reality” is pragmatic and ontological at the same time.

By “Reality” (Nicolescu, 2009) we intend first of all to designate that which resists our experiences, representations, descriptions, images, or even mathematical formulations.

Insofar as Nature participates in the being of the world, one has to assign also an ontological dimension to the concept of Reality. Reality is not merely a social construction, the consensus of a collectivity, or some intersubjective agreement. It also has a trans-subjective dimension: e.g. experimental data can ruin the most beautiful scientific theory.

Of course, one has to distinguish the words "Real" and "Reality". *Real* designates that what it is, while *Reality* is connected to resistance in our human experience. The "Real" is, by definition, veiled for ever, while "Reality" is accessible to our knowledge.

By “level of Reality”, a notion I first introduced in 1985 (Nicolescu, 1985), I designate a set of systems which are invariant under certain laws: for example, quantum entities are subordinate to quantum laws, which depart radically from the laws of the macrophysical world. That is to say that two levels of Reality are different if, while passing from one to the other, there is a break in the applicable laws and a break in fundamental concepts (like, for example, causality).

The emergence of at least three different levels of Reality in the study of natural systems — the macrophysical level, the microphysical level and cyber-space-time (to which one might add a fourth level - that of superstrings, unifying all physical interactions) — is a major event in the history of knowledge.

Two adjacent levels are connected by the logic of the included middle, which emerged as a valid quantum logic.

Our understanding of the axiom of the included middle — there exists a third term T which is at the same time A and non-A — is completely clarified once the notion of “levels of Reality” is introduced.

In order to obtain a clear image of the meaning of the included middle, we may represent the three terms of the new logic — A, non-A, and T — and the dynamics associated with them by a triangle in which one of the vertices is situated at one level of Reality and the two other vertices

at another level of Reality. If one remains at a single level of Reality, all phenomena appear to result from a struggle between two contradictory elements. The third dynamic, that of the T-state, is exercised at another level of Reality, where that which had appeared to be disunited is in fact united, and that which had appeared contradictory is perceived as non-contradictory.

The transfinite action of the logic of the included middle on the different levels of Reality induces an *open, gödelian structure of the unity of levels of Reality*.

The open structure of the unity of levels of Reality is in accord with one of the most important scientific results of the twentieth century concerning arithmetic, the theorem of Kurt Gödel, which states that a sufficiently rich system of axioms inevitably leads to results which are either undecidable or contradictory. The implications of Gödel's theorem have considerable importance for all modern theories of knowledge, primarily because it concerns not just the field of arithmetic, but all of mathematics which include arithmetic. The gödelian structure of levels of Reality implies the impossibility of a self-enclosed complete theory. Knowledge is forever open.

A new *Principle of Relativity* emerges from the coexistence between complex plurality and open unity: *no level of Reality constitutes a privileged place from which one is able to understand all the other levels of Reality*. A level of Reality is what it is because all the other levels exist at the same time. This Principle of Relativity is what originates a new perspective on religion, politics, art, education, social life and, particularly important for us, in this region of the world, the construction of Europe. And when our perspective on the world changes, the world changes.

There is no need to invent a totally new University, but one needs to transform the existing disciplinary universities by adopting the transdisciplinary methodology as their complementary methodology.

Important steps in this direction were made in several countries (CIRET, 2011). In particular, PhD programs in transdisciplinarity are established now in Romania and South Africa.

The transdisciplinary approach is realistic and even necessary for the survival of contemporary universities, placed in the chaotic context of globalization. One necessary condition is to understand what Reality is today. We are part of the ordered movement of Reality. Our freedom consists in entering into the movement or perturbing it. Reality depends on us. *Reality is plastic*. We can respond to the movement or impose our will of power and domination. Our responsibility is to build sustainable futures in agreement with the overall movement of reality.

The emergence of a new culture capable of contributing to the elimination of the tensions menacing life on our planet, will be impossible without a new type of learning which takes into account *all* the dimensions of the human being.

A viable education can only be an integral education of the human being. It is founded on a new type of intelligence, requiring the harmony between mind, feelings and body. The recent findings of neurophysiology (Damasio, 2003) show clearly the exceptional role of feelings in education.

Transdisciplinary education is founded on the inexhaustible richness of the scientific spirit which is based on questioning, and of the refusal of all a priori answers and all certitude contradictory to the facts. At the same time, it revalues the role of the deeply rooted intuition, of the imaginary, of sensitivity, and of the body in the transmission of knowledge. It is only in this way that the society of the twenty-first century can reconcile effectiveness and respect for the potentiality of every human being. The transdisciplinary approach will be an indispensable complement to the disciplinary approach, because it will mean the emergence of *continually connected beings*, who are able to adapt themselves to the changing exigencies of professional life, and who are endowed with a permanent flexibility which is always oriented towards the actualization of their interior potentialities.

Universal sharing of knowledge - a necessity of our world - cannot take place without the emergence of a new tolerance founded on the transdisciplinary attitude, one which implies putting into practice the transcultural vision. The transcultural attitude permits us to better understand our own culture, to better defend our national interests, to better respect our own religious or political convictions.

If the University intends to be a valid actor in sustainable development it has first to recognize the emergence of a new type of knowledge: transdisciplinary knowledge. The new production of knowledge implies a necessary multidimensional opening of the process of learning: towards civil society; towards cyber-space-time; towards the aim of universality; towards a redefinition of the values governing its own existence.

REFERENCES

CIRET. Internet site of the International Center for Transdisciplinary Research. Received from
http://basarab.nicolescu.perso.sfr.fr/ciret/indexen.html
available on 26.04.2011.

Damasio, A. R. (2003). *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain*. San Diego, Harcourt.

Nicolescu, B. (1985). *We, the Particle and the World / Nous, la particule et le monde*. Paris, Le Mail. 2nd edition: 2002, Monaco, Rocher.

Nicolescu, B. (2002). *Manifesto of Transdisciplinarity*. New York, State University of New York (SUNY) Press. Translation in English by Karen-Claire Voss.

Nicolescu, B. (2009). *What is Reality ? / Qu'est-ce que la Réalité*. Montréal, Liber.

Piaget, J. (1970). Epistemology of Interdisciplinary Relations / L'épistémologie des relations interdisciplinaires. In *L'interdisciplinarité - Problèmes d'enseignement et de recherche dans les universités*. Paris : OCDE.