

Transdisciplinarity in the university: discourse and practice

DOI: 10.3395/reciis.v3i3.270en



Aleixina Maria Lopes Andalécio

Postgraduate Program in Information Science, Federal University of Minas Gerais,
Belo Horizonte, Brazil
xina@cecom.ufmg.br

Abstract

This article presents discussions and partial results of a piece of doctoral research centered on the questions raised by the new forms of production and organization of knowledge, guided by the discourse and practice of transdisciplinarity. The latter is understood in the context of the university, as an effort to overcome the fragmentation of knowledge into disciplines and excessive specialization, in face of the complex reality of the modern world, with its relational and interconnected character. To guide the questions, the research is based on the presuppositions that there is an epistemological, practical, social, and political distance between the discourse and the practice of transdisciplinarity. The empirical terrain is represented by the analysis of two large institutional transdisciplinary projects implemented at the Federal University of Minas Gerais in the late 1990s. In the methodology, thematic document analysis techniques, in-depth interviews, and direct observation are used. The results reached so far indicate that even researchers who have a strong discourse in favor of transdisciplinarity still work in a disciplinary manner in practice. However, even among researchers who are called “disciplinary”, there seems to be a consensus that current problems demand a different approach and transdisciplinarity presents itself as an appropriate alternative to deal with them.

Keywords

knowledge; university; transdisciplinarity; information

Introduction

The second half of the 20th century brought many changes in the generation, organization and diffusion of knowledge, including excessive specialization, which resulted in countless disciplines and specialties, and some attempts to reunite, or even fuse, different areas of knowledge. Currently, the studies of complexity are gaining strength and value is being given to an approach that can establish a dialogue between the natural sciences, the humanities, philosophy and also the arts, work

carried out between, through and beyond disciplines, transdisciplinary work.

And how are universities, privileged knowledge-production sites, responding to these changes? How is transdisciplinarity taking place in the practice of researchers who work at universities? Is transdisciplinarity found in the practice of a university or is it restricted to the discourse level? And does the organization of the university environment favor transdisciplinary work or not? How is the discussion and adoption of transdis-

ciplinarity taking place in the eminently disciplinary/departmental world of the university?

The search for answers to these questions led to the ongoing doctoral research, which aims to investigate the presence of the transdisciplinarity thematic in university action, with transdisciplinarity being understood here in its different dimensions: organizational, epistemological and even political, as its adoption does not seem to be a natural and hegemonic process within universities.

The specific aims of the research are: investigate the mediations (historical, epistemological, theoretical, methodological, organizational, political, technological, etc.) used by universities to construct, discuss and disseminate transdisciplinary work and study the informational mechanisms employed by these actors in the reflections and practical actions in relation to transdisciplinarity.

A basic presupposition guides this investigation: that there is an epistemological, practical, social and political distance between the discourse and practice of transdisciplinarity.

Some empirical presuppositions are also used:

- transdisciplinarity, apart from being an epistemological question, also refers to the university's intention to review the paradigms, theories, methods and process of construction and management of the knowledge it produces, and which resulted, over time, in the growing specialization and departmentalization of the scientific disciplines;
- the network is the basic form of organization underlying the shared production of knowledge, transdisciplinary work and even contemporary social dynamics;
- network organization and the technological apparatus contribute decisively to the dissemination of the scientific-technological knowledge produced, because they provide new conditions for the production, storage, organization and access of this knowledge, but also bring new challenges for scientific activity, in standards of communication among peers and in the spreading of produced knowledge.

