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DIRIGENTI SCOLASTICI

Prova scritta e colloquio:

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Organizzazione degli ambienti di apprendimento

- **Education Systems in the EU**

Sistemi educativi dell'Unione europea



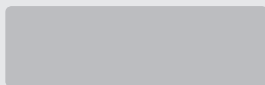
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Lingua Inglese

per DIRIGENTI SCOLASTICI

Learning environments
Education systems in the European Union

a cura di **Globalizing & Sara Mayol**



Lingua Inglese per Dirigenti scolastici – Learning environments – Education systems in the European Union

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Preface

“Better a well-made rather than a well-filled head”

Michel de Montaigne

How do you measure the effectiveness of a lesson? But before that, what is meant by effectiveness when it comes to teaching? This apparently trivial question is the starting point for this volume.

Traditionally, the idea of school is associated with the idea of learning, initially just notions. The first, obvious answer to our question then is this: teaching effectiveness is measured in terms of the results achieved by the students. The interest shifts to the expected results. We take a step forward and we realise that in order to measure effectiveness, we must first ask ourselves what are the results that we expect to achieve through teaching. It soon becomes clear that the transmission of teaching based on the mere acquisition of knowledge is now wholly inadequate. The real mission of the modern school is to train young people for life, make them able to deal with situations, endow them with the necessary tools to face the future.

Considering a complete study cycle, from the primary school to university, students who graduate today began studying about twenty years ago, in an environment totally different from today. How could school prepare him to face an unknown reality? In a society of the digital revolution, characterised by continuous and fast changing environment, the school must understand the necessity to train students in the use of technologies and for new professions in order to solve the problems yet to be known. Faced with these new requirements, the school and the teachers are required first to have the ability to help young people develop the skills and expertise necessary to address the challenges of society in which they live as protagonists.

Such knowledge, accumulated for some time internationally, has resulted in the investment of substantial resources in finding new and more effective training and learning methods, with the aim of achiev-

ing a profound revision of knowledge and of the models of education and training leading to the development of a complex thought process, the only one able to deal with issues that require multidisciplinary approaches. This is what the French philosopher and sociologist Edgar Morin explains in the book entitled, precisely and simply, *The head well made* (whose subtitle, *Education reform and thought reform*, is emblematic and more relevant than ever in this respect). The “well-filled head” is one in which “*knowledge is accumulated and does not have a principle of selection and organization to make sense*”, while in the “well-made” head there is “*a general attitude to ask and deal with the problems, organizing principles that allow to connect the pieces of knowledge and give them sense*”. Therefore, the “well-made” head is capable of overcoming the separation between cultures and meet the challenges of the complexity of life in every aspect.

It had become obvious for some time that pupils are not containers to be filled with many notions disconnected between themselves: the *National Indications* of 2007 took a road that, in our country, represents the first attempt to establish a training program based on a final competence profile, featured, i.e., by the goals to be achieved. The school is understood, therefore, as the context in which the foundations for a training course are laid, able to provide the necessary tools for a lifelong learning.

The *National Guidelines* 2012 continue in this direction and consolidate the choice of an education aimed at the acquisition of skills and abilities. With this objective, the continuity and unitary feature of the curriculum are reinforced between nursery school, primary school and lower secondary school, in relation to the unity of the person and the process of learning, recognising that skills and competences are not like notions, whose acquisition can be expressed in terms of defined times, but “qualities” that mature, become finer, and are perfected if properly stimulated over time. The vision of the education commissioned by the new *National Guidelines*, under which teachers must henceforth model their activity, is centred on the skills, or rather on the skill-oriented goals. Compared to this and taking into account the results offered by the research on learning models, the pedagogical and educational action is conceived in a new way, respectful of the knowledge related to the learning environment, understood as a context of activities and situations that respects and promotes the centrality of the pupil, which processes the right learn-

ing for multiple pathways, characterised by features of inflexible and precious uniqueness. In this context, interactive forms and collaborative learning emerge, as well as laboratory methods and situations contributing to enhance the expression of their potential on the part of the pupil and to connote learning as a constructive activity. Thus, the opposite of a transmissive setting - expressly stigmatised by the *Guidelines* - to which we can no longer recognize any plausibility, although it can be challenging, for further awareness and the project work that it requires.

