Practicing Transdisciplinary Methodology within the Frame of a Traditional Educational System

Mirela Mureşan, *"Moise Nicoara" National College, Arad, Romania, Email:mirela_muresan@hotmail.com*

doi: 10.22545/2013/00035

Everybody knows that the present educational system is mostly built on disciplinary teaching-learning basis: disciplinary curriculum and assessment, disciplinary specialization of the teachers, disciplinary diplomas etc. The topic of this study-case offers the opportunity to look for some proper answers to the following problems: could the transdisciplinary methodology be applied within the frame of a disciplinary system of education? How could it be done? What would be its challenges, limits and perspectives? The case represents the transdisciplinary didactic experiments conceived and performed at "Moise Nicoara" National College from Arad, Romania, during the last five years. The term and concept of "transdisciplinarity" will be used as it was defined by Professor Basarab Nicolescu.

Keywords*:* transdisciplinary education, curriculum design, transdisciplinary teaching and learning, competences, values.

1 Introduction

Conceptual Guidance

Transdisciplinarity (TD) is a term and a concept that is largely used today, in many fields and all over the world. Presumably, it is most frequently used in the educational area. Yet, unfortunatelly, this term is used in various meanings which bring about conceptual deviations, semantical slippings that give rise to dangerous confusions. The present day scientific community has not yet a terminological and conceptual consensus on "TD". The most frequent and inconsistent uses of this term and concept, entailing errors in understanding and application – aim at the confusion between *pluridisciplinarity-interdisciplinarity*, on the one hand, and TD; on the other hand, on the relation among them as well. Paradoxically, the same phenomenon happens in Romania too, all the more as the "father" of TD , the author who consecrated the new concept of TD in the international area, professor Basarab Nicolescu is Romanian.

Therefore, we do consider that a minimal updating of the concept of TD is absolutely necessary, taking into account the given definition in Basarab Nicolescu and CIRET group view. According to this view, **TD is a methodology**. This methodology is based on the already known three axioms that design it. Greek philosophers believed that an axiom is a claim that is true, without any need for proof. The truth of an axiom is taken for granted [1]. Hence, in Basarab Nicolescu's view the three axioms the TD is based on [2]:

a. ontology - Levels of Reality and the Hidden

Third,

b. the Logic of the Included Middle,

c. epistemology – knowledge as an emergent complexity.

TD cannot be understdood and applied in the absence of full consideration given to the above mentioned axioms. To ignore or to eliminate one of them triggers about the risk of a falsification of the TD concept, the risk of erroneous slippings, and applications of the latter, in all areas.

Theoretically, the possible need of a fourth axiom, with reference to axiology was discussed [3] Nicolescu, believes that the TD methodology does not require a separate axiom for axiology while others feel that this issue is not yet resolved, that we need to have further conversations about the need for a TD theory of values (a TD axiology pillar) e.g., Cicovacki, [4]. Nicolescu's position on the matter is clear: "there is no need to introduce values as a 4th axiom" [5]. In more detail, he believes "we have to limit the number of axioms (or principles or pillars) to a minimum number. Any axiom which can be derived from the already postulated ones, has to be rejected" [6].

A new clarification we intend to outline comes from the mistaken or malicious interpretations of TD. Therefore: What TD is not? Firstly, TD **is not another discipline**. According to Nicolescu's consecrated definition, "Transdisciplinarity concerns what is at the same time between disciplines, inside various disciplines and beyond any discipline. Its aim is the understanding of the current world and one of its imperatives is the unity of knowledge" [7].

Secondly, as I have already stated, since TD has to be looked upon as a methodology, there is no place for **confusion** between TD and ***a method***, as it happens many times when one tries to apply it, mostly in education. Reducing TD to a method implies a flagrant amputation of its own essence. "Methodology" is not just a "method"; methodology is the philosophical basis for method. Method and methodology are sometimes used as though they were synonyms - but they aren't. *Methodology* is the study of methods and deals with the philosophical assumptions underlying the research process, while a *method* is a specific technique for data collection under those philosophical assumptions. A methodology is a system of methods and principles for doing something, for example for teaching or for carrying out research.

Thirdly, TD – as methodology – *is not a religion, or a dogma, an ideology* to serve some group, economical, social or political interest. This is obviously transparent for anyone who tries to understand TD basic axioms and has a good faith.