The context of transdisciplinarity

At the solemn opening of lessons at the University of Coimbra, in 1985, the Portuguese sociologist Boaventura de Sousa Santos defended an antipositivist epistemological position, basing it on the debates that were taking place between physics and mathematics (SANTOS, 2004b). According to this author, that was a time of ambiguity and complexity, a time of transition, of the end of the hegemony of a certain scientific order, for the model of rationality that dominated modern science no longer took care of the problems found by scientists. The limits of this paradigm became apparent and they were qualitative, that could not be overcome

simply with greater investigations and more precise instruments. This led to the emergence of a new paradigm for scientific knowledge, which is still being constructed, but some of its characteristics can already be perceived: the elimination of the dichotomy between natural and social sciences, on the path to humanistic studies; the transformation of the subject/object distinction, with the introduction of consciousness in the act of knowledge and in the very object of knowledge; the view of knowledge as the search of universal totality, in contrast with the excessive disciplinarization of scientific knowledge; and the admission of methodological plurality and discursive tolerance (SANTOS, 2004a, b).

According to Nicolescu (2003), the term transdisciplinarity was first used at the I International Seminar *Interdisciplinarity – Teaching and Research Problems in Universities*, held at the University of Nice (France), from September 7 to 12, 1970, and sponsored by the French Ministry of Education and the Organization for Economic Cooperation and Development (OECD). The inventor of this word was the Swiss psychologist Jean Piaget, also the author of the first known definition of the term, where transdisciplinarity was presented as a stage that followed interdisciplinarity and that “would not be content in finding interactions or reciprocities between specialized research, but would situate these connections within a total system, with no stable boundary between these disciplines” (NICOLESCU, 2003, p.1). The characterization of the levels of collaboration and integration between disciplines proposed by Piaget contains three categories (SANTOMÉ, 1998): (i) *Multidisciplinarity* – that which occurs when information is sought and helps in various disciplines for solving a problem, without any of them being modified or enriched by this interaction. It is the lowest level of integration. (ii) *Interdisciplinarity* – cooperation among various disciplines where there is reciprocity in their interchanges and mutual enrichment. It is the second level of integration. (iii) *Transdisciplinarity* – implies the construction of a total system without solid boundaries between disciplines. It is the highest level of integration.

However, there is great variety in conceptualization, among different authors, for the terms multi, pluri, inter and transdisciplinarity. This diversity can be verified in the works of Santomé (1998) and Sommerman (2003), which list several of these concepts, revealing their polysemy, which can be seen as an indication that these concepts are still in a process of construction.

On March 7, 1986, the United Nations Organization for Education, Science and Culture – Unesco – held a symposium, in Venice, entitled *Science and the Boundaries of Knowledge*, where themes such as the discrepancy between the traditional way of making science and the new world view brought by discoveries in the natural sciences, especially biology and physics, were discussed. The final message of this symposium, known as the Venice Charter, is a document that defends the search for transdisciplinarity, that enables exchanges between ‘exact’ sciences, ‘human’ sciences, art and tradition. And, in 1990, the

Premier Congrès Mondial de la Transdisciplinarité was held at the Arrábida Convent, in Portugal. Also promoted by Unesco, it counted with world-renowned scholars, such as Basarab Nicolescu and Edgar Morin.

From September 6 to 12, 2005, the *II World Transdisciplinarity Congress*, an event organized jointly with Unesco, the Centre International de Recherches et Études Transdisciplinaires - CIRET, the State of Espírito Santo, the Federal University of Espírito Santo, the Center for Transdisciplinary Education (Centrans) at the University of São Paulo (USP), and seven other Brazilian and European centers of transdisciplinary studies and research. The main aim of this congress was to create a time and space where transdisciplinarity questions related to research and transdisciplinary action could be dealt with, giving special attention to collaborative activities.

For Domingues, transdisciplinarity “is an attempt to reestablish the connections in domains where, today, they are absent, have not been perceived or could not yet be found” (DOMINGUES, 2005, p.10), proposing broad methodologies and unifying procedures as an alternative to the pulverization of knowledge and the excessive specialization of disciplines, since reality is complex and diverse and cannot be understood by looking only at its parts (specialties). This demands the establishment of a collective intelligence, through the cooperation of specialists from various disciplinary fields (who will continue to exist, for it is impossible for someone to master all the knowledge available in any area), which implies the end of the self-sufficient expert. According to the final message of the congress *Science and Tradition: Transdisciplinary perspectives for the 21st century*, held in Paris, from December 2 to 6, 1991, sponsored by Unesco, there cannot be transdisciplinary experts, but only researchers animated by a transdisciplinary attitude.