Based on these premises, the volume is subdivided in two parts. The **first part** presents and compares the main learning models and their use in teaching projects: learning the knowledge is, in fact, the basis on which the teacher builds and plans the classroom activities, representing an essential prerequisite for anyone who aspires to lead an effective lesson. This is an interesting and thorough *excursus*, from Piaget to Baron, from Sternberg to Gardner and his theory of “multiple intelligences”, to the useful contributions of the social-cultural constructivism, to the latest contributions offered by neuroscience. Learning, as mentioned, is no longer considered a mere transmission of notions from the teacher to the learner, but it is essentially “social”, taking place in a context-class in permanent contact and mediation with others. A type of learning that wants and needs to be cooperative and collaborative, as we shall see. Then there is the section dedicated to programming and evaluation (who evaluates? what is evaluated? how do you evaluate?), in which the functions of evaluation are assessed and the most effective means to put it into practice are examined.

The **second part** deals with the topic – important now, more than ever – of multidisciplinary, crucial to understand reality in its entirety, abandoning the now dated separation between disciplines: the different ways of “teaching lessons” will be evaluated – from the frontal lesson to the participative one – and the different methods, in particular those that use new technologies. The lecture, with a long tradition, offers certain advantages when it comes, for example, to communicate a large amount of information to a large number of participants. However, when the aim is to establish an exchange, comparison, discussion, learning from each other, the lecture should be rethought, along with its limits. If the teacher can no longer be

considered as a mere transmitter of information but, instead, a “researcher” reflecting continuously on his own way of teaching, and learning to improve his profession, then he becomes the “director” of the learning process. Only in this way, the teaching-learning paradigm, from being individual, will be transformed into collaborative, where even the student will play an active and participatory role. Knowledge is a shared job: a more engaging learning is longer lasting. On this premise, we will examine the conditions of the collaborative and cooperative learning, its theories of reference, the formation of study groups and we will see how to establish that “positive interdependence”, which constitutes an essential element of cooperative learning, whereby each Member of the Group perceives to be indispensable for the group itself, having a common goal to achieve with consequent positive results both in terms of motivation and commitment and in the quality of interpersonal relations.

Two final **Appendices** to the text give a short summary of the Italian institutional and educational system and an overview on school systems in the EU

Questo lavoro, ricco, complesso, denso di rinvii normativi e spunti operativi, tratta materie in continua evoluzione.

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Part One

Learning, planning and evaluation

SUMMARY

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Learning: Comparative theoretical models
Planning
Evaluation

Chapter One

Learning: Comparative theoretical models

“The primary purpose of education is to enable the learner to take charge of his/her own personal construction of the meaning. Any educational event represents a shared action to seek an exchange of meanings and emotions between student and teacher. Whenever the student and the teacher are able to agree and share the meaning of a unit of knowledge, meaningful learning occurs. (...) Meaningful learning underlies the constructive integration of thoughts, feelings and actions and it leads to empowerment aimed at engendering commitment and responsibility” (J.D. Novak).