Consequently, we can firmly state TD to be the conclusive factor in knowledge paradigm changing for the 21st century. New methodological keys are hence offered by the recuperation of the Subject place in knowledge, by the logic of the included middle, by a new understanding of Reality – according to the ontology of Reality levels and the Hidden Middle – and by the realization of the incompletness of knowledge. These outcomes open a large opportunity for many applications in various fields: education is a privileged one.

In our opinion, TD can offer a sustainable solution to the educational crisis mankind is facing nowadays; we dare say that it could be the only solution to this problem and furthermore; transdisciplinarity could stand as a viable solution to the problems of the 21^{st} century human society as well.

2 Transdisciplinarity in the Present Days Education: Delors' UNESCO Rapport on Education

Many people might ask why an imminent change of the educational paradigm would be necessary nowadays. Philosophers, sociologists, psychologists, and researchers in the field of education, as well as parents and students all agree - expressing the idea in various ways – that something is 'rotten' in the education aria. But they can hardly see the roots of the problem and are hardly capable of searching possible solutions. After decades of disappointing educational outcomes, it's time to work on some educational possible solutions.

The present day public education in most countries is working on a curriculum based on "disciplines"; it was accepted by the tradition of an encyclopedic paradigm of knowledge. Such a curricular model does not venture to build a holistic (integrated) outlook on the world and knowledge; human knowledge is still reduced to a truncated approach to reality, without connections; there is a dangerous discontinuance between the inner and outer reality between the subject and object of knowledge. Wililam Grassie proposes in his article called "Reinventing Science

Education in the 21st Century" a great change of the curriculum. "The fundamental problem underlying the disjointed curriculum is the fragmentation of knowledge itself. Higher education has atomized knowledge by dividing it into disciplines, sub disciplines, and sub-sub disciplines – breaking it up into smaller and smaller unconnected fragments of academic specialization, even as the world looks to colleges for help in integrating and synthesizing the exponential increases in information brought about by technological advances" [8]. In his opinion "The solution to "disconnected ideas," "dry facts," and the "fragmentation of knowledge" may well be in recognizing that the history of the universe, the evolution of life, and the rise of human civilizations are in fact a *unified story* and best taught that way". This Big History curriculum has been tried with great success by a few pioneering colleges and disparate high schools. This approach engages students in profound questions of meaning and purpose, virtues and values, in ways that are respectful of science, supportive of thoughtful religion, and conducive to civil societies. [8]

A lot of others experiments of changing education in the perspective of TD methodology has been developed in many countries in the aria of higher education system. The ones from Mexico and Brazil are mentioned by Russ Volckmann and Sue McGregor [9].

The truth is that the same issue occurred in Europe too. The famous Delors rapport at UNESCO has revealed the need of changing the education according to the requirements of the 21^{st} century society. The International UNESCO High Commission for Education in the 21^{st} Century presided by Jacques Delors has written out a report (1994) where, in Ch. IV, the idea of a new type of education that should focus on four main pillars was stipulated :*to learn in order to know, to learn in order to do, to learn in order to live along with others, to learn in order to be* [10]. This program – theoreticaly possible even in the frame of the traditional educational system – would be completely inefficient from the practical point of view. Hereinafter, I shall try to sketch a connection between the TD outlook on education and the traditional system one; I shall preserve as criteria the four basic components as they were presented in the above mentioned report. The following synthetical schemes will easily point out the deep changes brought out by TD educational approach as opposed to the present day one in the school system [Table 1, 2, 3, and 4].

In an attempt at a synthetic outlook on everything previously stated, we feel that we are entitled to sum up the following conclusions: TD education is an absolute, integral education for any individual, it is able to ensure self-harmony, harmony with society and the universe; so that every individual be able to understand both the meaning of his own existence and the meaning of existence in general. It is the only way to "cure" the specific symptoms of the complex crisis mankind is facing today: "the loss of meaning and the universal hunger for meaning" [11].

3 Romanian Experiments in the High-School Education at "Moise Nicoara" National College, Arad

"Moise Nicoara" National College is the best college in Arad and one of the most well known college in Romania due to its students and teachers' staff. It was founded in 1873 and became famous in time because of a lot of Romanian academicians, and important writers, scientists, musicians etc. who graduated from this college [12].

