THE FALSE DILEMMA BETWEEN MANAGEMENT OF LEARNING AND THE PROCESSES FOR INSERTION OF NICTs IN EDUCATION: CONSENSUS AND CONTRADICTIONS

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ABSTRACT

This article analyzes the contradictory intra- and inter-social movement that is typical of the insertion of NICTs (new information and communication technologies) into daily practice in schools. In this particular *locus*, the main characteristic seems to be the *continuum* of the affirmation and denial of the processes of production, appropriation and dissemination of scientific-technological knowledge. However, the use of these new elements in the process of teaching and learning interact with other complex elements such as "technological convergence". As such, the educational manager appears to fall between between managing learning itself and the procedures for introducing these means. This sociological thinking brings up concepts that deal with a false dilemma: the choice between management of learning and the processes for insertion of ICT. Based on the fundamental elements of the concept of new technological convergence, its symbolic and ideological dimension, the studies show that by managing the insertion of new technologies into the educational process, the manager is also managing the learning process.

Key words: educational manager, technological convergence, technology, science, public policies for education

INTRODUCTION

Management of learning seems to be one of the fundamental processes in the knowledge-based society in which we live.

It is about understanding, galvanizing and making the most of the collective benefit that can be gained from a collective effort that starts with and includes the intellectual capital of an organization's members.

GAIRIN-SALLAN, J. Aspectos institucionales de la orientación. Congreso Internacional de Orientación educativa y profesional. Castellón, noviembre, 2007

The quote above clearly states one of the trends in educational practice within teaching institutions at the beginning of the 21st century. It deals with the structural changes in management practice arising from insertion of the new information and communication technologies (NICTs) in teaching and learning practices. By their very nature, these new tools describe a knowledge-based society and consequently, have given rise to doubts such as: to what extent does managing education overlap with management of knowledge itself? Is it possible to choose between managing

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educational practice and managing learning? This article aims to demonstrate that these dilemmas are false, since new concepts are what structure social relationships in modern times.

In order to understand this dilemma in depth, it is worth remembering that schools in Brazil, in particular, have inherited a literary tradition of education, whether due to the Portuguese or Spanish influence (Azevedo, 1958; Bosi, 1998; Carvalho, 1978; Cunha, 1978; Saviani, 1998; among others). The players in the current scenario show certain signs of estrangement from science, and from its more illustrious "side-kick", that is, technology. This has been among the concerns of Latin-American government bodies dealing with allocation of public resources for education, given its strategic socio-institutional importance. In part, this global trend has come about due to a reexamination of the social function of schooling based on human capital theories, in other words, the economic importance of education (Baudelot & Establet, 1975; Carnoy, 1990; Przworski, 2000; Schultz, 1968; among others), making it a "pre-condition" to bringing about innovative social action.

Specifically in Brazil's case, where creation of the Education Ministry only came about in the 1930s, an initial analysis is in order to typify the intra- and inter-social relationships in contemporary educational practice and policies, such as:

> (...) the evolution from an entirely agrarian-export model to a partially urban-industrial one, which affected the fundamental equilibrium of the elements influencing the educational systems by including new and increasing requirements for human resources to perform jobs in the secondary and tertiary sectors of the economy. The emerging economic model therefore began to make demands on the educational process. (Romanelli, 1933, 46)

As such, if on one hand some sectors of Brazilian society were institutionalized in a type of modernity in which technological convergence is part of the "cultural capital" (Bourdieu, 1998), a large majority of the population was historically sidelined during the process of modernizing social relations. Within this scenario of asymmetry and contradiction, the various educational indicators enable an analysis of the discrepancies between the new demands and the existing structures and in this way, constitute specifics – which then become fragilities in the context of globalized social relations (Chesnais, 1996; Ianni, 1997; among others). This scenario tends to expand in line with the moment of restructuring based on the *acceleration of technological change*, by which productive relationships tend to overlap in the current scenario of capital (de)structuring and the confluence of pre-conditions results in a hitherto unknown situation: "new technological convergence".