What is the learning process and how does it occur? How does the student behave when he/she learns? Learning, as we were taught by the constructivist proposal, and as we will soon examine, is not in the first instance, a solitary activity, but a social fact, as it happens in a relational context of sharing with others and their culture. It is understood that *“the teacher does not determine the learning process. Learning is an on-going process, which may use teaching as one of the many structural resources. (...) The teacher and the teaching materials become learning resources in many complex ways”* (B.M. Varisco), the teacher appears therefore as the “co-manufacturer of learning environments”: he is not the one who transmits or reproduces accurate information, but he who knows how to set the basis for an interaction with the environment, the context, so that learning becomes a constructive process, contextualised and collaborative. Learning is the result of a reciprocal exchange, it does not end with the acquisition of concepts and notions that, maybe, one day may or may not be useful, but it must provide the student with the skills to “learn continuously”; constantly “learning to learn”. A student who is able to organise his/her own learning, using knowledge and ability to achieve new knowledge, will also be able to connect new ideas and materials to the existing knowledge, even and especially after the school process.

That said, the school of the 21st century requires an innovative change of perspective, primarily by those who are “responsible” for the school process: namely the teachers. In order to be educators, Plato said, “*you have to love what you teach and the people whom you teach*”: the educational work required now by the teacher is to train students capable of learning to operate, making them flexible and willing to accept new and stimulating *input* and information, preparing them to raise issues and problems as well as solving them. The school today has changed extensively, hand in hand with the society we live in: it is multicultural and often multilingual. Moreover, the continuous and unstoppable development of the information technologies and their increasingly easy accessibility and use helps the education itself in forming citizens able to live and work in a globalised world, which constantly changes our ways of thinking and perception.

Today, everyone has a guaranteed access to culture and learning. The “circularity” of knowledge can now be implemented and it is highly desirable. It is no longer a science or sciences reserved for experts, but one that everyone can make their own using various channels and social or aggregated contexts. Edgar Morin talks about “cognitive democracy”, which according to him implies a necessary reform of thought, that is well suited to teaching, requiring necessarily the “training of the trainers” and the “self-re-education of the educators,” educating the “educators to a complexity of thought”, even where they find obstacles relating to preformed mental and institutional structures. The “cultural reform” advocated by Morin, wants to open the way for a knowledge which is no longer fragmented into individual disciplines, but capable of framing the knowledge and information in a common collection: “*reconcile the knowledge and discard the bridges, establish correspondences between disciplines which so far have not been communicating between them.*” In one word: multidisciplinary. The issue of central learning has certainly influenced and still influences the design of the teaching activities: thorough and lasting learning should be the primary objective for each student, followed by the formation of intelligences able to accompany and support them in the resolution of the complex problems. Therefore, it is essential to invest in “competences”: the student, through these, will be able to learn continuously throughout his/her life, acquiring responsibility and autonomy, being aware of “know-how”, and organising the construction of their personal profile related to

his/her academic career. But most of all being aware that learning does not fade away after the years spent in school since it continues at every stage of life. It follows that the skills should become a fundamental heritage for all the students, not just for an elite few, allowing the circulation of knowledge previously mentioned. Competence is not just knowledge or capacity, but it requires know how to respond to complex requests, which also involves psycho-social resources to deal with the complex challenges of today's world, for successful outcome in life and social functioning, beyond that of an individual. The so-called “core competences” should stimulate and act on the internal and external resources required to address the continuous challenges of life in a constructive way.

In his *Formae Mentis Essay on the plurality of intelligence*, Howard Gardner asserts that “*a competence must imply a set of skills for solving problems (...) to create valid products and to be able to discover or create problems, from which new knowledge is acquired*”. Intelligence is not innate, but gradually built, through the formulation and investigation of various areas of life. Everyone can develop the various intelligence required, as identified by Gardner, and attain a good level of competence or ability; however, in order for this to occur, one must create situations and conditions of encouragement, insistence, curiosity and creativity. Therefore, learning in a profound way is identified as one of the most important objectives that each student must achieve during the academic process, together with the development of intelligence that will guide and support him/her in solving problems.

According to new stimuli and new changes required by modern society, the school and the concept of “learning” related to it have continued to evolve over time. It is therefore appropriate to examine how psycho-pedagogical thinking in terms of learning was formed.