The interest for transdiciplinarity is a consistent proof for the creativity of the teachers' staff and the capacity to research in order to be updated and innovate in the field of education. A lot of interesting inter/pluri and transdisciplinary didactical projects were conceived and performed during the last five years. That is why last year "The Trasdisciplinary Center of Educational Applications" from "Moise Nicoara" National College, Arad was founded - the very first in Romanian secondary education. One of its important instrument of dissemination of TD didactical experiments is The "'*T Journal*". It is an on-line journal written in Romanian and English as well which promotes the TD applications in Romanian secondary education [13]. These projects have practically proven that the TD approach of teaching and learning is possible and effective in a real school. From these attempts to apply the theory, serious reflection issues have arisen. Finding proper answers to them means contributing to the enrichment and refinement of the TD methodology itself.

The approach was not meant to tend to a theoretical contribution to TD, but to its applications in education. We only attempted to see how to tran-

Table 1: Learning to know.

Actual Approach	**TD Approach**
Fragmentary knowledge (partial meanings)	Holistic knowledge (global/general meaning)
Disciplinary curriculum	Inter/pluri/transdisciplinary curriculum
Mostly rational knowledge	Balance among rational, affective, corporal knowledge
Logic of the excluded middle (or/or)	Logic of the included middle (and/and)
TO KNOW	TO UNDERSTAND

Table 2: Learning to do.

Actual Approach	**TD Approach**
Emphasis is on professional competence for insertion in the labor market	Emphasis is on "life competence" (insertion in the society and universe)
Fragmentary evaluation (scaled competences, "hic et nunc")	Integral evaluation (individual creative potential)
Process evaluation heavily quantitative	Process evaluation heavily qualitative
"Horizonta" formation	"Horizontal" and "vertical" formation
To act efficiently	To think, to feel, to act in a creative manner
Routine	Joy
TO DO/TO ACT	TO MAKE/CREATE

Table 3: Learning to live with the others.

Actual Approach	**TD Approach**
Importance of the individual (the difference matters)	Importance of the individual and universal (the identity matters)
Social desirable attitudes and behaviors	Human desirable attitudes and behaviors (transhumanism)
"Horizontal" integration (a single Reality level)	"Horizontal" and "vertical" integration (a plurality of Reality levels)
WITHIN THE SOCIETY	WITHIN THE SOCIETY AND UNIVERS

Table 4: Learning to exist.

Actual Approach	**TD Approach**
Human existence/ life according to moral values of the society	Human existence/life according to moral values of a certain society and culture but also universal human values
Material existence	Material and spiritual life
Personal/individual dimension	Trans-personal dimension
Surviving (concurrence, competition)	Living (self-harmony, with society and universe
TO EXIST	TO BE

scend from theory to practice, i.e. how to adjust the theoretical aspect of TD to the actual use of the educational issue areas. These experiments intended to prove that the TD approach applied to the teaching-learning processes is likely to work in school: hence, an exquisite prospect for the education of the future generations could be generated.

The theoretical background of all experiments was of course the theory of transdisciplinarity as it was conceived by Professor Basarab Nicolescu. In order to have a proper idea of this projects, a detalied description of the first and last TD experiments performed at "Moise Nicoara" College will follow. The both experiments were coordinated by Mirela Muresan.

The first complex TD experiment started in 2008 and it was carried out as it is described in the book published in 2010 in Romania [14]. Basarab Nicolescu wrote the foreword of this book and he pointed out the following: "We are in front of an event book. A blazing-the-path book. A cornerstone which will mark the history of education in Romania.(...) We are congnizant and follow diligently all TD experiences in the high school systems in many countries (e.g., in Brasil, a large scale experiment took place for several years). Hence we can state, without any hesitation, that the Arad experiment is both the most successful and biggest potential educational product to export in any country of the world. The great discovery achieved by the Arad experiment participants is the fact that *disciplines are masks of TD* – an axiomatic truth, able to inspire any worthy project for an education able to face the huge throws of the century we are living in" [14].

This first experiment was also described in an article entitled "The International Journal of Learning" written by Muresan M, and Flueras J., [15]. The article aimed to answer to the following questions: what kind of educational paradigm would be available for the future society (what would be its "philosophical" basis) ? What would the "educational ideal of the 21^{th} century"' look like? In what way could TD be applied to educational issues? How could it be implemented to the public education? How could the bridge between the TD knowledge and the TD teaching-learning process be crossed? The following description of this experiment is partially taken from the above mentioned article [15]. The project was carried out for two years, involving activities attended by high school students and teachers. The target-group consisted of 23 students from the 9^{th}, 10^{th}, 11^{th} and 12^{th} grades. These activities took place in parallel with the official curriculum that was taken as a reference frame. The activities extended over 10 weeks every Saturday morning. The 17-teachers team (Mathematics, Physics, Biology, Literature, Music, Drawing, Geography, Religion) prepared ***transdisciplinary syllabus*** which was applied to the target group of the students.