In this sociological analysis, including the situation of Brazilian education as part of the socio-institutional structure whose dynamism would be essential for achieving a modern agenda, Schwartzmann (1991, 56) reinforces the inconsistencies between the new demands of the techno-scientific paradigm and the Brazilian educational system evidenced by "institutional inertia" when he comments that

> (...) countries like Brazil were left mainly with the carcasses of centralized bureaucracies, which increasingly lost their reason for being and gradually came to exist only to ensure their own survival. This reality may be at its most dramatic in the area of basic education, where bureaucracies involving dozens and even hundreds of thousands of people perform their duties in a predominantly ritualistic and routine manner, under the command of central administrations that are incapable of knowing or of influencing what happens where the educational relationship actually occurs, that is, in the classroom.

These factors, when related (as an example) to modernization policies for secondary schooling based on adoption of NICT resources, bring to mind an inter-social movement in the sense of a "policy of results" (Bosi, 1992), which has guided government policy practice throughout the last decades of the 20th century, propelled by said "technological convergence".

Analyses of this social process – and its contradictions – reinforce the *theory* that institutional inertia in the Brazilian educational system will tend to prevail if the current relationships are maintained between traditional performance assessment indicators – chiefly

enrolment, failure rates, truancy – and "non-traditional" indicators such as those that attest to its efficiency – or the "quality of the learning process"[2]. Therefore, if from the point of view of increased enrolment, basic education specifically has only reached universal levels at the end of the 20th century, in the 1990s[3], the same cannot be said in relation to the indicators that relate to adequacy of content, standards and resources for a significant part of the population that historically represents the social layers that have been sidelined from the modernization of productive and social relationships. Mello (1991, 48) defines the movement as "worthless expansion" when rationally analyzing the intentions behind the guided actions and expansion policies with the macro-social and economic scenarios observed in Brazilian society during those decades:

> a. the development model itself that was based on unqualified, cheap labor, massive ingress of foreign capital, abundance of raw materials and the inception of a small, controlled elite of technocrats, to sustain the process of technology importation;
> b. the federal government's transfer of the cost of quantitative expansion of the educational system to state and municipal governments, concurrently with a process of fiscal concentration at federal level;
> c. a powerful and extremely complex and contradictory combination of corporate interests within the State apparatus, involving: the companies contracted to provide school construction services; the political class and its clientele, which always exerts pressure to have its own school; the middle class, which had access to private university education, mainly sought the teaching degrees and entered the job market demanding to work in the public system; the private education sectors, which had a captive market among the future public school professionals.[4]

As such, recent statistics show that among the 34 million young people aged between 18 and 29 years, living in Brazilian cities, 21.8% have not completed primary school – in other words, did not finish 8th grade – and 2.4% are formally illiterate. In addition, the IBGE/PNAD 2006 (*see footnote 3*) states that data regarding the difference in the rate of illiteracy and school truancy varies between states and regions: Alagoas – a state in northeastern Brazil – leads the ranking with 46% of people who did not finish primary school or are not literate, while in São Paulo the rate is 15%; these extremes constitute the macro-social scenario of contradictions in the inter-social movement which characterize the possible fields of application for technological conversion, as per Fig. 1:

[2] Given the difficulty of addressing the quality of education, some authors prefer to talk about quality education, such as Schwartzmann, among others, in Velloso, J. P. dos R. & Albuquerque, R. C. *Educação e modernidade*. Petrópolis: Fórum Nacional/Vozes, 1993

[3] The process that has occurred since the beginning of the 1990s is remarkable, when the rates were at 84%, in the 1930s only 21.5%, compared with the current rates that show that 97% of children aged between 7 and 14 have access to basic education. (*cf*. BRASIL. Instituto Brasileiro de Geografia e Estatística/Pesquisa Nacional por Amostra de Domicílios, 2004 - 2006)

[4] Mello, G. N. and Silva, R. N. "A gestão e a autonomia da escola nas novas propostas de políticas educativas para a América Latina. " /*In*:/ *Estudos Avançados*, 12 (5), 1991, pp. 45-61.

Expansion of perception / National security / Computer modeling of the planet / Robotics/intelligent gadgets / Unification of Science/Education / Human-machine interface / Improvements in Physics/bio-medicine

Figure 1 –Possible fields of action for Technological Convergence
Source: ANDRADE, Thales Haddad Novaes de; SILVA, Lucas Rodrigo da, and GITAHY, Leda. New policies for science and technology and the impacts on public research institutes: a case study in Brazil. *Bras. Political Sci. Rev*. [online]. 2013, vol.7, n.2 Accessed on 29/06/2014.