First of all, this thought has been developing over the last twenty years, along two axes of thought: the cognitive one and the socio-cultural constructivist one. We will address both lines of thought in our study, but we will analyse in particular the contributions of the constructivist theories that have inspired the research and experimentation in the educational and teaching field.

1.1 Learning: definition and theoretical core references

Learning, according to the definition proposed by the psychologist Ernest Hilgard, *is an intellectual process through which the individual acquires knowledge about the world that he subsequently uses to structure and guide his behaviour in the long run.*

Learning may be the result of spontaneous processes, as occurs in children, such as with language, or it can be induced and guided through outside teaching. Psychology and pedagogy are often concerned with the learning processes, producing many and different interpretational theories on learning, classified according to the great schools of psychology of the 20th century. The main theoretical cores in the research on learning are the behaviourism, the cognitivism and the constructivism.

Behaviourism is based on an association-like concept, considering learning as a result of new combinations between stimuli and behaviour in response to stimuli. In this approach there is a learning concept of summative type, which considers the subject as essentially passive. What is being learned is a copy of the presented stimulus therefore learning can be measured, on the one hand, by comparing the behaviour acquired after the learning situation to the previously presented one, and on the other hand, it can be evaluated according to the criteria of quantity and accuracy of performance.

The authors of reference of the behaviourist approach are J.B. Watson, I. Pavlov, E. Thorndike, B. Skinner.

The **cognitivist approach** moves away from the behaviourist models shifting the focus away from the concept of association to that of an active subject in working out the surrounding reality, better revealing the internal processes of preparation and representation. If in the behaviourist perspective learning is studied through the manifested behaviour and treated as a “unitary” phenomenon, in the new cognitivist perspective we notice a fragmentation of the scope of inquiry and learning is redefined in relation to the different cognitive components involved. In particular, there is a strong association between the study of learning and the study of memory, because, in order to learn, you first need to know how to encode, store, integrate and remember a set of information. So, since the information are processed first by the senses and then by memory, the projection of the training

content must take into account the need to ensure that transfer in the most efficient way possible. When such a transfer does not take place immediately, the information is lost. The quantity of information that can be stored in the memory depends on two factors:

- The attention devoted to the information by the learner;
- The presence, in the learner, of cognitive structures suitable for receiving information.

The most important authors of the cognitivist approach are C. Hull, E. Tolman, W. Kohler, K.J.W. Craick, G.A. Miller, E. Galanter, K. Pribram, U. Neisser.

The constructivists believe that in the process of learning, the student plays a central role while the designer/teacher takes on a marginal role, aimed at facilitating the completion of that process. On the basis of this approach the teacher will have to produce a teaching programme based on the learner, where the latter is an active part of the knowledge process: thus it is essential to insert considerable practical activities, structured and de-structured simulations that stimulate creativity and the formation of one's own knowledge about the subject matter of the course. The learner will acquire the information even from sharing with his colleagues involved in the formative process, leveraging the observations and knowledge of the classmates; this may contribute to the formation (construction) of a collective knowledge. The authors of reference of the constructivist approach are L.S. Vygotskij, J. Piaget, J. Bruner, D. Merrill.

1.2 Social interaction in the learning process

The dynamic character that underlies the learning process causes social interaction to play a vital role in the process of the cognitive development.

We showed above how the concept of learning has been developing over the past twenty years, along the line of cognitive and constructivist thinking.

In the cognitive perspective, during the learning process, all the processing and reprocessing made by the subject on the acquired information are relevant. Constructivism can be considered a particular aspect of cognitivism: Jean Piaget, with his studies on the stages of cognitive development and on the importance of cognitive conflicts

for the construction-renovation of knowledge, can be considered a forerunner of constructivism. Constructivism has not stopped, however, with the theories of Piaget, but has gone beyond them thanks to the contribution of scholars such as Jerome Bruner, L.S. Vygotskij, Seymour Papert, David Jonassen.

