Postmodern Openings

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About iSTEMIA – Innovation in Science, Technology, Engineering, Mathematics, Informatics and Arts

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Abstract: Then involvement is essential. You cannot stand aside as a member of a community. The real involvement presupposes first a connection at the level of understanding the phenomenon, an empathic relationship with the studied phenomena and processes, relationship that generate intuitions, leaps in understanding and knowledge, discoveries, revelations. The paper is based on the idea that information technology and communications today generate a global interaction based on a complex computer network, which forms a sphere that covers the planet, assimilated with a global intelligence, to which we can consciously adhere becoming a synapse. a global neural network.

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1. Introduction

We are living in a period when society cannot keep up with the accelerated development of technologies. We see ourselves in a situation where we cannot control the negative impact of mobile phones or games on new generations. The whole society is *dominated* by the smart phone. Entertainment offered by information technologies and social media, attracts all the resources of young people and places education at the tail of their preferences. Many people see the phone as *the multiple mirrors*. They photograph and flood the social media space with their image in the desire to be seen, but without showing anything. But the phone should be perceived as a window. A *window to knowledge*, to understanding this world, a window in front of which you marvel at the complexity of the Universe at all levels, through which to communicate and interact with information in different forms. Does this school understand this? Does the school have the power to use this gadget to achieve its noble ideals? Does the school understand the future of humanity and what society is headed for?

The change of the quality of the educational environment is not made by constraining the social factors involved, nor by legislation, but by raising the awareness of the society about its needs. Education is done in school but also in the family and society. Unfortunately, everything is based on *the image*, the advertisement, and the desire to show that something good is being done. The society is concerned with analyzing and presenting the image of politics, with all its problems and unfulfillment (even when it presents positive elements). The family leaves the school free and only intervenes when it has the impression that the young man is not sufficiently praised (without seeing if he deserves or needs praise). The school is inertial, adapts hard, reacts late, does not anticipate and is not receptive to the immediate needs of society but quickly displays any small achievement. The paradigm shift in education at the planetary level has long been prohibited. This phenomenon leads in the short term to chaotic searches for a solution, without noticing that the environment itself must be reorganized by access to experiment and digitization. The fourth industrial revolution makes us seriously think about how society will be over a decade (maybe two) and what our role will be then. Will we remain simple consumers? Already the new generations are trained to communicate otherwise, already using the ordinary computer and interacting with information as simple and convenient. Calligraphy has not been done in school for years and the number of books read by young people has dropped dramatically. We are talking about *a new literacy*, the one given by IT, and also *illiteracy* (as it was

initially defined). Reading imposes complex processes on the mental level, while visual information is more accessible and convenient.

The intelligent machines can *learn* much faster and better than the biological brain does, can access information from any field much easier, and can process metadata with ease of envy. The school is stubborn, however, to go in the direction imposed by the ancient thinkers, without giving too much importance to the fact that critical thinking of the machine could be much more effective in some situations. What remains to be done, thinking biological beings? Creation - *the divine grace dripped by divinity*, the joy of being born, imagining, seeking solutions that others have not thought or have not reached. We innovate every day, consciously or not, more or less, because we are always searching, and seeking to experiment. (Milici et al, 2010) We think, improvise, analyze, try, because these things differentiate us from the condition of "*talking animal*".

2. The story and the game

The fourth industrial revolution brings the manufacturing line in a position to adapt automatically to the requirements of the market, each product purchased produces an automatic reaction at the level of the manufacturing industry, the machine can make decisions without mistake in medicine, in the low field, in the management of activities, machines without the driver is already on the road. The evolution of science and technology surpasses the power of understanding and awareness of the human environment, making its place in history and making it talk only about it. Information floods the planet and drowns us free time. The dividing line between the real and the virtual environment is increasingly difficult to draw. The wall of complexity is pierced by the advent of the quantum computer. Programmers need to learn how to program them, new professions are waiting to be born in the Humanity laboratory. What remains for the man to do? To return to the innocence of childhood and play. *The mathematical theory of the game* becomes very topical. The experiment must be an opportunity for learning and discovery, the game of knowing, of knowing, of understanding nature and integrating into the Universe. The final goal must be based on the complex framework that allows *knowledge* based on a concrete experimental environment. The school must become an educational space through discovery and an inter- and trans-disciplinary approach for a team of students. Innovation must overlap over an ecosystem of interactive and metadisciplinary knowledge, consisting of knowledge in art, science, technology, mathematics and engineering. Essentially the school must lead to

the fusion of information into knowledge designed at the social level and interconnected with nature. The laboratory is no longer *a space* but *an environment* that answers the initial questions and leads to new and new questions.