The TD target of this project was to show the students that a *unity of the world and knowledge exists.* The main objectives in accordance with which the content was built were the following: developing students' interrogative abilities (asking questions); developing students' *abilities to understand* fundamental truths (about nature, humankind etc.).

The syllabus of the project was established after taking into account a generous topic, generous in the sense that it should belong to each discipline, it should transgress the disciplines, and, at the same time it should be beyond any discipline. A metaphorical title was given to the topic: "*The Anonymous Behind the Mask*". It deals with the relationship between essence and appearance, between what can be "seen" and what is usually hidden, in both the outer and inner universe, on both a human and cosmic level. The content of the curriculum was structured on three learning unities as follows:

- The *"masks" of the human being*: the scientist, the artist, the religious man, the social man;
- The *"masks" of the world*: the infinite, the space-time, the gold-number, the Mobius strip, the camouflage in nature;
- *Beyond the mask.*

The weekly meetings were organized as workshops. While attending these workshops, both teachers and students experienced unique feelings. These workshops were all based on *dialogue* and *debate.* While attending these activities, all participants experienced amazing revelations about: the resemblance between scientific and artistic imagery, the representations of the *infinite* in Mathematics, Physics, Religion, Poetry, Music, Sculpture; about the divine proportion of *the golden number* and its presence in the cosmic and human body architecture, in painting, architecture, sculpture; about the issue of the camouflage and its forms in nature, in the social and individual life, about the need for camouflage

in plants, animals, human beings and sacredness, as well. *The Mobius strip* was another challenge: its effective manufacturing by hand and pointing out to its properties represented the starting point for discussing its presence in topology, physics, chemistry, biology, literature and film, music, religion, architecture. Its presence in the ordinary life was discussed as well as its philosophical meaning.

The relationship between*portrait, self-portrait and mask* was also a core point of the debates concerning "the masks of the human being". The didactical scenarios we made up emphasized the subtle connection between the aesthetic and the ontological: as God made the human being after his image and resemblance, the work of art is, on its turn, a kind of a self-portrait of the author. How could we rebuild the "image" of the author behind all his creation. The art works (in literature, music, painting and sculpture) are but different *faces* of the creative artist, thus the cosmos and the human being are but different *faces* of the divine creator. The topic concerning the masks of the social human being produced an ardent debate on the totalitarian periods in the history of mankind: a fragment from the Bible's *Genesis* and from Andersen's story – *The New Clothes of the Emperor* were the starting point to remake the need for a "mask".

The main idea, which was progressively born during the workshops, was the fact that, behind the mask, the essence of both the human being and the world is the same, but in most cases it looks like a "Great Anonymous" due to the lack in our capacity to adequately understand the truth. Sciences, arts, religion, mythology, they all assert the one and the same truth. In this respect, through the information they provide, and through their specific investigation methods, the disciplines are also "forms / patterns" of knowledge, and the truth always stays *in, among* and *beyond* them. Progressively building this idea during the workshops could help students develop their abilities to understand fundamental truths (about nature, humankind etc.), [15].

The last transdisciplinary project was performed this spring, in the frame offered by our Ministery of Education: "Another School-Type Week". Its title was *A Transdisciplinary "Reading" of the Water*[16]. The project targets focused both on experiencing a TD teaching-learning methodology and on setting up a holistic integrative view of the knowledge of water, developing a positive, desirable attitude able to contribute to an education for the quality of human and planetary life. The project contents were conceived and structured in order to get a synthesizing view on many dimensions and significations of water, able to transcend the borders of the "classical" disciplines; the main outcome was to help teachers from different disciplines to teach together, as a team. The interactive workshops alternated with explanations, power-point presentations, debates, topic-oriented visits, artistic creations and performances.

The syllabus of the project was structured in three learning units as follows:

1. The Philosophy of Water (sacred dimension)
    - Water in cosmoghonical "scenarios"
    - Water in folklore rituals, in religious rituals
    - Symbols of the water: living water/dead water; holy water, healing water
    - Christening water and Flood water
    - Water wisdom: syntagms, proverbs, sayings
    - Water messages: crystallization experiments
2. The Water life (profane dimension)
    - Water as chemical substance; properties
    - Planet water: roles, functions, dangers, threats
    - Water crossing the human civilization evolution
    - Water and the human body; intra-uterine water
3. Aquatic imaginary aspects (artistic dimension)
    - Water images in literature, music, painting etc.