Transdisciplinarity and universities

The university plays a fundamental role in the development of science and technology, whether by creating concepts, paradigms and knowledge about nature and society, promoting the intellectual enrichment of humanity, or by introducing innovation in products and processes, meeting society's needs. Thus, how does the university place itself in relation to the question of transdisciplinarity? According to Domingues (2001), the Western university, since its creation, has had to answer two different, almost contradictory, demands: organization into areas of knowledge, with its disciplines and specialties, and the attempt to unify this fragmented knowledge into a single institutional space. The debate about these questions became more accentuated, as fields of knowledge started to multiply at a faster pace. All this led to the holding, in 1997, in Locarno, Switzerland, of the congress *Which University for Tomorrow? Towards a Transdisciplinary Evolution of the University*, a forum where alternatives for university action were discussed, so as to spread complex and transdisciplinary thought through the structures and the programs of the university.

But is this effectively happening? That is what this research proposes to investigate. For this purpose, the study is based on the field concept, used in various areas of knowledge and appropriated by several sociology authors, especially by Pierre Bourdieu. According to Wacquant (2002, p. 98), field, to Bourdieu, designates “relatively autonomous spaces of objective forces and standardized struggles about specific forms of authority”, revising the notion of structure by adding to it a historical dynamism it didn't have before, due to being static and treated as an object. This symbolic production space lends itself to a sociologic reading, to which Bourdieu dedicated himself avidly, tackling diverse fields, such as the power, the partisan, the artistic, the religious, the literary and, especially, the scientific field (BOURDIEU, 2003), which makes him an essential reference for the analysis of what this work intends to achieve.

Bourdieu introduces his notion of a “field” as a space of forces and struggles that seek to transform that field (BOURDIEU, 2003). He defines the system of production and circulation of symbolic goods as being “the system of objective relationships between different instances defined by the function they perform in the division of production, reproduction and dissemination work of symbolic goods” (BOURDIEU, 1987, p.105). In the case of the scientific field, it is a competition for the monopoly of scientific authority, or monopoly of scientific competence, the legitimized capacity to talk and act, with the authority of someone who has received society's authorization to do so. The image of the altruistic, disinterested researcher does not fit this vision, as, to Bourdieu (2003, p. 123), “the very functioning of the scientific field produces and supposes a specific form of interest”, with scientific practices being directed at acquiring scientific authority, which is associated to prestige, recognition, competence, celebrity and other goods of symbolic value. In this political struggle for scientific domination, the choices made by the researcher (research field, methodology, when to make the work public, how to make it public, etc.) are political investment strategies directed at obtaining recognition from peers, peers who are also competitors and, therefore, not keen to offer this recognition without discussion or examination. The peers are the judges and, also, the interested parties in the judgment, which becomes a problem, as the process does not contain other instances in charge of validating the legitimization by peers. Can this environment of struggle games contribute to establishing a favorable environment for transdisciplinary work?

To Birger Hjørland, the analysis of knowledge domains is an approach that emphasizes the social, historical and cultural dimensions of information. To him, the best way of understanding information in information science is to study knowledge domains as discursive communities, that are part of the social division of work (HJØRLAND & ALBRECHTSEN, 1995), because the organization and structure of knowledge, cooperation standards, language and the forms of communication, information systems and relevance criteria are reflections

of these communities' work objects and of their role in society. The serious unit of analysis, therefore, formed by the knowledge domains concerning the discursive communities, seen as "social constructions understood by individuals synchronized in thought, language and knowledge, and forming modern society" (MORADO NASCIMENTO, 2006), connected to cultural and social dimensions. Discursive communities can be scientific, academic or professional, with their own communication and publication structures, types of documents, terminology and informational structures (HJØRLAND & ALBRECHTSEN, 1995). And how does the discussion of transdisciplinarity take place in the university discursive communities?