Papert, a student of Piaget, introduced research on artificial intelligence in the late 1970s, focusing on the development of what Piaget had called “operating thought”. At a time of important social and cultural transformation, Papert – thanks to the contribution of new technologies arriving from the States in those years – intended to create “gyms for thought”, school environments where there would be cooperation and support of the teacher and peers. This new perspective, defined as “constructionist” by the scholar, implies sharing, negotiation, mediation by the teacher in an atmosphere of sharing and motivation. This theory is incorporated in the psycho-pedagogical perspective of “socio-cultural constructivism”, which today represents the main theoretical horizon of the modern school. Socio-cultural constructivism refers to knowledge as a shared construction but subjective in interpretation, requiring a thought process which was narrative, reflective and with cognitive purpose, different from the previous “behaviourist” tendency, based on the knowledge transfer mechanism, according to a stimulus-response structure. For constructivism, knowledge is complex, relative, contextualised and subjective, constructed in a relentless exchange of trading and sharing of meanings. Knowledge is built by the subject gradually, as he tries to sort out his own experiences; it is built in the mind of the learner. Thus, learning becomes, “significant”, active and collaborative.

Actually, the learning environment also takes on a new significance: it becomes a laboratory, where one can learn to integrate and interact with others, promoting cognitive processes for the solving of the problems (*problem solving*) and search for new problems to tackle and overcome (*problem finding*), in an atmosphere of creativity, discussion and exchange of views.

Jean Piaget, introducing the concept of psychological structure as a product of a slow process of construction – which happens in childhood – catches a glimpse of the consequent need for self-regulation of this process, as a result of the need to manage materials and experiences that become increasingly complex with age. The development is a gradual process, tending more and more towards

objectivity, rationality and capacity to recognise and accommodate the views of others, creating, thus, the “socialisation”. Therefore, the “perception” of the small child switches to the “logical and rational thinking” of the young man and adult. There is, for the Swiss psychologist, a qualitative difference between the way a child thinks and that of an adult. The concept of “cognitive ability” is related to the ability to adapt to the physical and social environment: in the case of a child, it is characterised by “assimilation” and “accommodation”. Accepting the argument that the social interaction is the fundamental element in the process of cognitive development, the concept of learning acquires a new and essential meaning: learning, far from being a solitary activity, implies exchange, negotiation and cooperation processes. It is, therefore, essentially, a *social fact*; this is an assumption, in terms of learning, of the social-cultural constructivism, rooted in the theories of Vygotskij. In the process of knowledge the mind not only assimilates and accumulates information, but it actively reassembles it. Unlike Piaget, for whom the child development precedes learning, in the view of Vygotskij social learning precedes the development: every function in the cultural development of the child takes place first at the social level (“inter-psychological”) and then at the individual level (“intra-psychological”), in an incessant process of mediation. For Vygotskij it is not important what the child knows, but what the child can learn: learning then becomes a mutual experience for peers and adults, a continuous active and constructive process. Consciousness and cognition are the result of socialisation and social behaviour. In his theory of the “zone of proximal development”, Vygotskij emphasised that the child’s learning grows with the help of others: a relationship of help that is established, that is, between a more competent person (adult or peer) and a less competent one, so as to achieve a higher level of intelligence. The “zone of proximal development” is, therefore, the distance between the current development and the possible development that can be reached with the help of others. Unlike Piaget, for whom the child passes through various stages in the development process until he becomes “ready” to learn new knowledge that he had not previously had, for Vygotskij the child learns from those who have a higher level of knowledge. Imagine what the incidences and consequences of this theory would have had on the subject of learning and teaching, uncovering contexts in which the students play an active role in learning, beyond

and contrary to every theory that sees the teacher as the depositary of knowledge which is to be simply transmitted.