The three modules pointed out many and unexpected properties and meanings of water and generated a great deal of discussions and debates: teachers and students as well were challenged to answer many questions and problem-situations that came out from the new information issued during the presentations. The answers to the final questionnaire form, which was conceived as a feed-back, fully confirmed this aspect. Here are some problems students confessed they will keep thinking about: *the role of the water in the act of creation, the religious meanings of the*

water, the water in the human body, the subjective images of the water in artistic representation, the vital link between human being and the water, the spiritual force of the water, the significance of the Flood, the water magic power, why does water have so many powers?, why does water react to feelings ?, is there water on other planets ?, how was water created?, why is man wasting so much water instead of appreciating it ?, does water have feelings?, and so on. **Moreover,** *a student has sincerely admitted: every time I will use tap water, from now on, I shall think twice in order not to waste the water that came in my house with such difficulty, thanks to so many centuries of civilization.*

This interrogative-reflexive part – started in students mind – seems to be the major gain of the project. Thus, there was a privilege for all participants (teachers and students) to get and give information, to share their own opinions, beliefs, to confront ideas, due to this different school week.

Water was "read" by their mind, heart, sensorial attitude, into a valuable process of TD knowledge. The visit to *the Water Tower* of the town built in the 19th century facilitated the real knowledge of the objects and instruments that were used during the centuries by the rural and urban civilization concerning the use of water; the creative workshops facilitated unexpected "meetings" between poetry, music and painting in the artistic imaginary frame of water; the presentations revealed the magic powers of the water in the Romanian folklore, mythology, the astonishing Bible significations of the water and its use in religious rituals; the scientific outlook on water brought forward for discussion its physical-chemical properties, its role in the human metabolism and in all living beings. Emoto's experiments presentation was a great challenge too. Students could express their artistic vision on water – by words, colors and sounds: they selected the proper music for the poetry texts they were reading, they painted their own "view" on water, starting from a blue drop, and transforming it in their soul's colors, they wrote interesting essays. They have imagined an ocean storm as in Turner's paintings – using the fingers and palms only, to produce the sound of the rain drops and then the sound of an unexpected storm accompanied by thunders; a valuable symphony was created and performed using "water glasses". The series of unexpected experiences concerning the knowledge of water could go on indefinitely. It's would be worth describing each module, one by one, but it would take it much time [16].

4 Limits and perspectives: Questions, Worries and Chalenges

Different obstacles occurred while performing these TD projects within the frame of the traditional system of education. Why?

First we had to build the teachers' team in order to be qualified for this kind of experiment and to accept to be volunteers. Then, we had to find the most efficient strategy to attract the students to this new way of teaching-learning process. But the main challenge was to decide upon the topics of the two projects. We had to find large and generous topics, suitable to a TD approach. The bridge between *inter-, pluridisciplinary* and transdisciplinary seemed to be more difficult to build from the didactical point of view. If, theoretically, the problem was clear enough for us, didactically, we did not know initially how to solve it. Solutions emerged along the way, but questions remained, as we were not yet convinced we made the intended jump completely [15].

Another difficulty was to design the syllabus. Setting up competences was the most difficult challenge for the teachers team. From a TD point of view, competences should cover all the three levels: individual, social and cosmic, in order to build the ultimate human being. On the other hand, these competences should also harmonize the dimensions of *to know, to understand and to create.* How can one achieve the "trans-relation" that could connect to know, *to understand and to create?*

As Muresan and Flueras have already written [15] the concept of *cross-curricular (transversal) competences* used in the modern theory of education is not the same as the *transdisciplinary competences* in the way we understand this concept. Transversality refers to fragments of the world (fragments of both subject and object), and does not refer to the sacredness as a *tertium datur*: "Transversality is almost always horizontal", when transdisciplinarity, which is at the same time across and beyond, is vertical. [17]. It seemed impossible to state these desiderata as "competences". How could competences of the *ultimate human being* or *integral education be formu-*