The laboratory must be restored into education, in school. It can be the stage of the educational show, it must be part of the educational environment and it is the path to modern education. Nothing complicated because in nature self-organization is a ubiquitous law. But can self-organization manifest itself in an inert educational system, satisfied with the fact that it still exists and is convinced that society will never give up on it, whatever its results? How frequent are bifurcations in such a system? What could trigger a major change throughout in this system?

Today we can digitize everything. This led to major economic changes, to a thoroughgoing study of knowledge, but did not produce that trigger necessary for major changes in education. Digitization leads to a change in attitude towards education, young people are willing to plunge into the virtual, nontangible, immaterial space, to develop a computerized thinking, continuously adapted through self-learning. Communication in the virtual environment requires the emergence of specialized languages. Classic interhuman communication becomes a burden and a handicap in the super-computerized communities. The notion of *friend* is changed. If you were able to share your problems with a friend a few years ago, today this is equivalent to becoming vulnerable in a virtual society that instantly analyzes and catalogs you. Adaptability to the virtual environment is the one that most often makes the difference between success and failure, both in school and in life. Second by second our lives depend on our image from the virtual space, and WEB 2.0 allows us not only to interact easily but also to express ourselves without the complexities we have in society. We have a dual identity, one in society and one in virtual space, bursting from behind the screen or eager to show the little we have to show. We all need an education for the virtual environment as well. For now, we are adapting, some are learning from mistakes, others are more involved, they are showing us how they would like to be seen, and a smaller part, as they actually are.

In these conditions, motivation is essential because learning and education depend on what the individual wants at a given time. In a world where everything is developing rapidly, the complexity of the problems waiting to be solved does not allow for a vague preparation, but it depends on an flexible and complex involvement, based on a completely different educational approach. But in a society focused on the need of the individual, in which the economy provides comfort to the smallest detail, the

motivation no longer exists. She must be trained in school. Contemporary teaching techniques use *the story* - the story of knowledge, the story of current technologies, and through them at *the play*. The story is the one that attracts the interest in computer games and the successful video productions, the story is the one that produces feelings in a cold society, where productivity and financial interest predominate. In a society that needs *human robots*, economic efficiency and a post-humanist civilization focused on strict rules and emotional balance, *Man* disappears. The contemporary man demanded on the labor market today is formed by an educational system that does not understand the notion of *Man* in a society of the future, interconnected with nature and technology alike, eager to dive into the story and seek the challenge of the *game of knowledge*. The contemporary society still does not know what to ask and the contemporary school still does not know what to offer. Among them, in the middle, is the young man subjected to a period of modeling that he is not asking for, does not understand and does not like. We are talking about a crisis of society superimposed on an ecological and climatic crisis of the Earth ecosystem. At the same time there is a confrontation at the level of the paradigm in science. It's a World in which everything is changing ... fast.

3. To innovate in education

The notion of *crisis* has become widespread because today everything is going fast. The climate crisis interferes with the economic crisis, with the existential crisis, with the information crisis, war (as we have learned) is no longer a solution for contemporary civilizations and all humanity see education as a solution in this process of global restructuring. In fact, we need a different kind of thinking. An integrative thinking, a critical thinking but with creative accents. We need innovation in all fields of society, in science, technology, engineering, but also in art in mathematics and computer science, we need new tools to model the future posthumanist society. All this can be formed through an integrated education. We must find all that is good and useful in what surrounds us. Locked in a three-dimensional space we have the chance to escape in 4D using the virtual environment. Escaping from the three-dimensional cage can lead us to conceptual breakthroughs, access to new energies, space-time detachment, understanding of the laws of the Universe.

The problem of training young people involves a dynamic, self-adaptive process, it is a planetary problem and requires the definition and design of new features. The concept of *Education* must be reconsidered and

adapted to the demands of today's society. Humanity creates its future and the school must take part in this creative act. Only in this way can we give young people a chance. We tend towards a society in which each individual has a financial situation that allows them to survive but not every individual is happy, enjoys what he does and develops harmoniously. The Western urban mentality sees financial achievement as a supreme goal, it sees *human being* only as a machine capable of profit and its development only on a narrow field, in order to make it as productive as possible. The financial prosperity of the individual must be the support that will ensure a profound experience that will ultimately *shape* it.