Constructivism first and socio-constructivism later re-evaluate the specificity of higher capacities and the role played by the context: the development of the higher thinking is influenced by the social context; reality, after all, is not conceivable according to a fixed and unchanging structure, but it is a constant interaction between the individual and the environment which are reciprocally built and determined. The roles of the teacher and the student, therefore, change: a teacher can collaborate with his students in order to facilitate the construction of the meaning for the pupil. Learning becomes, therefore, a mutual experience for both parties, an active process of sharing and participation, always remembering that at the centre of the learning process there is the learner. The definition of Antonio Cosentino in this regard seems illuminating: (*Autonomy in learning and interpretation of philosophical texts*, in “Philosophical Communication”, no. 6, November 1999) “*Constructivism (...) turns its attention to the mental activities of the learner and, more specifically, to socio-culturalism, the cultural practices that take place in the environment. A teaching method consistent with these assumptions points to the development of the ability to investigate the processes of cognitive construction by which we read the world and we produce meanings. There isn't a ready-made subject and object dealing in the process of learning, but rather there is a process by which a subject is formed, actively internalizing life forms and meanings that circulate in the cultural context in which it is situated. At the same time this external-internal dialectic, due to the multiplicity and variety of situations it has to come to terms, has unpredictable ways of emerging leaving room for creativity*”. Learning, conceived in its highest realisation, is what happens in a context-class dominated by positive relationships, in constant relation and mediation with others, so as to become a continuous experience in contact with differences and diversities possibly leading to transform its inner world, its points of view. We will shortly examine the strong link between the socio-cultural constructivist theory of knowledge and the discovery of the mirror neurons, as it emphasises the importance of building a school conceived as a laboratory, like “gyms for thought”, to quote Papert, creating new learning environments, with new languages and new technological tools for the development of intelligence and skills. Collaborative and cooperative learning should be developed together with the others when they have the tools and

technology available to all, in a context that should be relational, supportive and cooperative, i.e. a context of active participation - including research and discovery - where the diversity of each student must be recognised allowing him to bring out the best of his potential.

1.3 The relationship between learning and development

Attention to the existing relationship between learning and the development of the subject is essential if, as part of educational initiatives, you are in the position of having to organise stimulating environments, i.e. those with potential effects on the development processes.

In fact, the nervous system receives stresses from the environment (sensations, or impressions of the sense organs and perceptions, namely recognition of sensations) to which it reacts according to a series of complex inter-neuronal connections.

The levels of reaction, both in terms of quantity and under the quality profile, depend on a network of inter-neuronal connections that constitute, in functional terms, the propulsive element of each response. The relationship between the brain structure and its functionality appears to be evident.

Structure and functionality must be framed according to the genetic code, which ensures both the stability, relative to the “specificity” of species, as well as the variability, relative to the differentiation of the individual. Structure and function are outlined, therefore, according to a programme encoded in which invariable elements are integrated with variable elements.

The latter are vital in differentiating the ways of being and the performance of the subjects that will characterise the individual learning processes.

The nervous system responses to stimuli that are conveyed through the sense organs, that is, the receptor organs of the stimuli, are characterised by levels of plasticity that, in the functional processes, make up the set of availability and potential of the individuals.

The changes that the environmental stress can bring to the functional dimension of the nervous system appear of primary interest to identify the correlations between the learning and development processes.

While it is true that organisms, in relation to the structure and morphology, have basic models of behaviour that characterise the specificity of the subject, it is also true that these models are not presented as rigid paradigms on which the man's identity is outlined, but they show aspects of flexibility that open the field of investigation to a plurality of hypotheses.

1.4 The contribution of neuroscience to psychology and education

While it is true that the nervous system, being a rigid structure morphologically, does not show new formations of synaptic junctions ¹, it is also true that it shows, in any event, levels of functional plasticity related to modifications of the synaptic activity and changes in the chemical transmitters.

The invariability of the scheme of neuron connections according to rigid interconnections overlaps onto a bridging neuronal activity that uses conduction circuits and variable adjustment systems and that determine the levels of functional plasticity.