lated? Are there "competences of the being"? The common understanding of the concept of *competence* is based on the idea that it concerns something which compulsory must be "quantified"; if not, it cannot be accepted as a "competence". The human values, attitudes, behaviors that are built up by education, remain out the educational system evaluation and cannot be evaluated inside the institutional, official forms of the public educational system. It is possible to formulate competences for "to know" and "to do" but not for "to be". So, a virgin, vacuum area in education sciences is revealed. *Crossing (transversal) competences* in the modern curricula, are also limited to "to know" and "to do / to make" even if they cross disciplines and their afferent methods; they focus only on "the exterior human being set up" and not the "interior human being creating". From my standpoint, it would be wrong to build up synonymies between them and the so-called *transdisciplinary*. "*Transdisciplinary competences*" should point to the foundation of both the interior and exterior human being. Features of the ultimate human being are not yet set up in competence terms, nor are they yet quantified and standardized. I wonder if such a thing could be possible. Additionally, the targets, forms and proper evaluation instruments are not established.

The most difficult thing in performing both experiments consisted not in finding out the proper strategies and methods to conceive the steps of the didactic enterprise, but in what way we could awaken the *wonder*, and produce in our students that *inner experience* which is a fundamental component of understanding. If we sometimes succeeded to push the "inner button", we have also to accept that it was a random or spontaneous or momentary case. It could not be controlled in any way, and, even less, could be not valuated in its depth, dimension or its consequences. All this was exclusively due to the didactical vocation and skillfulness of the teacher, to his empathy and not to some previous planning. In sum, we are not able to build up a pattern scheme or script to replicate the effect or to decide on any didactical method or strategy. This proves once again that the TD learning is something alive, has no previous rules: "being" has no patterns. [15]

New problems came up: we had to prove intellectual and affective mobility, to deal with new situations, to make use of play-related capacities, tolerance, openness and patience, to be prepared for a continuous adaptation to our students demands. The most important challenge we met, at the beginning, was to get the students beyond their usual way of thinking. The students were used to think in terms of *yes or no, correct or incorrect, true or false* terms. They were uncomfortable with the lack of a rational conclusion or a clear, definitive, precise answer. They found it hard to accept that there might also be answers of yes *and* no, *true* and false type at the same time, and the fact that reality was in a continuous dynamics. The intuition of the fact that we are and we are not at the same moment, the universe is and is not the same, a thing is not only what we know about it at a given moment, the fact that there is an invariant *what* in all entities was an important step we made in the dialogue with them [15].

These experiments proved that transdisciplinarity is not a utopia. TD can be transformed in a current practice in school; to pass from theory to practice means new problems and questions searching for new answers. To prove – in a convincing way – the important potentialities the TD has was also a result of these projects.But, in my opinion the most valuable thing is the fact that these didactical TD experiments succeeded to identify some important reflection points that are necessary for applying the TD in public education. Some of these questions are: what a TD curriculum means? what does it really implies? Could we practice the TD methodology within the frame of a disciplinary designed curriculum? Could we conceptualized the "didactical border" between the inter/pluri and transdisciplinary approach in the teaching-learning process? Which is the difference between the "transversal competences", "cross-curricular" ones and the "transdisciplinary competences"; or could we speak about TD competences without enlarging the definition of the concept? Which would be the correct relation among *information, competences* and *values* in the educational process? the right balance among *to know/to do/ and to be*?

All these questions were also refreshed during the recent International Colloquium organized in Arad, Romania, the first one of the kind in our country [18]. More than 200 participants were present: teaching staff from primary, secondary and high school education and also from university education, educationalists, students interested in educational issues, managers and parents. The Colloquium *Transdici-*

plinarity in Primary, Secondary and High School Education aimed at a basic establishing of a working team, at a national level, able to provide hands-on solutions for implementing the transdisciplinary education in the Romanian educational system and, moreover, for a future curriculum design guidance. The participation of Professor Basarab Nicolescu was a great help for us in our attempt to find solutions for the TD application in the Romanian secondary education.

5 Conclusions

The case study – as presented here – has tried to point out what questions could arise from practising the TD methodology in the frame of a "traditional" educational system: what the challenges of a such an approach are, what kind of obstacles are to be faced, and so on. All these are aiming at identifying possible reflections on moving the deck between TD methodology and its applications in school practice. Keeping in mind all the outcomes of this case study, we will try to sum up.

From the beginning, we should like to focus on the *limitations* the TD methodology practice implies, in the frame of the traditional educational system in Romania. The first limitation is the *coercive force of the system*, totally inadequate to the TD practice. This kind of force refuses – from the very start – the ongoing of the TD activities in the frame of the official established curriculum; hence the TD activity processes can be developed only as alternatives to the official curriculum: optional courses, volunteer activity of the teachers and students or, in the most fortunate case, as the "Another School-Type Week".

