

Revealing Significant Connections of the DTIC in Multireferential Learning Environments from Cognitive Analysis

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Abstract: The Multireferential Learning Environments constitute scenarios that induce to deepen, autonomously and creatively, the studies on translation, transfer, reappropriation, transformation, reconstruction of knowledge, that is intended to spread. The problem refers to the possibilities offered by the DTIC to contribute to the real empowerment of the subjects about having greater economic capacity, influence and political dignity to exercise a real counterweight or opposition to the state power and the big capital. Considering the report of ECLAC on the inequality matrix in Latin America, the need to contemplate the daily dimension of the actors in the sustainable local development processes is observed. The hypothesis assumes that as societies have more information available they can transform it into knowledge and therefore improve their conditions and quality of life. The objective is to identify, describe and contrast models that contribute to assess the derivations of the DTIC in the Multireferential Learning Environments, that participate in local development processes from a complex systemic approach where the daily dimension of those involved is considered from a Cognitive Analysis model. In certain aspects, the idea that the Learning Society is limited exclusively to the knowledge economy and to the social organization in networks, as the main structuring axes, is questioned. Consequently, learning throughout life is no more than a process that, being pragmatic and committed to productivity, leaves aside all those formative dimensions of dialogical education defended by Paulo Freire (1970, 1992, 1997).

Key words: DTIC, multireferential learning environments, cognitive analysis

1. Introduction

The Multireferential Learning Environments (MLE) (Casnati, Galeffi, 2014) constitute scenarios that induce to deepen, autonomously and creatively, the studies on translation, transfer, reappropriation, transformation, reconstruction of knowledge that is intended to spread. The MLEs in Tacuarembó (Uruguay) contribute to forming collaborative solidarity networks that intertwine favouring sustainable local development. For the enunciation of the problem the concern refers to the possibilities offered by the DTIC, to contribute to the real empowerment of the subjects to the effects of having greater economic capacity, influence and political dignity to exert a real counterweight or opposition to the state power of turn and the great capital. In the light of recent political developments and considering the ECLAC report on the inequality matrix in Latin America, the need to contemplate the daily dimension of the actors in the processes of sustainable local development is observed.

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Cognitive Analysis (AnCo) argues that knowledge is not constituted only by disciplinary content; in these areas, social relations, aesthetic, emotional and affective expressions are included, as well as the biological and economic factors that reflect the socio-historical-cultural conditions of the subjects and social groups (Froes Burnham, 2012). In the investigative process symbolic, cultural, ethical, and political perspectives intervene in an explicit or implicit way, among others, that are not subject to the logical and methodological foundations of the disciplinary schemes. The hypothesis assumes that as societies have more information available they can transform it into knowledge and therefore improve their conditions and quality of life. The objective is to identify, describe and contrast models that contribute to assess the derivations of DTIC, in the Learning Multireferential Environments, that participate in local development processes from a complex systemic approach, where it is contemplated the daily dimension of those involved in the process from a model of cognitive analysis.

2. The MLE

In the research on the MLE, two epistemological contributions converge: the recognition of the complexity of the FDC context and the multireferentiality. The multireferential perspective is particularly appropriate to tackle complex problems such as educational and educative ones, recognizing the irremediable opacity that characterizes them (Froes Burnham, 2012, p. 172)

So, praxis places are identified where they discover, rehearse and know multireferential learning environments. These areas constitute scenarios that induce to deepen in an autonomous and creative way the studies on translation, transfer, reappropriation, transformation, reconstruction of a knowledge that is intended to spread. They warn that there are alternative university proposals that recognize the most diverse contributions of historically active subjects to understand diversity and uncertainty in sociality¹ and this is what is innovative.

The MLEs can contribute to forming collaborative solidarity networks that are intertwined as described by Euclides Mance (2001, p. 8) favouring sustainable local development. Mance recognizes economics, political and cultural networks, at local, regional and global levels. In the economic dimension, it identifies “solidarity collaboration and the main aspects of its implementation strategy — with a horizon of complexity that involves self-organization, feedback”.

3. Potentiality of DTIC in Development Processes

Tejedor (2012, p. 141) points out that in order to homologate the data used to evaluate the potential and influence of DTIC in the development, the Global Partnership for Effective Development Cooperation, in 2005, presents a series of key indicators and guidelines to guide improvements in infrastructure for economic and social development.