The use of the expression "technological convergence", first coined by Roco and Bainbridge (2001), might, at first glance, suggest an element of harmony; but it might just as easily suggest this article's epigraph. However, in this article, the intention is to analyze this process as one of the "battlefields", as per Bourdieu (1992) since this concept merges a series of factors of an intra- and inter-social nature, which this article aims to deal with by analyzing an intrinsic movement of contradictions and differences.

In fact, in this sense, the complexity of the meaning of "technological convergence" will be analyzed based on actual experience of the process of inserting NICTs in Iberian-American countries in one of the fields of application and, at the same time, on the generation of the pre-conditions, that is, education and its socially accepted *locus* – educational institutions. In Latin America's case, in general and overall, the movements that deny and/or affirm public policies concerning insertion of new technologies as part of the modernization of social relationships present some vicissitudes that are typical of the analysis in question.

Note that alongside unification and science, education represents one of the possible fields of application for technological convergence processes and products. Next to other fields such as "robotics/intelligent gadgets", Figure 1 shows part of the scenario of an intra- and inter-social movement with "Unification of Science/Education". In it, the subjects have a dialogic relationship governed by scientific-technological knowledge where the frame of "technological convergence" constitutes the *locus* of contradictions, or the "battlefield", as Bourdieu put it (*op. cit.*), in which its occurrence can be perceived in educational institutions when they decide in favor of implementing NICTs in their daily routine.

1. TECHNOLOGICAL CONVERGENCE AS A 'BATTLEFIELD', HIERARCHIES AND THE SOCIAL INEQUALITY FACTOR

Studies on the Sociology of Knowledge enable the processes of production, appropriation and dissemination of technological convergence to draw closer to the processes that characterize in-depth knowledge of Information and Communication Technologies. The advent of microelectronics would be one of the factors that would enable possible analyses by some theorists that were fundamental to comprehending the "battlefields" that typify the current moment in contemporary society.

Following a tradition of critical analysis, Lojkine (1995) and Schaff (1995), among others, are on the same track when it comes to comprehending the developments in the use of computers in certain societies. For Lojkine (*op. cit.*) the computer is not purely an intellectual technology or a mere instrument for representing the world. It is an instrument of transformation for the material and human world, born from the demands of the American military and industrial complex. For Schaff (*op. cit.*), the emphasis is on the condition that the computer is a human creation and therefore, part of human culture. It is worth remembering that for this author, the idea of culture is related to the totality of man's material and spiritual products over a certain period of time and in a certain country; note that he considers the concept of national culture – either in the wider sense, encompassing all of humankind (universal culture), or on a supranational scale (territorial criteria based on common language, religion…). It will be precisely on this concept of culture that Schaff presents three problem areas: a) dissemination of culture; b) dissemination of supranational culture; c) dissemination of new personality models and of a new social character for man, which are connected to the first two sets of questions.

The questions that refer to culture are made more complex by the fact that the computer will revolutionize the actual process of creating culture, whilst serving many purposes such as, for example, providing artificial "super-memory", which will "take the pressure off" human memory, being able to carry out combined operations and a faster learning process for students, according to Schaff. He also stresses that the possibilities for using the technologies are still blocked by "lack of understanding" and that children and adolescents find it easier to learn new communication and information codes.

The findings presented by Lojkine (*op. cit.*) are in line with the various approaches in the treatment of new information technologies in the context of their insertion into organizations, interactively and as a whole. Lojkine draws attention to the problems that relate to the "information revolution": the question of the lack of rigorous definition of the nature and types of information dealt with by the information revolution and the confusion between the economic logic of commercial profitability and the specific – non-commercial – logic of how information is treated.

On the question of absence of definition as to the nature and types of information, Lojkine (*op. cit.*) raises the issue that information can be kept open and interactive or can be partial, specific, in a small informal group or within an organization's action strategy. This polarized opinion on open and interactive information versus coded information hides the question of whom and what social group shall have access to the strategic information.

The issue of the confusion over the economic logic of profitability and non-commercial logic, when dealing with information, manifests itself in the correlation made with the "industrialization of information" and "industrialization of culture", both of which are manifested in expressions on the "treatment of information". This confusion occurs due "(…) to the lack of a clear analysis of the opposing relationships that develop in the evolution of mass media, between the

logic of commercial profitability and the non-commercial specificity of social relationships founded on communication." (Lojkine, *op. cit.*, 30).