The second limitation springs from the *asessment system's incompatibility*, as it has been implemented in the present day educational system. This system assesses quantitative aspects to the injury of the qualitative ones. The asessed competences are standardized and scaled "hic et nunc" detrimentally to the qualitative assessment.

The third limitation is the *lack of qualified human resources* able to implement a TD teaching-learning process, as well as the impossibility of teachers to work formally as a team in the class.

The fourth limitation is *the resistance, opposition force of the collective mentality* to any kind of change, actually the fear of the new and of the experiment. It is, in fact, the refusal to change a structured curriculum that was practised disciplinary for centuries; the fear to lose the disciplinary specialization because of the Td opening; this kind of fear comes obviously from the lack of a right understanding of the TD methodology. Opposition may be generated, on the other hand, by some social-political circumstantional interests which refuse to see the educational benefit in the long run; these interests are holding on to the pseudo-payoffs of immediate, visible outcomes.

Obviously, this case study pointed out remarkable *prospects* as well: these spring from the TD methodology applications in education (not only at the high school level). This last aspect would certaintly necessitate a longer time period. A complete TD education desideratum would need to change the whole educational paradigm that – in turn - would need a new setting of the educational ideal, according to the TD axioms. These axioms generate – in their turn – a new value system. All these imply the setting up of a new TD curriculum and an adequated strategy in the human resources training such an entreprise would entail. Last but not the least, a new "didactics" is needed: this has to be compatible with the TD methodology.

How to achieve these desiderata ? There are no unique "prescriptions".Romania has started to set up *centers* and *nucleuses* for TD methodology dissemination, both in high schools and universities. One can even state there is a "TD trend" to struggle for the implementation of TD in education: books and journal publishings, conferences and symposia on TD topics, setting up TD projects and programs (of lesser or greater scope), good practicing exemples dissemination etc. All these are due – in our country – to local initiatives which were professionally sustained and stimulated by professor Basarab Nicolescu. We hope to be on the right path.

References

[1] McGregor, S. L. T. and Murnane, J., 2010. Paradigm, methodology and method: integrity in consumer scholarship. International Journal of Consumer Studies, 34(4), pp. 419-427.

[2] Nicolescu, B., 1985. Nous, la particule et le monde [We, the Particle and the World], Paris, France: Le Mail;
Nicolescu, B. (2002). Manifesto of Transdisciplinarity [Trans. K-C. Voss]. NY: SUNY;
Nicolescu, B. (2005). Transdisciplinarity: Theory and Practice. Cresskill, NJ: Hampton Press;

Nicolescu, B. (2006a). International Congresses on Transdisciplinarity [Interview given by Basarab Nicolescu to Professor Augusta Thereza de Alvarenga of the Faculty of Public Health, University of São Paulo, Brazil]. Retrieved from http://basarab.nicolescu.perso.sfr.fr/Basarab/Docs_articles/InterviewAlvarengaENG.htm, accessed: December1, 2012;
Nicolescu, B., 2006b. Transdisciplinarity – Past, Present and Future. In B. Haverkott and C. Reijntjes (Eds.), Moving Worldviews (2006), Moving Worldviews, Leusden, the Netherlands: ETC/Compas, 4, pp. 143-165. Retrieved from http://basarab-nicolescu.fr/Docs_articles/Worldviews2006.htm, accessed: December 1, 2012;
Nicolescu, B. (Ed.)., 2008. Transdisciplinarity: Theory and Practice. Cresskill, NJ: Hampton Press.

[3] McGregor, S. L.T., 2011. Integral Leadership Review, 11, Issue 3 Transdisciplinary Axiology: To Be or Not to Be? , http://integralleadershipreview.com/2011/08/transdisciplinary-axiology-to-be-or-not-to-be/, accessed: December 1, 2012.

[4] Cicovacki, P., 2004. Transdisciplinarity as an interactive method: a critical reflection on the three pillars of transdisciplinarity. TRANS: Internet Journal for Cultural Sciences, 15(1). http://www.inst.at/trans/15Nr/01_6/cicovacki15.htm, accessed: December 1, 2012.

[5] Nicolescu, B., 2006. Transdisciplinarity – past, present and future. In B. Haverkott and C. Reijntjes (Eds.), Moving Worldviews , (2006) Leusden, the Netherlands: ETC/Compas 4, pp. 143-165. Retrieved from http://basarab-nicolescu.fr/Docs_articles/Worldviews2006.htm, accessed: December 1, 2012.

