TECHNO-PEDAGOGY OF CREATIVITY: FROM PRODIGIUM TO THE DEVELOPMENT OF INTELLIGENCE THROUGH NEW TECHNOLOGIES

Carla Pampaloni

Genius are rare, but potential talented persons are much more numerous than we can imagine. It's a pity that most of them remain unknown and dry up.

The current challenging era of *technological revolution* drives to a cultural, social, and institutional reorganization. The focus of nowadays reflection is the human capital. In a socio-economic perspective, the human capital, a set of knowledge, skills and competences of the members of society, can be considered, together with the physical capital, the main resource at our disposal for progress and development. Valorising the human capital makes society more competitive in terms of economic growth, social cohesion, employment with more qualified and paid jobs, and life quality.

In this phase of creative passage, learning changes into a the *life long learning* model, involving young and adult coming from all over the world. This new pedagogical, sociologic and economic model creates a synergy between social capital quality and collaborative networks within practice communities.

It is therefore necessity to acknowledge that the non-valorisation of talents blocks the possible actions oriented toward the human capital development. With talent we mean *a person's natural aptitude to succeed in a specific activity*. Starting from the childhood. While disability is quite recognized, the value of intellectual talent is not sufficiently taken into account, and can even lead to discrimination. In didactic projects, the lack of *equal opportunities* has negative effects both for children and countries. In the Middle Age, a talented child would have been observed with astonishment in fairs, as *monstrum naturae* or *prodigium*. Statistics point out that in Italy every class has one/two potential *children prodigy*, with a double intelligent quotient compared with the average. Some of them can read when children of the same age can hardly recognise vowels, write backwards like Leonardo da Vinci, and find problem solutions without logical passages. They are the so called super-hyper-gifted persons. They are *different*. One every 25. Rarely acknowledged, often socially excluded.

The educational institutions, which should create a virtuous circle of growth, take erroneously into account only the *average child*'s needs, generating in this way the average citizen. Such approach reduce the individual diversities and generate difficulties for gifted children in the name of social cohesion and integration.

The fact of not recognizing talent as a potential of everyone, implies that intelligence, meant as collection of individual and personal possibilities and capacities, is not sufficiently valorised and trained and can be lost forever. As the famous German psychologist William Stern affirmed (1916): *giftedness represents only the possibility for achievement: it is not the achievement itself*. It is a concept highly related to problem solving, creativity, and to the tools allowing the individual to learn during the whole life path.

The power of creativity is heritage of everyone, although at different levels, and implies invention, elaboration, organization and planning. The need to develop a pedagogy of creativity serves as stimulation, strengthening and self-realization in order to create a free personality, not subject to conformism. *Creativity is the way you solve a problem, it's finding the rhyme you were looking for, it's the colour of the eyes you are painting. You can find creativity when children play, or in the elderly's will of living. Creativity is life adventure!*

Many are the psychological definitions of creativity, whose concept is complex and fleeting. Anyway, the different psychological theories agree on two main points:

- Creativity is a psychological gift common to everyone;
- Like all other human faculties, it can be developed thanks to the influence of environmental and educational factors which during the evolution process may represent inhibitory and/or facilitative elements.

Creative, analytical and practical intelligence are the basis of Sternberg's triarchic theory that helps us understand the "Flynn effect".

As the years go by populations with the same age (ten, eighteen, twenty-year old etc…) seem to become more and more intelligent. That was observed starting from the beginning of the last century and it became more evident in the 50ies, through the improvement of test results, in particular of the less cultural ones, based on

abstraction and reasoning (*pure* intelligence). Such phenomenon, "Flynn effect", from the name of the researcher James R. Flynn that defined it, is in part due to schooling growth. What has changed?