França (2002) presents the terms network, reticular structure, mesh and web as the fashionable metaphors to represent the way society functions, but says that in reality, society has always been structured as a network. According to this author, the network thematic allows two approaches, one related to the empirical phenomenon, where we find the development and expansion of information technologies and economic and informational globalization, and another related to the theoretical rule of the network notion, which is also a metaphor, a concept to help in the interpretation of the way society and the communicative processes function. The term network represents a mesh of strands, a set of interconnected knots and, by analogy, it began to describe "the interconnection of elements, processes and senses that mark communicative relationships and the construction of social life" (FRANÇA, 2002, p. 59). And Marteleto presents the idea of networks, in the social sciences, as being used "to refer to the diverse set of relationships and functions that people perform in relation to each other" (MARTELETO, 2000, p. 78) within complex societies, as individuals are linked to one another through work, property, affection and other relationships, forming a network with many units, where there is a function interdependency between the individuals. This type of organization is also present within university environments, being a fundamental element for the shared production of knowledge. To Latour and Woolgar (1997), knowledge is the effect of a network of heterogeneous materials, including agents, social institutions, machines and organizations. Knowledge, therefore, is not simply the result of applying a privileged scientific method, it is a social product. Knowledge assumes material forms (a speech, a conference, an article, a book, a patent or any other form of materialization) or it can appear as abilities incorporated in scientists and technicians. Science, seen within the actor-network theory, is a process of "heterogeneous engineering" that juxtaposes elements of the social, the technical, the conceptual and the textual and translates them into a set of scientific products that are equally heterogeneous. So are networks an essential element for establishing transdisciplinary practice?

Fernandes (1995) says that one of the indicators that distinguish the modern age from the one preceding it is the counterposing of the notions of together/connected/united and of separated/fragmented. In modernity, ac-

tion is separated from knowledge of action and scientific knowledge is separated from religious and philosophical knowledge. And scientific knowledge fragments the world in objects studied by separate specialties. Fernandes gives the name *institutional management of knowledge* to action that aims to heal this fragmentation, to reconnect what each person knows about themselves and the world, so that this knowledge can belong to everyone, even if this aim is impossible to fully achieve. Information is seen as the product of this action, a means to reconnect what has been separated, a construct "capable of operating a relationship with the totality of others and of knowledge" (FERNANDES, 2004, p. 213). According to this author "the fragmentation and reorganization of scientific works into transmittable informational artifacts now reveal a formula that sees knowledge as a sum of information and information as (decomposed) parts of knowledge" (FERNANDES, 2004, p. 213). If the role of information is to reconnect specialties, it seems possible to say, therefore, that it has a fundamental role in transdisciplinary practice, for it is what will allow the transit of concepts between different areas of knowledge and the emergence of a shared knowledge.

To Lévy (1999), one characteristic of the time we live in is the acceleration of technical alterations. However, what we call new technology is the result of human group activity crystallized in material objects (such as computers), programs and networks, it is the product of collective intelligence, in opposition to the separation of activities, compartmentalization and the opacity of social organization. The development of information and communication technologies allowed new informational devices to arise which in turn led to new ways of thinking and living together (LÉVY, 1999) and provoked deep changes in the process of knowledge production, communication and use. And what role do these technologies have within the discussion of transdisciplinarity?

These are the elements that were used to form the theoretical basis of the research reported here.

The empirical field

For the empirical field of the research, the Federal University of Minas Gerais (UFMG) was chosen due to this institution's importance in the production and reproduction of knowledge in Brazil and because it was a pioneer in creating, within the university's formal hierarchy, an institute dedicated to transdisciplinarity¹. This creation can be seen as an example of these new desires, challenges and transformations in the university, in knowledge and in science. Another factor that influenced this choice was the fact that the research author has been an employee of this university for almost thirty years, which simplified access to the actors involved. The institutional actors chosen to be study subjects are two large transdisciplinary projects independently implemented at the university in the late 1990s – IEAT, created in 1999, and the Manuelzão Project, an extension project dedicated to the recovery of the Rio das Velhas river basin, which arose in 1997.