Marvin Minsky says that “*the brain uses processes that modify themselves*” ². The stresses from the external environment, transmitted according to itineraries following the structural plan, but assumed according to variables reception levels, determine different responses, which can be individuals, correlated to the wealth of genetic memories, relating to the biological evolution, and of acquired memories, related to the lived experience.

The functional plasticity of the human brain, understood in relation with the factors that determine it, allows man to adapt to the changing environmental conditions.

Man gives the environment the most appropriate answers, by using behaviours that, in re-establishing a new balance between the subject and his *habitat*, help to change this. If it is true that man acts on the environment tending to modify its aspect in the most favourable

¹ The synaptic junction is the point of connection in the neurons (nerve cells) in the bone marrow that allows the entry into the spinal cord and the exit from it of the nervous stimuli and impulses.

² M. Minsky in G. Petracchi *Neuroscienze, psicologia, educazione, Atti del Convegno, La mente del bambino*, Sorrento 1996.

manner to him, it is equally true that in the course of this commitment he receives a plurality of stimulation from the environment that will determine organisational and cognitive answers, increasingly complex, or more advanced and better articulated mental processes. It is in relation to the functional plasticity of the brain that the learning processes acquire new connotations.

A biological connotation becomes essential as a precondition for any cognitive relationship.

A cultural connotation is emerging as a privileged path for the development of the thought that, from culturally organised systems, brings about new contents for the processing of new ideas.

The study of the learning processes, therefore, cannot disregard a brief knowledge of the most basic aspects of the brain structure and its levels of transmissive functionality of the information.

This should, however, take into account the cultural dimension of the environment in which the subject is immersed.

The environment, in fact, becomes the creator of a series of educational processes that, transmitting new learning and new paradigms of reference, tend to modify specific and different responses of the individuals, influencing their behaviour.

Thanks to the new contributions of the cognitive neuroscience, today we have new instruments to be applied in the field of education. We have anticipated, as in the life of every individual, genetic initial endowment and experiences that interact to allow the development. Our brain is structured and restructured by the interactions with the social and natural environment, and this process affects future learning.

In the cognitive process, a key role is played by emotions, whose influence actively involves several areas of the brain: neuroscience has established a strong link between emotional and cognitive dimensions, so it is clear and obvious that an education system dealing with the cognitive development of the child must necessarily deal also with his emotional development. Neuroscience demonstrates how our brain develops through interactions with others. In this regard, the discovery of the *mirror neurons* helps us to understand this link between the cognitive dimension and the emotional dimension: mirror neurons are brain cells that activate either when we perform an action or when we see someone else who performs it; they help us to understand immediately what the person in front of us is doing

without the need for complex reasoning. In addition, they allow us to mimic the behaviour of others and empathise with them. Obviously, from a pedagogical point of view, one cannot help thinking about the implications in the imitation of the cognitive processes. With regard to the empathy involved in our interactions and relationships, the mirror neurons help us to empathise with others and with what is happening in front of us; so, an environment full of stress and where there is interaction and impulse towards understanding allows the mirror neuron system to recognise and learn. According to Gardner, in the development of his theory of “multiple intelligences”, when a class has a climate of trust, deep changes occur that facilitate and promote learning, because they come to change the pre-knowledge that each student possesses. Among the intelligences identified by Gardner, the interpersonal one is manifested through the ability to be with others by establishing positive relationships and nurturing the very process of empathy, as it enables for the emotions, motives and moods of others to be interpreted.

1.4.1 The contributions of the science of education

The environmental context, which is permanently transmitting new reference learning and paradigms, makes it necessary to have the required cognitive and language tools that allow them to interact with one another weaving a productive dialogue in an interactive and reciprocal relationship. This is a relationship of continuous enrichment where new cognitive and communication skills are enhanced. Based on this premise, in a relationship of constant exchange and interaction with the outside world, learning itself cannot follow a linear and flat path, especially when at the heart of the educational process is the child (the future adult), whose learning is achieved mainly through the observation of facts and phenomena.