The report includes definitions, questions and methodological guidelines for key indicators for data collection and use of DTIC. The report is prepared by Robert Sheridan who points out the importance of specifying the temporary periods of analysis, preferably annually, in relation to similar denominators. He also explains that in case of using the technique of surveys it is necessary to observe the strategy for obtaining data as

¹ The concept of “everyday sociality” (Maffesoli, 2010, p. 31) acquires meaning in contemporary society due to its complex and organic structure. Maffesoli applies the metaphor of the tribe to respond to the valuation of the subject. The essential characteristic of tribalism is the feeling of belonging, of horizontality in relationships and affective associations, which respond to the characteristics of the subjects. Sociality is based on the ambiguity of symbolic structuring when subjects are found to share feelings, passions, myths in a network, based on what is emotionally common.

well as the choice of the statistical sampling unit: municipality, company, educational centre, teacher. Finally, it also requires taking care of the homologation of the classification variables: age, gender, educational level, work situation, training activities. On the other hand the World Summit on the Information Society has intensified and achieved the collection of data about DTIC worldwide and shows some important features in its latest report 2015². This report describes and analyses aspects such as access and inclusive DTIC policies with the aim of promoting sustainable development.

4. Conceptual Contributions About Development

As Amartya Sen expressed in “Desarrollo con libertad” (Development with Freedom) (1999, p. 40) the origin of the economy was motivated in a very significant way by the need to study the opportunities that people have to enjoy a good life, quality and the causal influences of those opportunities. From Aristotle to William Perry, in the seventeenth century, François Quesnay and Joseph Louis Lagrange, these ideas flew over the first writings on economic prosperity and human wellness. However, these thinkers also perceived that the fortune of the people and their satisfaction have an instrumental nature that depends on the circumstances. Thus, even when Petty (1992) proposes the expenditure method to calculate the national income, in reality his concern lies explicitly in the idea of the “felicidad particular de cada hombre” (particular happiness of each man), directly related to the living conditions of the subjects.

With enthusiasm it's expressed “que el proceso de desarrollo humano es irreversible porque en la medida que nos proponemos ser protagonistas — y no víctimas de nuestro tiempo, la necesidad de profundización en todo lo que nos rodea vinculado a las personas y al entorno, nos convoca y moviliza la investigación, acción, aprendizaje y transformación en un proceso sin fin” (that the process of human development is irreversible because in the measure that we propose to be protagonists — and not victims of our time, the need to deepen in everything that surrounds us, linked to people and the environment, bring us together and mobilizes research, action, learning and transformation in an endless process) (Chapitel L. & Pereira D., 2004, p. 11). This development is perceived as “un proceso integral, auto sostenido, sustentable y dinámico de las capacidades humanas de todos los ciudadanos, en una sociedad heterogénea pero integrada, sin excludidos, contrarrestando el desarrollo del capital global y restituyendo la soberanía de los pueblos” (an integral, self-sustained, sustainable and dynamic process of the human capacities of all citizens, in a heterogeneous but integrated society, without excluding, counteracting the development of global capital and restoring the sovereignty of peoples” (Ferrando G., 2004, p. 16). To understand the processes of development and to be able to speak of it, it is believed that the best thing to do is to compare it with movement, with which remarkable analogies are added. Development, in effect, is like a movement in which its positive, or ascending, sense of improvement in the quality of life of people is taken, and this because development is considered a “human value”. According to the UNDP report on Human Development (1996), “la gente educada usa el capital de manera eficiente, por lo cual pasa a ser más productiva. Es también probable que esas personas introduzcan innovaciones en el modo de idear nuevas y mejores formas de producción” (educated people use capital efficiently, which makes them more productive. It is also likely that these people introduce innovations in the way of devising new and better forms of production).

To consider people first would seem to be the conception that should prevail, but development cannot be conceived without taking into account the impact of environment. So the best option may be to link the generation

² http://www.itu.int/net4/wsis/forum/2015/Content/doc/outcomes/WSISForum2015_Outcomedocument_ForumTrack.pdf.

of capacity to understand and critically transform the environment, taking into account the background and consequences of a diverse, multidimensional and complex reality.

On the other hand, Sen (1999), when concentrating in freedoms to evaluate development, does not suppose that there is a single and precise criterion that allows to have an approximate model of that process and when investigating a complex problem of development he demands to know and consider economic, sociological, political, ethical and even pedagogical aspects.

Bouché proposes that “la denominada mezcla de tecnologías puede ser una solución, que aplica técnicas nuevas a antiguos productos y habilidades para obtener resultados más adecuados a las exigencias actuales” (The so-called mixture of technologies can be a solution, which applies new techniques to old products and skills to obtain results more suited to current demands”. In this approach, development is considered as the well-being of individuals everywhere and is outlined with the acronym: WISE, which corresponds in English to “The Well-being of Individuals and Societies Everywhere”. This includes education, property rights, health, financing or revenue, so it is essential to know the problems from a systemic view, finding solutions in interdisciplinary work.