The definition and then the formation of attributes that define the human being starts in the family until the access to the institutionalized forms of education. The family provides the basis of attitudes towards community, work, empathy, and the relationship with nature, with living, with the Universe. The hormonal outbreak of puberty involves the refining of emotional states and then, the longest stage focuses on rational formation, deep understanding of the world, abstract thinking, assimilation of aptitudes, skills, abilities, results following the choice of an area of interest, so the youth is structured in the social structure.

But an educational system will have to form a useful member of the community at the same time with a personality capable of understanding the world in which he lives, able to feed on the universal culture, interact with the local tradition and think about his peers, it brings happiness and fulfillment for him. An educational system must help you to find a meaning in your life, find your way, teach you to always learn, form your reasoning, critical thinking, and creative thinking. The simple transfer of knowledge, without analysis and synthesis, without the capacity for self-development, self-evaluation, understanding and empathy, does not place the young man in the future but definitely binds him to the present. The factories that make millions and millions of *identical screws* are gone. Today each screw has the shape adapted to the requirements of the user. Why should there still be schools that make millions and millions of *identical specialists* without taking into account each person's personality and desire? The problem of an integrative approach - the problem of *initiation* if we refer to artistic techniques - must be taken up by the educational system and applied to each person.

The educational process aims the training, for an average period of 12 years, a young person for integrate socially. Without a vision on the social dynamics, without foresight assessments on the future needs and opportunities of the community generated by the accelerated technological and socio-economic transformation on a global scale, education cannot be

done. The development in the field of educational technologies must be based on the evolution of science and engineering, on the evolution of the young people's psychic abilities, on understanding the cultures of the world and, finally, on the future needs of society. We need generations of people capable of developing knowledge and culture and building machines that ensure well-being and comfort. *The joy* of understanding this Universe cannot compete with *material happiness* whatever it may be. We provide our young people with all possible external comfort (food, clothes, gadgets, the possibility of asserting themselves, of being "*seen*" in the community) but we think very little about their inner tranquility, the spiritual nourishment of which their soul does not even know that you might enjoy it. Are we sure that this means education, that they are truly happy?

Education has many forms: formal, nonformal and informal education. The fact that a young person goes to school does not mean that they all benefit from *education*. Developing the spirit of observation, the patience, the intuition, the ability to synthesize, essentialize and correlate, so useful for understanding the world we live, depends on *motivation* and motivation depends on the degree of maturity of each person and his desire to learn the mysteries of the universe, the curiosity, the inner anxiety and the astonishment.

The meaning of the expression "to receive a lesson from life" is different from the meaning of "to receive a lesson from school" because the life lesson follows from an unpleasant event and the lesson at school is based on motivation, the joy of learning something new and useful. School lessons must be the means by which you receive answers to some essential questions (mysteries) and which are the germs that generate the chain for us and new questions in a *true story* that has no end. Just as in a sports game, you train your skills and do almost no effort to win, just as, motivation in school must lead to knowledge, in a mental game with clear rules and challenges. We sink into the story through the play of reason and experiment.

Permanently, professions appear and disappear, and it is said that the profession of educator (teacher) will never disappear. Not true. The teacher, as he once was, is gone. Today's teacher will also disappear, because this is a lot of innovation in the school, because the school also changes its role in the young man's life. The teacher of the future will probably manage the young person's individual educational path according to his wishes, aspirations and performances.

A program that is developed in the West is based on the dissemination of the latest scientific news in society, *Science and / for / with Society*, which contains presentations aimed at popularizing and

understanding scientific theories and the consequences of their application. This program is intended for the general public and is not based on a distinct educational method. The content of these presentations, the value of communication, and the assimilation of information from the broad mass of people, will depend the cultural level of the community, its ability to easily assimilate the results of applying new technologies, the adaptability of individuals to the society of the future. This understanding eliminates the *fear of the new*, reasons why this program should be promoted by local leaders, companies and the educational environment in a community. Understanding a phenomenon from *nature* is perhaps the most important and difficult part of an educational process. Understanding involves the germination of a specific mental function, beyond the automatic reproduction of some notions, involves the formation in the cortex of an intuitive model based on small examples, which leads to restructuring of the vision of the World. Understanding leads to Knowledge and is the only mechanism that forms mental models of phenomena, leading to discovery and innovation. There is a periodicity and an evolution in stages, at the level of each person, but also at the level of society, science, technology and industry. This evolutionary profile is similar although it evolves at different time scales.