One can see that Lojkine places information in a ring of disputes and hierarchies when he stresses that information as a public and universal service is up against a type of information that is a commercial product, "adapted" to specific clients. According to this author, specific information, arising from segmentation of target publics, is peculiar because it is serialized and of a squared-off nature (sectioned for specific publics), contrary to universal, egalitarian information, which does not hijack the societal conflicts and challenges under debate.

Schaff (*op. cit.*), on the other hand, insists that the problem of information technology does not lie in the way it occurs, but rather in the process of managing the results and how to use the available data. As this process expands there may be a gap between those who possess and those who do not possess the appropriate information, and this division may take on a class nature. Schaff admits a few sources of danger in the information revolution process, among which is the creation of a new dividing line between people, such as: a division between those who have something that is socially important and those who do not. This "something" is information in its widest sense, which under certain conditions may be a discriminating factor in the new social division. To corroborate his argument, this theorist stresses that currently a clear division can be seen, similar to the "uncultured" masses in computer science, between those who know and those who do not know how these machines work. The author does not refer to the difference between this "knowledge" and "ignorance", since it is a transitory phenomenon that will soon disappear once school curricula are modified. In this *locus* – of school curricula as a legitimate "cultural plan" (Sacristán, 1988) for implementing new cultural practices that are part of innovation – two examples emerge of the counter-movement against dissemination of technological convergence in modern-day Latin America, where high rates of illiteracy coexist with innovative experiments in new technology.

3. TECHNOLOGICAL CONVERGENCE X HIGH ILLITERACY RATES: A CASE IN BRAZIL

Speaking specifically of Brazil, the example of Macaíba is cited. Few places in Brazil have such a high concentration of illiterate people or such a high infant mortality rate as this town of 65 thousand inhabitants, located 14 kilometers (8 miles) from Natal, capital city of Rio Grande do Norte state in the northeast of Brazil. Residents traverse dirt roads in pony traps and go shopping without a cent in their pockets, merely carrying old items with which to barter. Come May, an advanced research center specializing in neuroscience will begin operating in this scenario of poverty and backwardness. Its improbable location is certainly surprising and reflects the essence of an inter-social movement.

Another notable factor in this example is the unusual unanimity that has pervaded the academic world – inside and outside Brazil – even before its inauguration, demonstrating a clear shift in the intra-social sense. From the start, neuroscientists associated to top laboratories described it as one of the best of its kind, an assessment backed up by objective facts. The first is regarding its facilities, which match those of any top-of-the-line laboratory. The second, and this is the center's most important differential, is precisely the type of research that will be developed there: in general terms, the idea is to create prosthetics that are able to capture the intention behind a movement in the human brain and immediately execute it, something that if successful, will open new possibilities for those suffering from motor impairment. In neuroscience no other current study has been so commented upon or has influenced so many scientists, according to a survey by *Scientific Americ*an magazine.

The person responsible, Miguel Nicolelis[5], will be regarded as the representative of a "crucial experiment" (as per Khun, 1972), because before him, machines built to observe the brain could only capture the movement of three types of neurons responsible for motor memory. This research work in a field of neuroscience is a step forward in that it has resulted in technology that can describe the behavior of 130 neurons simultaneously – from the moment that there is intention to move an arm or a leg until the movement is executed. Within this scope, the experiments conducted by Nicolelis, hitherto on mice and monkeys, have shown that it is possible to replicate a movement with 90% precision. This is done with a computer that reads the information in the brain and sends it to the prosthesis, to which it is connected. In 2009, he began to test his technique on humans. The research was conducted in the new laboratories in Macaíba, chosen as representative of somewhere where this action would represent "radical change", since "the people would always live far away from science" (interview for *Veja* magazine, 02/04/08). During this period of installation, the scientist set up a temporary laboratory near to a public school, whose community has an average family income of one minimum salary (around EUR 157). The children began to have science lessons in their free time. The experiments amuse the children, as told by one of them who says, "I hated science; today I dream of being a chemist," (statement recorded in an interview in the abovementioned magazine). The interaction established with the scientific community, local government authorities and with the schools near to the laboratory permit a glimpse of the intra- and inter-social factors that characterize "technological convergence" in its production and dissemination processes; assessment of its impact presents discrepancies similar to those described by Khun (*op. cit.*) as a paradigm in crisis.