On the other hand, the notion of territorial development, associated with the idea of sustainability, was originally linked to the environment and therefore relates to disciplines related to Natural Sciences. However, the Social Sciences contribute to define articulation strategies; provide new visions for the discussion emphasizing the peculiarities of human groups, within their insertion in the global society. The organizational study area makes important contributions to the understanding of the theoretical and practical aspects of the development model that is considered as socially just, economically viable and sustainable. Organizations are social units that formalize articulation spaces and it is essential to understand them as linkages, capable of promoting social transformations at the same time that they are transmuted. Therefore, in the analysis of the development processes, qualitative contents must be added to the quantitative indicators, based on the nature and character of the relation between institutions and society.

As can be seen, the studies on development have tried to identify problems, analyse determinants and propose actions aimed at improving both the material and cultural quality of life of the population, considering that there are multiple dimensions involved in this concept (Bertoni R. et al., 2011, p. 2).

If development is understood as a process of enlargement of the options that people have to plan and concretize their lives in their own proper way, this process should be conceived as a collective project and the approach is systemic trying to understand the complexity of the process object. Thus, individual realization can only be possible in a social context where values and actions that involve the common good and not the absolute competitiveness, are shared and promoted. When thinking about collective processes it is necessary to think also that people have conceptions and interests that sometimes contradict each other and it is necessary to harmonize to achieve a common goal towards development. In this way, development initiatives, at the local level, are conditioned by the ways that communities have to build consensus and manage the conflicts that arise during the process.

In this sense, it can be affirmed that the development models are constructed from the modality adopted by the resolution of emerging conflicts, articulating actions tending to achieve the convergence of interests through the construction of consensus, participation and commitment. Thus, development requires promoting the creation in the community of skills to transform social conflict and for this, the negotiation process can be the shared construction of solutions promoting creative processes to solve it. In this way, the conflict becomes a factor that

offers an opportunity and a power that collaborates with social change.

Also, in the implementation of collective development projects it is necessary to make explicit the ethical stance on which the proposal is based since the actors involved in it can only commit themselves if they share ethical foundations. The exercise of freedom is mediated by values that can be affected in each locality or community by public discussions and social interactions, that depend on degrees of freedom of participation of ten related to cultural, ideological or educational values, and these values involve ethical aspects. Vazquez Barquero (2011) distinguishes three dimensions that influence and articulate the processes of local development:

- 1) Economic: led by local businessmen who take advantage of their capacities to organize local productive factors so that they have competitiveness in the markets.
- 2) Administrative policy: so that favourable economic environments are created to promote an attractive context that stimulates the development process.
- 3) Socio-cultural: where the values, the ethical principles and the sense of sustainability of the territory constitute the basis of the process.

Development processes are conditioned by cultural factors such as the spirit of work, savings capacity and tolerance, as well as by the norms and rules that regulate relations between people and organizations in the territory. Thus, when a society rewards effort and work ethic, entrepreneurial capacity is a recognized social value, and social mobility is stimulated, the population is able to respond to challenges creatively (Vazquez Barquero M., 2011).

When Peres and Hilbert (2007) affirm that actions are needed, that complement the modifications that DTIC are causing in societies, in terms of economic growth, one of those possible actions can be specifically education. In certain aspects is questioned the idea that the Learning Society is limited exclusively to the knowledge economy and to the social organization in networks, as the main structuring axes. If this happens, lifelong learning will not be more than a process that, being pragmatic and committed to productivity, leaves aside all those formative dimensions of dialogical education defended by Paulo Freire (1970, 1992, 1997). So, it is proposed the construction of relationships that enable the construction of proper and appropriate senses for people, based on the information available, so that they do not feel appressed or discriminated against under the predominance of the economy and DTIC.

For Froes Burnham the Learning Society must enhance a close and powerful interaction with the sociocultural context where meanings, senses, beliefs, values, principles, are intimately imbricated among the members of a territory in the local dimension. In order that these interactions facilitate the processes of development, in the current Learning Society, the work in interactivity is proposed as a complement in a learning society.