At the scientific level it was started from Aristotle, the one who completely neglected the experiment and put maximum emphasis on reason and contemplation (as did Plato and Archimedes in the development of mathematics). But science is not mathematical, even though they are intertwined and mutually supportive. Curiosity introduced the experiment in modern science. She started shyly with Leonardo da Vinci (the last great *homo universale*, artist, engineer, researcher), but the major leap was made by Newton, who, unlike Descartes, places the major emphasis on experiment concomitantly with generalization and abstraction. Abstracting uses the concepts for idealize. But hypotheses, however elegant or intuitive they may be, must always be tested by reproducible experiments.

The scientific method, as an instrument of progress in knowledge, leads to the emergence of technology. The method involves observing the phenomenon, formulating the problem, generating the hypothesis and finally conducting the experiment to validate the theory. All these stages are based on creativity and critical analysis, so you need objectivity, fidelity, validity and standardization. The technology combines processes, operations and methods, can be applied to matter, energy or information (data) and leads to a product.

It is the engineering that helps to create the technology and uses it efficiently, generating productivity, profitability, value. Industry and

technology are born with science, in the 14th - 16th centuries, but much more timid. The First Industrial Era is based on the steam engine at the beginning of the 18th century, following the end of the same century to bring electricity as the engine of the Second Industrial Era. The end of Second World War coincides with the start of the Third Industrial Era, when the computer evolves, and the material resources are gradually competed by the immaterial (informational) ones. The Fourth Industrial Revolution, although it remains under the imprint of the great engineer Nicole Tesla, is not very clearly defined because concepts such as biotechnology or bioengineering try to change the economic conception of the world. *Biobacking* today defines the risk of managing one's body using medical, chemical and electronic techniques, the person becoming the designer of one's own life or of another person's life. Thus appears the notion of technoethics, a notion that has a semantic area in continuous development, difficult to define under the conditions which the technologies is developed and multiply, the information grow and grow, and the border between the harmful and the necessary dissolves into subjectivism.

Today, intelligent machines allow the emulation of the learning capacity and advanced analysis of information, the structuring of efficient algorithms, but they will use a series of invariants identified as a result of the automatic learning process and will efficiently use the results obtained to reach the objective set. The human mind has the ability to understand the phenomenon, to analyze it critically and to improve it through innovation. The machines can't do that. In the human mind there is a process of *discovery*, *understanding*, *illumination*. This phenomenon that are not necessarily related to mathematical relationships or to dry algorithms. *The penetration* is deferred by *legitimization* and the diffusion in the *social* one is different from the diffusion in *virtual*.

Today, humanity has the chance to collaborate on a global scale, to share knowledge in a universal virtual environment, easy to access and understand. Transhumanism aims to increase the human performance and implicitly of the society, with an emphasis on the engineer. The purpose of the engineers is achieved through the technology, that is continuously developing based on principles related to energy, resources, and ultimately price and consumption. The ideas that the human species must be able to overcome their biological limits with the help of new technologies already have millions of followers worldwide. Science is trying to break through the quantum barriers, of the Universe and not the last of life. Education can be applied at the living, but there are twins of education for the machines. With the first computer application, the man began to communicate with the

machines, but education is more than an information transfer. Education remains closely linked to life and through everything it produces, it must support life. The concept of *work* and *place of work* is lost in creation and innovation. The change requires the awareness that the new instruments, volatile, offered by emerging technologies, will produce evolving leaps, and life will become increasingly unpredictable and have a chaotic transformation in all its fields.

As in any area of life, competition also appears in education. The competition becomes one of the engines of education in the contemporary school. But the purpose of education is not to *be the first*, but to reach that through what you do to contribute as much as possible to the progress of your community. Competition, if necessary, must appear outside education. The engine of education must be the *motivation*. The competitive side distorting the educational process. The mental processes of deep understanding have their own rhythm, involve the sedimentation of knowledge and require a phase of *illumination* that is eroded by "faster" and "better", that can bypass the supreme purpose of education. Emphasis should be placed on the happiness generated by understanding, by finding an expected response. The ultimate goal of the cognitive process is to be able to understand. Otherwise you will not be able to truly assimilate. Education must respond to a need through motivation, not through competition. "Without ideas, without connections between phenomena, without history, there is no culture." (Marcus, 2013)

There are today, countless educational methods and practices, suggestions, studies, tests. The relocation in time and space of the activities, the dematerialization of the products and the virtual laboratories generate new methods and practices in education. In an Information Society, the learner has his own laboratory on the work desk, perhaps in the computer interconnected with a laboratory-on-a-chip. Motivation can transcend today's classical education. We no longer need legislative changes; we no longer wait for the start of the school year. On the world, we have online kits with a diverse character, which can be manipulated in improvised laboratories, thus transforming simple citizens into amateur scientists. Virtual educational mobility practically, transfers us instantly from educators in educated, transfers us between schools, subjects, mentors, in a global educational market, that no longer takes into account borders, nationalities, current, but what you really want. In such an educational market, anyone can innovate, can offer services, can train, if they understand the need, if they will not wait, and if they risk.