[6] Nicolescu, B., 2010. Disciplinary boundaries – what are they and how they can Be transgressed? Paper prepared for the International Symposium on Research Across Boundaries. Luxembourg: University of Luxembourg. Retrieved from http://basarab.nicolescu.perso.sfr.fr/Basarab/Docs_articles/Disciplinary_Boundaries.htm#_ftn1, December 1, 2012

[7] Nicolescu, B., 2002. Noi, particula şi lumea, Polirom, Iaşi, p. 232.

[8] Grassie, W., 2000. Reinventing Science Education in the 21st Century. http://www.grassie.net /articles/2010_educate.html, accessed: December 1, 2012. According to a note of this article, a recent survey suggests that "Big History" is taught at 32 institutions by 28 professors (or teams) in 7 countries. See Barry Rodrigue and Dan Stasko, "A Big History Directory," World History Connected (2009), 6, no. 3.

[9] Volckmann R., McGregor,S., 2010. Transdisciplinarity learning in graduate programs in Brazil, Mexico. Integral Leadership Review, 10(5).

[10] Rapport to UNESCO of the International Commisss ion on Education for the Twenty First Century, (1994), http://www.unesco.org/pv_obj_cache/pv_obj_id_5103980EA9B7368319D2734CE965F8B9C7FF0600/filename/delors_e.pdf, accessed: December 1, 2012.

[11] Niclolescu,B., 1999. Transdisciplinary evolution of learning. Talk at the American Educational Research Association (AERA), Annual Meeting, Montréal, Canada, April 1999, Round-Table "Overcoming the Underdevelopment of Learning : A Transdisciplinary View", with the participation of Leon Lederman (Nobel Prize of Physics), Jan Visser, Ron Burnett et al.; accessible at http://basarab-nicolescu.fr/on_line_articles.php, accessed: December 1, 2012.

[12] see the website: http://www.moisenicoara.ro/, accessed: December 1, 2012.

[13] see the website: http://www.moisenicoara.ro/revista-t-nr1/, accessed: December 1, 2012.

[14] Muresan, M., coord., 2010. Transdisciplinaritatea de la un experiment spre un model didactic, Junimea, Iasi, with a foreword written by Basarab Nicolescu.

[15] Muresan, M., Flueras, J., 2010. Towards a new para digm of education in the 21st century society., The International Journal of Learning, 16(8), pp.207-220, http://ijl.cgpublisher.com/product/pub.30/prod.2343, accessed: December 1, 2012.

[16] Muresan, M., 2012. A transidsciplinary "reading" of the water, in "T" Journal. no.2, edited by The Trasdisciplinary Center of Educational Applications from "Moise Nicoara" National College, Arad, http://www.moisenicoara.ro/t-journal-no-2/, accessed: December 1, 2012.

[17] Nicolescu, B., 2006. Phantasma (Centrul de Cercetare a Imaginarului, Cluj, Romania), http://www.phantasma.ro/dezbateri/masa/masa14.html, accessed: December 1, 2012.

[18] International Coloquium "Transdisciplinarity in Pri mary, Secondary and High School Education" (2012) Arad, Romania, http://www.moodle.ro/edutd, accessed: December 1, 2012.

About the Author

Mirela Mureşan is a high-school teacher in the Romanian Department, of "Moise Nicoara" National College, Arad, Romania, Europe. She teaches Romanian language and literature to the students from the 9-th to 12- th grade; member of the National Committee for Romanian Literature Curriculum Designing in Romania; she is one of the designers of the new curriculum performed today in all the high schools in Romania, according to the reform of education, which took place in the country starting from 1997; member in the Board of the National Association of Teachers of Romanian Literature (ANPRO) (see www.anpro.ro); board member of the national didactic review, "Perspective" (Perspectives) issued in Cluj–Napoca, Romania; coordinator of The Trasdisciplinary Center of Educational Applications from "Moise Nicoara" National College, Arad; chief editor of "T Journal" – on-line journal published in Romanian and English (see http://www.moisenicoara.ro/revista-t-nr1/ .Her research interests and work are in the fields of philosophy of education and educational strategies, transdisciplinary education. She attended many national and international conferences, symposiums organized in Romania, with various scientific papers concerning the problems of curriculum designing, philosophy of education, critical thinking and didactic issues. She took part in a lot of national and European projects for education such as Comenius, Grundvig, provided by the European Union.