5. Quotidian Built and DTIC

Under the postdoctoral Multi-institutional and Multidisciplinary Dissemination of Knowledge in progress at the *Universidade Federal da Bahia*, projects and activities were developed during 2017, within the framework of Cognitive Analysis, applying the methodological model proposed by Dr. Gabrielle Bammer (2013) in her work: *“Disciplinando la interdisciplina: integración e implementación de las ciencias para la investigación de problemas complejos”* (Disciplining interdisciplinarity: integration and implementation sciences for researching complex real-world problems), that develops next:

- 1) Initiative of teaching pedagogical development: Training in multimodal teaching for Regional University Centres of the Udelar, in the area of education and DTIC, optimizing the use of means and resources currently available at Udelar. The purpose is to provoke reflection processes on teaching practices and educational innovation linked to the development of proposals, in particular in the Northeast Region. The result is the formation of a group of teachers trained to start a process of continuing education in their regions. These teachers can be projected towards the research in Teacher Training and DTIC to generate a network (MLE teacher) as a space of exchange towards the formation of a community on educational practice, focused on the challenges of multimodal university teaching, inside the country.
- 2) Laboratories of experimentation in teaching with DTIC. It is an intervention/research proposal with the purpose of supporting teachers in multimodal teaching. The project focuses on a theme or objective, previously negotiated, based on some proposals. A list of possible topics is proposed, although suggestions are also accepted from the specific teaching teams. Based on the agreed theme, objectives are negotiated and a strategy and a work schedule are proposed. We work with teachers of the discipline “Sustainable Economy” of the career of Technologist in Sustainable Development. The intervention extends to the whole course and the multimodal activities are decided in conjunction with the teachers of the course on the use of multimodal/digital educational resources: possibilities and creation process by part of the teaching teams, integration of said resources to teaching, reception and understanding by the students. At the end of the course an online evaluation is made with the students who participate in the experience.
- 3) “*La transdisciplina como catalizador del desarrollo local sostenible: el caso de Tacuarembó*” (Transdiscipline as a catalyst for sustainable local development: the case of Tacuarembó) in collaboration with the University of Leuphana and the National Institute of Agricultural Research (INIA). The main conclusions of the workshop were that the inter/trans discipline and the multireferentiality generate a common place that contributes to the shared narrative (Richard Sennet and Saskia Sassen, 2017) in such a way that, between institutions and the actors that promote development, there is an idea and an own and appropriate narrative (Galeffi, 2001) of the territory.
- 4) “*Espacios de Educación de Adultos y Mediación Telemática*” (Spaces for adult education and telematic mediation) In this project through digital literacy and interaction in the MLE there is an appropriation and empowerment mediated by TICs that results specifically from mutual influence

The intervention and research does not intend to amend the deficits or weaknesses looking for a solution to present problems, but from a collaborative action the DTIC contribute to promote and mobilize resources and potentialities of people or groups for a better quality of life.

6. Conclusions

The methodological framework proposed by Dr. Bammer (2013) ensures that all complex aspects can be taken into account by providing communication channels between researchers, who address complex problems in different ways, and providing a way to store and organize relevant concepts, methods and experiences.

The framework considers 3 domains of boarding:

- The domain of the evidence, that comprises the disciplinary knowledge and that of the actors involved

in the system, and that is necessary to synthesize.

- The domain of the unknown, that is perceived as unknown and what is unknown that is unknown, that requires understanding and managing.
- Finally, the domain that requires the obtaining of integrated support of a research for the change of practices and policies that ultimately makes possible the modifications required as a result of the investigative process.

In the domain of evidence is possible identify three questions: why? For whom it is? What is needed? Looking to answer these questions the research is justified in a territory that has not yet managed to overcome some problems that limit development such as geographic inequality, rural poverty and health care for the neediest population. The beneficiaries are the inhabitants of the Department of Tacuarembó and the Northeast Region of Uruguay and for this it is necessary to synthesize the disciplinary knowledge and actors of the system.

In the domain of the unknown the question is: how? And where cultural, ideological, political, economic, values and resistance to change conflicts are identified.

Finally, to make the change possible the key answer is:

The DTIC, implemented massively in educational environments, contribute to sustainable local development if they are accompanied by changes in the institutions themselves, in the ideological, cultural, political, economic, management, contemplating cultural values and overcoming resistance to change. In the University Centre of Tacuarembó, innovative processes occur that often go unnoticed and are sometimes valued by the actors of the territory. There are also intrinsic characteristics of the inhabitants that need to be related especially with proper and appropriate cultural factors (Galeffi, 2001) of that region, which contributes to generate an atmosphere propitious for these processes to be favourable.

However, in order for these processes to contribute to real sustainable local development by overcoming the problems of poverty that still exist, a change in the institutional cultures where innovations take place is necessary. In this sense it is necessary that the generation of collaborative environments be recognized, valued and widely disseminated; the acceptance of new scenarios (situations and processes) where you learn differently; design of devices to weigh innovative actors and innovation/evaluation.

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