Adapting to new situations always requires intelligence and skills that prepare not only the child-learner but also the teacher who, in search of the best practices and strategies for the successful attainment of education, cannot ignore the contributions of education science and the most significant training models in the organisation and creation of the teaching relationship.

We see, then, how the child's thinking operates and what mental structures characterise the potential for the development of the cognitive activity.

1.5 The pattern of genetic psychology

Genetic psychology has developed gradually as a system of knowledge oriented towards the study of the “mental development” of the child. The object of studying this area of psychology, therefore, is not the “child” in its psychological and behavioural manifestations, but the processes that characterise the child’s evolution.

The intention of the study of mental development, in the context of the genetic psychology, is to locate the source and the ways of working of the thoughts that follow along the development lines linked with a plurality of factors.

Genetic psychology has moved towards well-defined directions:

- > it tried to define the issues with the object of study;
- > it tried to develop research methods with a more scientific basis;
- > it tried to encode and interpret the data emerging from the studies carried out.

The object of the study favoured by genetic psychology is, in synthesis, the “child’s mental world”.

Thus, some aspects of this world are instantly detectable and obvious, such as the ludic dimension.

Other aspects, however, are more hidden and only a systematic observation activity, a subtle intuitive capacity and an interpretation of data allow them to be captured.

Often, when approaching the world of childhood, we apply interpretive schemes that belong to the world of adult thinking; therefore the knowledge of a child’s mental world is approximated and inaccurate. There are, in fact, marked differences between the consciousness of the child at various levels of development and that of adults.

Trying to locate identities and differences between the child and the adult means understanding the basic mechanisms and lines of development of different spheres of the mental life, or of the perceptual, sensomotory, intellectual, emotional and mnemonic activity of the child.

The purpose of study and research in genetic psychology is, in particular, to identify the ways in which simple mental structures grow into increasingly complex mental structures.

This study relies on the research of the factors that contribute to the mental development, defining the role of heredity and of the environment, of the maturation processes and the educational factors.



1.6 Jean Piaget's contributions to the knowledge about the child

Jean Piaget's contribution can be considered a precursor of cognitive psychology in which he anticipated the ideas of mental structures and of operating schemes of thought that can process sensory information and perception. He tried to interpret the mental processes as active construction and the organisation of ideas.

Piaget can be considered a representative of the genetic epistemology school because his interests are oriented towards a systematic study of the development of cognitive structures from their origin: from the birth of the entities until they reach adulthood.

The main purpose of his studies was the intent to identify the origin of all forms of knowledge in children.

Born in Neuchâtel in 1896, he died in Geneva in 1980; and was the student of Édouard Claparède and his successor in the direction of the Jean-Jacques Rousseau Institute in Geneva.

The results of Jean Piaget's research in the development of the cognitive development and the development of intelligence have led to the identification and differences between a child's mental life and an adult's mental life also describing how the child's way of thinking operates during development.

In the study of the evolutionary processes, Piaget analysed the early stages of the mental development by detecting child's patterns and manners of thought, following the transformation of the child's mental patterns from simple structures into increasingly complex structures up to a final phase that corresponds to adulthood.

He raises the issue of the relationship between formal logic and the psychology of the intellectual development.

Formal logic describes the formal reporting systems already completely constructed by thought and independent of experimental verification, i.e. not susceptible to arbitrary changes by the same thought.

The psychology of the intellectual development seeks to establish how the thought comes to realise the existence of systems of logical relationships, and, above all, it is concerned about ascribing a real meaning to such relationships, considering them as a description of the methods of work of the thought, when this has reached a high level of development. Thus, general and abstract formal logic will create a model of the operations that the thought should be able to accomplish when it has

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