UFMG was founded in 1927, bringing together the Law, Medicine, Odontology, and Pharmacy departments and the Engineering School (UFMG, 2008). Currently, it has 95 academic departments, distributed over 20 units, and offers 5,950 places on 66 degree courses and, on the postgraduate level, 56 doctorate courses, 66 masters, 77 specializations (on regular offer) and 135 places for medical residence. It counts with 645 groups and 817 research lines registered in the National Council of Technological and Scientific Development (CNPq). In relation to extension, it offers 359 extension projects, 545 courses, 573 events and 598 service provider items, benefiting a group of nearly 8 million people. According to data from the second semester of 2008, it has 22,459 students enrolled in degree courses, 6,166 in specialization courses, 3,123 in masters courses and 2,534 in doctorate courses. It counts with 4,781 professors and 7,623 technical and administrative employees to perform the teaching, research and extension courses that characterize a university.

IEAT was created in 1999, on the president's decision, as an organ connected to the President's Cabinet (IEAT, 2008). On May 12, 2005, the UFMG University Council formally created IEAT in the university structure, focusing on research, inserted in teaching and extension, and with the mission of promoting transdisciplinarity through the approximation, articulation and penetration of traditional disciplinary fields and areas of knowledge. Its specific aim is to generate a favorable environment for performing transdisciplinary studies at UFMG, with criteria for excellence (for exceeding the normal and the ordinary), for innovation (directed at novelty and the future) and for induction (interfering in the way of generating, organizing and spreading knowledge), covering the various areas of knowledge – humanities, exact and biological sciences, always searching, in their different lines of action, the so-called art of knowledge state. For this purpose, it develops programs directed at developing transdisciplinary and advanced research, autonomously or in partnership with other UFMG organs and other institutions.

The Manuelzão Project sprung from the observation, by a group of UFMG Medical School professors associated with the Collective Health Internship discipline, which is compulsory in the medical curriculum and in which students spend three months in the state's interior developing preventive and social medicine activities, that it was not enough to treat the population whenever the discipline was offered, it being necessary to work on the causes of the diseases. In these professors' opinion, health is not just a medical question, but it is directly related to social conditions and the environment in which people live. This led to the creation, in January 1997, of an extension project aiming to revitalize the basin of the Rio das Velhas river, an affluent of the Rio São Francisco river (MANUELZÃO, 2008). The project is based at the UFMG Medical School and its general coordination is carried out by professors of that school, with support from a diverse team of professionals that instigates and coordinates activities all over the Rio das

Velhas basin. This basin extends over an area of more than 30 thousand square meters, holds more than 4.5 million inhabitants and includes the capital of the state, Belo Horizonte.

As the environmental question is a complex problem, not restricted to the field of medicine, the project increased its research activities, creating the Transdisciplinary and Transinstitutional Nucleus for the Revitalization of the Rio das Velhas Basin (Nuvelhas), which brings together research activities in diverse areas, such as biomonitoring and geoprocessing, in search of joint solutions for the basin's problems. In 2005, the Manuelzão project inaugurated a new agenda: the cultural agenda, with the Manuelzão Festivalhas: the Rio das Velhas Basin Festival of Art and Culture, which is already in its third edition.

Research methodology

This research is a case study, that investigates a phenomenon, the establishment of transdisciplinary practice, within a particular real life context, the university, looking for evidence that helps to understand how this phenomenon takes place in this context. It is, therefore, a qualitative research, an eminently interpretive analysis, not an explanatory one, of the establishment of transdisciplinary practices in the university.

The main activity of the field research consists in performing semi-structured interviews with the actors involved in the discussion about transdisciplinarity at UFMG. The selection of interviewees was intentional, non-random. In the case of IEAT, five researchers who took part in the commission that proposed the creation of the institute were included; the president responsible for the creation, the current director and two researchers who did a residence at the institute. On the Manuelzão project, it was based on the organizational structure found at the project site (MANUELZÃO, 2008), including all the area coordinators. On the whole, 19 in-depth interviews were performed, lasting on average two hours each, seeking to glean information, experiences and perceptions from the interviewees about questions related to transdisciplinarity and knowledge.