Robert Sternberg, with the triarchic theory of intelligence, discerns three kinds of intelligence: analytical, creative and practical. The analytical and creative intelligence are the most evolved and entail forms of thought like analyze, criticize and innovate. Practical intelligence is the *rawest* one, related to an original and concrete thought which has difficulties in abstracting data and doesn't search natural laws. This level of intelligence deals with the immediate "being able to do", it therefore doesn't go beyond the empirical data, being limited to "here" and "now". Thus, in the peasant pre-technological world, practical intelligence was sufficient since based on immediate problems. On the contrary, nowadays, being able to see beyond and thinking in a creative way is an advantage. The current dynamism of life needs an aptitude to work on hypothesis and different mental models, and to solve complex and unexpected problems. Right this latter seems to be the most growing ability in all the industrialized Countries over the XX century. Children are absorbed in a stimulating modernity full of new ways of thinking. From a pedagogical point of view, the triarchic theory of intelligence leads to the adoption of a constructivist perspective, since it considers learning as the subject's active process of knowledge construction. According to Flynn, this is a scientific behaviour. Flynn observes that until the beginning of the XX century the whole population lived in a pre-scientific era whereas later, in Occident, the number of individuals using scientific mental categories has constantly increased. On this basis Flynn explains the regular improvement of the average results of abstract reasoning tests.

Constructivist didactics introduces the value of technologies applied to learning, which are considered as tools facilitating the recognition of talents and the development of intelligence during childhood.

Technology has a direct impact on reality but also allows to play with imagination, pre-organising the crucial moments of transformation, and creating innovation. This operative imagination is developed through *edutainment* (educational +

entertainment), that allows to learn and have fun at the same time. The edutainment offer is divided into two categories:

- products supporting basic school education;
- recreational products aiming at developing skills and creativity.

Software addressing didactics with the user-friendly and easy approach typical of videogames are considered edutainment. Such software develops cognitive skills and stimulates children's natural curiosity giving them the opportunity to discover amazing paths. The interaction between children and computer is characterized by the young users' use of open cognitive strategies: they explore the software trying to discover its tricks, without getting tired of trying all possible solutions. This lightness allows a less mnemonic and more qualitative and synthetic learning. Children relation to computers differs from adults attitude: adults consider computer as a specialist machine and project on it their monomedial, *linear and textual*, vision of reality; on the contrary children, with their *audio-visual aptitude*, have a more natural approach to computer, considering it as an environment and a subject with whom establishing an interactive relation.

School needs to make a fundamental choice about multimediality: the deficiencies of the didactic structure in relation to the new generations' exigencies are often blamed and multimediality represents an innovative response to the school system long-term crisis.

When analyzing the different kinds of didactic strategies, it could be useful to keep into account Malone's categories of intrinsic motivation for learning as keys to recognise a software potentiality, issuing from the observation of the interaction between children and videogames.

Learning motivations are *challenge*, *curiosity*, *control*, *fantasy*, *competition*, *cooperation* and *recognition*, and are at the basis of the edutainment software planning. The first four involve a single subject and are therefore classified as individual motivations.

Individual motivations

$\longrightarrow$ Challenge

$\longrightarrow$ Curiosity

1 single subject $\longrightarrow$ Individual motivations

$\longrightarrow$ Control

$\longrightarrow$ Fantasy

A good level of challenge must be located halfway between trivial easiness and impossible difficulty; it is reached through variable levels of difficulty and goals, incomplete or hidden information needed to complete the task, and elements of casualness.

Curiosity can be sensorial, provoked by elements that pleasantly stimulate senses, or perceptive, stimulated by the perception of a defectiveness in the subject's mental structures. Sense of control increases when the subject's actions have strong effects on the environment, while the presence of fantasy elements tends to satisfy the subjects' emotional exigencies.

The last three forms of motivation are called interpersonal, since they depend on other people.

Interpersonal motivations

$\longrightarrow$ Competition

Interpersonal motivations $\longrightarrow$ Cooperation

$\longrightarrow$ Recognition

It is necessary to keep into account that cooperation and competition may have negative or positive effects according to the individuals. For recognition we mean the subject's need of approval and exhibition.

How could multimediality be used in the school field?