3. NEW REALITY, OLD INSTRUMENTS

Therefore, still in the sense of analyzing the inter-social contradictions that characterize technological convergence, ever since the 1970s various authors have highlighted the fact that, faced with the important and radical transformations underway, "we still do not have a system for measurement, an adequate accounting system, legal representation or regulation, even though these elements are fundamental to all modern forms of power." (Lévy, 1997, 87). One of the main difficulties in this arises from the lack or inadequacy of the theoretical approaches and traditional measuring systems, which are based on "physicality" and the scarcity of resources. This difficulty is constituted in one of the examples about the place occupied by inter-social relationships in the technological convergence process: in economic and more traditional spheres, the focus is on investment in fixed assets and production of material goods, with relatively sophisticated instruments having been developed to measure them.

As previously stated, in the current holding pattern intangible resources, such as knowledge, innovation, cooperation, skills and competency assume an even more central and strategic role, which endangers the traditional methods for defining, understanding, evaluating, measuring, regulating, valuing, charging, rating and guiding their production, treatment and dissemination. (*cf*. Figure 2)

[5] A doctor who moved to the U.S.A. 20 years ago to become a researcher. Available publications can be found at http://www.sciam.com/podcast/episode.cfm. Recently, he achieved worldwide fame when the 'exoskeleton' was exhibited at the opening of the 2014 World Cup, in Brazil.

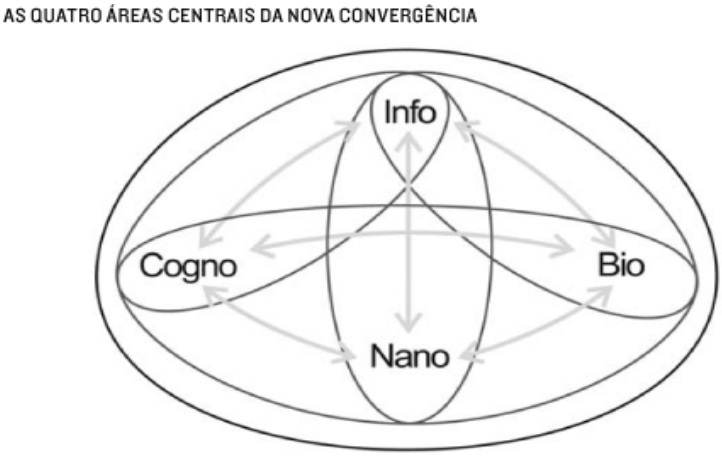

Figure 2 – The four main areas of the new convergence
Source: ANDRADE, Thales Haddad Novaes de; SILVA, Lucas Rodrigo da, and GITAHY, Leda. New policies for science and technology and the impacts on public research institutes: a case study in Brazil. *Bras. Political Sci. Rev*. [online]. 2013, vol.7, n.2 Accessed on 29/06/2014.

Dissemination of the new pattern has contributed towards even greater exposure of the crisis facing classic economic concepts and thinking, since the consumption of information and of knowledge – both intangible, inexhaustible and enduring resources – does not destroy them and disposing of them usually leaves no material traces. Assigning or selling them does not mean losing them. Additionally, and unlike traditional manufactured products, many of the new goods and services can be reproduced at an almost insignificant cost. As a result, the great majority of schools of thought still offer little understanding of the economic method peculiar to this new millennium, or of the transformation taking place in their knowledge bases; the use of a model conceived to cope with old-style products and services is still prevalent along with other typical characteristics of the industrial era. Most of the more profitable and progressive activities associated to the new pattern are still invisible, given the lack of vision with which to see them, and as a result, of measuring systems that would allow their importance to be gauged and monitored.

The concern grows therefore, over how to measure and market these intangible, digital goods and services, and how to account for and adequately evaluate them. One example is the U.S.A.'s Bureau of Economic Analysis reclassification of software as a form of investment, rather than as a business or interim material cost. This change in concept has meant a substantial increase in NICTs' share of the country's national accounts, rising from US$ 28 billion in 1987 to US$ 149 billion in 1999, a period considered significant for tracking this phenomenon. This fact has encouraged debate in other areas of U.S. government, such as the Federal Reserve Board, with a view to furthering this trend and including other intangible investments.