Interview scripts contained one set of questions common to all the interviewees, relative to the concepts and themes used as the research basis, and a set that focuses the projects themselves. Depending on what the interviewees said, new questions were made during the interview. The material produced was transcribed and its content was analyzed, seeking to find inferences that would allow the investigation object to be discussed. The preliminary analysis categories were the very themes studied in the literature review: knowledge, university, transdisciplinarity, information, technology and networks.

As well as the interviews, the research includes thematic analysis of the material produced by the two projects (books, magazines, videos, conferences, and newspapers), verifying if it is possible to find characteristics of transdisciplinary work there.

Preliminary results

Although the research is still ongoing, the material obtained already permits some observations. The first of these is that it does not seem easy to establish transdisciplinary work in a university environment. Even researchers who are directly involved with the theme of transdisciplinarity within UFMG, speaking strongly in favor of this approach, such as the ex-directors of IEAT, still perform highly-specialized research, partly because the rapid development of science itself seems to demand this hyperspecialization. It is worth noting that, among the interviewees, those whose research comes closest to transdisciplinary work are the researchers linked to the arts. A pertinent explanation could be that in the arts, disciplinary limits are more fluid than in other areas of knowledge, such as the natural sciences.

Another fact that draws attention is the lack of dialogue between the two projects studied. Although the IEAT is an institute formally geared to the discussion of transdisciplinarity and the Manuelzão project dedicates itself to an eminently transdisciplinary theme, water, they don't interact. This is made even more obvious by the fact that the IEAT and Nuvelhas, the Manuelzão Project research nucleus, occupy the same physical space, sharing the same floor and the same wing of the same building, with no joint work being done.

Based on the material produced by the Manuelzão project, what we apprehend is that, in spite of the transdisciplinarity discourse, their work seems closer to pluridisciplinarity, for this production still resembles a collection of texts written by people from different areas, with the same purpose, which is the question of water. In IEAT production, on the other hand, because the purpose is more directly linked to the discussion of transdisciplinarity, there is work with authorship that is closer to the shared construction of knowledge, a fundamental demand of transdisciplinary work.

Final considerations

Transdisciplinarity has been presented as an alternative to the excessive specialization and fragmentation that is present in science today. However, it is necessary to verify if it is restricted to the epistemological discourse or if it is present in researchers' practice. As the university is a privileged place of knowledge production, it seems relevant to investigate if it is part of the daily life of a large university, UFMG, which has at its disposal an institute exclusively dedicated to instigate this kind of research.

What the preliminary results seem to indicate is that it is possible to identify instances of transdisciplinary research, but even researchers directly involved with this theme are still performing highly specialized research. Some possible reasons for this are the demand for specialization of science itself and the university's organization into academic departments, which does not promote interchange between researchers from different areas.

There is still a lot to be done, but hopefully this work will contribute to a better understanding of trans-

disciplinarity, beyond discourse, and raise new questions about the theme, since the product of research is not an answer to a question, but rather finding other questions to be researched.

Notes

1. According to Sommerman (2003), when IEAT was created, USP already had the Center for Transdisciplinary Education (CETRANS), but it is a transdisciplinary nucleus within the university, not an institute that is part of the institution's formal structure, directly linked to the president, as is the case with IEAT. Later, it detached itself from USP and is nowadays becoming an autonomous institution.

Bibliographical references

BOURDIEU, P. O mercado de bens simbólicos. In: BOURDIEU, P. *A economia das trocas simbólicas*. São Paulo: Perspectiva, 1987, p.99-181.

BOURDIEU, P. O campo científico. In: ORTIZ, Renato (Org.). *Pierre Bourdieu: sociologia*. (Col. Grandes Cientistas Sociais, 39). São Paulo: Ática, 2003. p.112-43.

DOMINGUES, I. *Conhecimento e transdisciplinaridade*. Belo Horizonte: Ed. UFMG/IEAT, 2001. 72p.