The amount of information develops explosively and uncontrollably due to digitization, creativity and innovation simultaneously, with the number of opportunities, which leads to mental blockages, the impossibility of their biological processing, difficulties to choose, difficulties to adapt, stress.

In response to the impact of the industry on society and as a result of the spectacular discoveries obtained by science, compared to other fields of knowledge, in the world is an increasingly important initiative to develop STEMIA education (Science, Technology, Engineering, Mathematics, Informatics and Arts). This current register different forms, is applied to all age categories and all levels of knowledge and aims to raise awareness of the need to develop certain skills and notions. "My proposal today, is to think a little about the revolution we are witnessing - some more enthusiastic, others more suspicious. Digital textbooks for first-grade students are in schools, and native-born digital children are living their education in a contemporary way." (Mironov, 2013)

The Fourth Industrial Revolution is turning the Planet into a world of consumers, and less of producers, including in the education field. There are many who want to access courses of any kind, but relatively few are those who produce new educational content. "The Knowledge Society raises to *product* level an idea, a concept, an educational method. This focuses on Creativity and Innovation ... a new economy is generated, a new value and this is equivalent to education." (Munteanu & Udriste, 2008)

Knowledge means exploring reality, training the skills to ask essential questions to the Universe and not to memorize methods for solving standard problems. Knowledge must be based *on a need* that is sprouted from motivation and extrapolated through continuing education. The society must react by reformulating the educational system, by a different school and by a common interest of students, teachers and parents. This is where appears the major interest of some priority investments of resources in education.

The notion of *life cycle management* of an educational product that allows the transformation of a creation result (scientific, technical, artistic) into an opportunity with variable validity, depending on the dynamics of creativity in the field, appears here.

4. Conclusions

At this moment, on a global level, the education system is the most refractory and inertial component of the knowledge society, based on the paradigm shift and having the technological progress as a motor. The

phenomenon of self-organization imposes a natural reaction to the modification but also a spark that will lead to a collapse generated by the increasingly obvious inability of the internal elements to capitalize on the old paradigm.

It is necessary to clearly define the concept of *educational technoetics* in a knowledge society in which, educational technologies are immersed in a complex virtual environment that involves continuous reinterpretation. The emotional effect diminishes gradually, and the new generations react differently to the challenges of society. The status of women changes and the equality of the woman with the man makes them have more and more common features, transferred and assumed by both parties and the dominant features are fading. (Pata et al., 2016) Identically, the transformation of the *man* into the *biological robot* is at this moment the phenomenon with which society must fight. The contemporary man no longer exists for himself, he transforms himself into the machine, while the engineers try to give the machine more and more human qualities.

Starting from the multidimensional concept of *Creativity*, until recently it was associated with Art (the essence of human creativity), but lately the semantics of the word encompasses the fields of economics, business, politics, sports (Milici, 2004), science, technology, engineering (Milici et al., 2009), mathematics and computer science. Generating an original idea can lead to artistic, scientific or technical creations and requires: originality, ingenuity, flexibility, fluency, efficiency, expressiveness.

The school must completely remove the inhibiting factor of creativity for students. They need to understand that creativity is not only realized by geniuses, and that creative act involves both convergent thinking and divergent thinking (Cropley, 2006). Essentially, the creative process has four stages: problem identification, incubation (a complex cognitive stage that processes information), illumination (a stage that appears instantly) and final evaluation. Illumination was the basis of all masterpieces of art (see da Vinci, Rowling, Mozart), great discoveries (see Galilee, Newton, Einstein, Bejan) and great inventions (see Tesla, Otto), but the creative process must include all four stages.

A creative person has imagination and intuition, is sensitive, original, independent and curious. A person's creativity depends on age, level of intelligence, and clinically it can be influenced by the tendency towards schizophrenia - specific to artistic creativity (Batey & Furnham, 2008] - and autism - specific to technological and engineering creativity.

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