Three different utilizations are possible:

- As tool, that is to say as support to the traditional learning sources;
- As object, that is to say the direct use of machines for the development of technical and operative skills in the sector;

- As learning-teaching environment, entirely replacing the traditional books used since now for this purpose.

Starting from the thesis that it is possible to *learn by playing*, theorists of this didactic methodology test innovative teaching and learning modalities based on the synergy between the educational process and gaming, taking advantage of the interactivity, connectivity and multimediality of the digital world.

One of the objectives of didactics is to help students recognize the emotions in learning, that could be achieved by means of several instruments like the Internet, metaphorically indicating a controlled and safe environment where research and discovery may take place through gaming.

Although edutainment manifests itself as an educational and editorial policy of great potentiality, unfortunately school is still not ready to activate partnership with multimedia authors and publishing companies, and is still too linked to traditional methods.

In didactic culture, playing is still considered a pre-educational and even harmful activity, an idea that is in contrast with the constructivist approach to learning which sees it as a specific dimension of the human behaviour allowing to pre-figure reality. At school, playing acquires an educational purpose and can be used as an active methodology, not separated from creativity, provided that teachers choose games according to the prefixed learning goals.

When playing, students acquire knowledge on the different games typologies, use several supports, develop less explored abilities, learn historical models, compositional structures, problem analysis and strategy of constructions. Next future applications of learning by playing strategies imply the immediate visibility of contents, easiness and gratification when using them, possibility to use them in a multi-user environment.

Young people are more and more fascinated by a digital world that is not seriously taken into consideration by adults, while it is necessary to understand that the great dare of our society doesn't occur at the "new economy" virtual level but concerns a forma mentis in continuous and dynamic change.

The fact that the generation of nowadays parents hardly interacts with young people when they use a laptop, lead to a serious reflection. We should face the contradiction implied by the fact that, while the World is changing, we are no longer willing to change

along with transformation. It represents a problem for those who want to "change the world" and not to be "changed by the world". The approach of young people to external reality is changing in favour of the *interactive technologies* and the Internet, that can no longer be considered only as a dangerous *mare magnum*, in order to catch the virtuous dynamics of interactivity, hypermediality and connectivity for social interaction. Multimediality and telematics are not only good tools but also environments for social and economic interaction, inventing innovative forms of communication.

In this sense, the educational system starts recognizing the importance of the digital citizenship, and the activation of projects that make friendly and easy the approach with new interactive media.

In multimedia communication, the interaction between cognitive and textual elements with perceptive elements like images and sounds, leads to an edutainment relationship where education merges with play intended as triggering modality of active and collaborative human resource. This opens three fronts: education, play and communication. If education means stimulating a dynamic approach to knowledge, activating resources more than simply giving information, we gather that the traditional system of education is unprepared to the social changes provoked by media.

The playing activities implemented by the artificial systems refer to three main sectors: micro-worlds, simulations and games, and all these have been developed bearing in mind different kinds of learning styles and behaviours. Actually, according to us, playing is synonymous of learning.

playing = learning

For this reason, we cannot talk about playing without mentioning learning, with strong attention to the particular activities which can be planned in virtual environments in order to help students to learn in a faster way but also in a more durable manner.

Conclusions

Quoting the famous *Parable of the Talents*, although all the individuals have talents, the important is being able to have them multiplied, that is to say to cultivate and valorise them. Thus, recognizing the skills of everyone becomes crucial. A modern social system must generate the best conditions to allow individuals to develop their talents and make them recognized and shared both at national and global levels. In order to success in this, it is necessary to intervene since childhood. Many authors underline the value of the play-drama in the development of the child's creative personality: such play originates from sensitiveness and imagination which permit the subject to fantasize, catalogue ideas, recall and analyze in depth the already acquired skills, trying out what he/she has learnt in order to get new experiences and competencies through the computer game. Although several critics have only proved that, in children, the use of videogames strengthens the eye-hand coordination, we may also suppose that once these children will grow up, they will be able to discover the cancer cure, since computer allows researchers to consider the interaction of multiple variables in a way and speediness impossible without a computer.