This same lack of models for evaluating and measuring the impact of educational projects linked to fields of action for technological convergence seems to accompany the plans for insertion of the new technologies into educational practice. In this specific case, the intra- and inter-social movement takes on a guise of 'resistance to' when denial of the importance of inserting these different forms of understanding new technologies is observed daily in schools, or as Alonso (1995, 63) described it, institutional inertia:

> *Information technology materializes in some machines which, when divested of their own history and viewed in isolation, can be fully integrated into the formal structure of any organization, including an educational one. The organizational culture will do the rest when faced with this complete integration, because at the end of the day, nothing much changes.*

However, it can present a sense of 'resistance with', when it takes on these techno-scientific practices in education, since according to Postman (1994, 204)

> (...) education is an excellent antidote to the nature of the anti-historic technopoly, saturated with information, a lover of technology (a fact confirmed by a curriculum in which all subjects are presented as a historic stage of human development; in which the philosophies of science, history, language, technology and religion are taught, and in which there is a strong emphasis on the classic forms of artistic expression. This is a curriculum that goes "back to basics", but not in the way the technocrats advocate. And it is, without doubt, in opposition to the spirit of the technopoly. **Nota do tradutor: Faltou fechar o parêntese no original.

FINAL CONSIDERATIONS

> New technology always presupposes a welcome from society; a waiting period that often begins even before the technology itself has emerged.
>
> (Darnton, Robert. *O beijo de Lamourette. Midia, Cultura e Revolução.* São Paulo: Companhia das Letras, 1990, p. 112.).

The studies carried out have sought to demonstrate the idea that "technological convergence" introduces an intra- and inter-social movement characterized by contradictions and principles that establish the scale of what is 'new' in scientific work. In this sense, we can conclude that conception of the scientific-technological process is important as a socially organized activity, desired and controlled by a series of social structures in accordance with society's interests and dominant structures at a given moment in time.

The sociological proposals deal with "innovations" or "discoveries", which throughout history, have stood against these interests and have been omitted, prohibited or contested in a more or less radical manner, depending on the risk faced by intra- or inter-social relationships. The archetypal example could be to consider the vigor with which the Church contested Galileo's discoveries in astronomy. At the same time, other discoveries historically considered too "premature" to be integrated into social structures can also be included. The principle behind the steam engine, for example, was known since Antiquity, but an entire set of social and political factors in the early days of capitalism were required before it could emerge as a productive force. The extent that intra- and inter-social factors legitimized the emergence of scientific-technological innovations is clear and goes hand in hand with the process of "technological convergence".

Therefore, only new elements that do not conflict with established structures and interests can be integrated into the recognized body of knowledge and the society in question.

As such, either the educational policies for insertion of NITCs or the denial or partial acceptance of "technological convergence" in Latin-American school practice seems to make the contradictory scenario of intra- and inter-social movements even more complex: the relationships between science and power, divided by the infrastructure, seem to be at risk. It is worth remembering that this movement is not recent, since science (as well as technology) in its active sense, has become a constituent element of production, and is part of the inter-social relationships that characterize the "power games of the social classes in modern societies."

Still within the context of Latin-American countries, the movements that typify this phase of development in the structure of society's capitalist relationships should be quickly adjusted, according to some theorists like De Rivero (1998, 52). This is so as not to be further damaged by the natural selection of technology and the market. They should therefore seek to modernize their production quickly and also to start exporting manufactured goods with higher technological content, as can already be observed in the balance of payments of some countries, such as Brazil:

> They will need to be freed from the trap of selling only minerals, agricultural products, wood, leather, drinks and textiles and start to export other more sophisticated products, such as electronics, semi-conductors, bio-

> technology, pharmaceuticals, petrochemicals and chiefly, software and spare parts for transnational telecommunications, transport and aerospace industries (…). They should also invest in more competitive national services, in modern infrastructure and most of all, in technological research and development.

As such, having got past the stages when workers in major factories destroyed the weaving machines that were falsely defined as the enemy of the working class, mobilization of the new technologies in favor of these social classes or types (in the view of Marcuse, 1967) depends on new inter-social relationships. Among the social institutions directly involved in these processes, the school functions as a melting pot, which while condensing these relationships also represents an important *locus* for appropriating and disseminating technological convergence, with the purpose of overcoming the *status quo* of the dominant social order. In this challenge, the role of the manager seems to gain new importance as the mediator of these paradoxical movements that typify the insertion of NICTs into daily school practice.

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