DOMINGUES, I. *Conhecimento e transdisciplinaridade II: aspectos metodológicos*. Belo Horizonte: Ed. UFMG, 2005. 411p.

FERNANDES, G. C. O objeto de estudo da ciência da informação. *INFORMARE - Cadernos do Programa de Pós-graduação em Ciência da Informação*, Rio de Janeiro, v.1, n.1, p.25-30, jan./jun. 1995.

FRANÇA, V. R. V. Do telégrafo à rede: o trabalho dos modelos e a apreensão da comunicação.. In: PRADO, José Luiz Aidar. (Org.). *Crítica das práticas midiáticas: da sociedade de massa às ciberculturas*.. 1. ed. São Paulo: Hacker Ed., 2002, v.1, p.57-76.

IEAT - Instituto de Estudos Avançados Transdisciplinares da Universidade Federal de Minas Gerais. *Sítio do instituto*. Available at: <http://www.ufmg.br/ieat>. Accessed: 27 Jun. 2008.

LATOUR, B.; WOOLGAR, S. *A vida de laboratório: a produção dos fatos científicos*. Rio de Janeiro: Relume Dumara, 1997. 310p.

LÉVY, P. *Cibercultura*. São Paulo: Editora 34, 1999. 260p.

MANUELZÃO, Projeto. *Sítio do projeto*. Available at: <http://www.manuelzao.ufmg.br>. Accessed: 27 Jun. 2008.

MARTELETO, R. M. Redes e configurações de comunicação e informação: construindo um modelo interpretativo de análise para o estudo da questão do conhecimento na sociedade. *Investigación Bibliotecológica*, México, v.14, n.29, p.69-94, jul./dez. 2000.

NICOLESCU, B. *O manifesto da transdisciplinaridade*. São Paulo: TRIOM, 1999. 151p. NICOLESCU, B. *Definition of Transdisciplinarity*, 2003. Available at: http://www.interdisciplines.org/interdisciplinarity/papers/5/24#_24. Accessed: 20 Jun. 2008.

ORTIZ, R. Introdução: a porosidade das fronteiras nas Ciências Sociais. In: ORTIZ, R. *A sociologia de Pierre Bourdieu*. São Paulo: Olho d'Água, 2003, p.7-29.


SANTOMÈ, J. T. *Globalização e transdisciplinaridade*. Porto Alegre: Artmed, 1998. 275p.

SOMMERMAN, A. *Formação e transdisciplinaridade: uma pesquisa sobre as emergências formativas do CETRANS*. 2003. 353f. Dissertação (Mestrado em Ciências da Educação) - Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, São Paulo, 2003.

SANTOS, B. de S. *Conhecimento prudente para uma vida decente: 'Um discurso sobre as ciências' revisitado*. São Paulo: Cortez, 2004a.

SANTOS, B. de S. *Um discurso sobre as ciências*. 2. ed. São Paulo: Cortez, 2004b. 92p.

UFMG - Universidade Federal de Minas Gerais. *Sítio da universidade*. Available at: <http://www.ufmg.br>. Accessed: 20 Aug. 2008.

WACQUANT, Loïc J. D. O legado sociológico de Pierre Bourdieu: duas dimensões e uma nota pessoal. *Revista de Sociologia Política*. Curitiba, n.19, 2002. Available at: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-44782002000200007&lng=en&nrm=iso. Accessed: 26 Jul. 2008. 

About the author

Aleixina Maria Lopes Andalécio

Aleixina Maria Lopes Andalécio has a degree in Engineering and Psychology from the Federal University of Minas Gerais (UFMG), and a master's in Information Science from the same university. She is an information technology analyst at the UFMG Computing Center and has worked as a professor in the Computer Science Department at the Exact Sciences Institute and the Psychology Department at the Philosophy and Human Sciences Faculty at UFMG, and the Information Technology Institute and the Economic and Managerial Sciences Institute at the Catholic University of Minas Gerais. She is a doctoral student at the Postgraduate Program in Information Science at the UFMG Information Science School, in the Information, Culture and Society research line.