

MULTISENSORY IN THE APPROACH OF THE INCLUSIVE EDUCATOR

LA MULTISENSORIALITÀ NELL'APPROCCIO DELL'EDUCATORE INCLUSIVO

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Abstract

Gli attuali studi nell'ambito delle scienze cognitive dell'Embodied Cognition, nel riconoscere il ruolo del sistema sensori-motorio nei meccanismi che regolano la cognizione, creano le premesse per una riflessione in ambito pedagogico sulla complessa relazione esistente tra dimensione corporea, attività mentale e ambiente e sull'importanza di creare contesti educativi in cui le esperienze sensoriali siano favorite sin dalla primissima infanzia. L'obiettivo del presente lavoro è di guardare allo sviluppo di professionalità, come quella dell'educatore, che siano capaci di *educare alla multisensorialità* con lo scopo di facilitare gli apprendimenti, le relazioni e i processi inclusivi.

The current studies in the field of cognitive sciences of Embodied Cognition, recognize the role of the sensorimotor system in the mechanisms that regulate cognition, creating the premises for a reflection in the pedagogical field on the complex relationship between the body dimension, mental activity and the environment and on the importance of creating educational contexts in which sensory experiences are favored from early childhood. The objective of this work is to look at the development of professionalism, such as that of the educator, which is capable of educating to multisensory experiences in order to facilitate learning, relationships and inclusive processes.

Keywords

Embodied Cognition; Multisensory; Inclusion; Educator
Cognizione Incarnata; Multisensorialità; Inclusione; Educatore

1 Il contributo rappresenta il risultato di un lavoro congiunto degli autori; tuttavia, per quanto riguarda le singole attribuzioni, si precisa che Michela Galdieri è autrice dell'*Introduzione* e del paragrafo n. 2; Amelia Lecce è autrice dei paragrafi n. 3 e n. 4. This article is the result of the common work of the authors. However, as regards the individual attributions, it should be noted that Michela Galdieri is the author of the *Introduction* and paragraph n. 2; Amelia Lecce is the author of paragraphs n. 3 and n. 4.

1. Introduction

Embodied Cognitive Science (ECS), promote a systemic and complex idea of the individual in his relationship with the environment and go beyond the limits imposed by the previous philosophical tradition. This was based on the binomial *res extensa - res cogitans* (Descartes, 1987; Ferrini, 2015), on the contrary, the new approach recognizes in embodiment much more than a set of chemical-physical phenomena or a biologically entity structured. Now, “that *original body-world relationship* is strengthened by which we feel in the world not extended bodies (*Körper*), but as living bodies that enter into that current of desire that produces the action and makes the body not the *obstacle* to overcome, but the *vehicle* in the world” (Galimberti, 2003, pp. 21-22).

These theories, which recover the suggestions of the phenomenological (Merleau-Ponty, 2003; Hiedegger, 2015) and of pragmatism current, recognize the importance of shifting the *focus* of scientific investigation onto action and behavior (Dewey, 1938; 1954). It also highlights the need to overcome linear and unidirectional logics in the study of the person and his ways of knowing, perceiving and acting. The relationship between “*nature*” and “*culture*” evolves and with it the study of the interactions between the different components of a system. These parts are understandable when they are studied not as an “intertwining of elementary units” but with respect to their interaction. As von Bertalanffy writes, these are “dynamic interactions that appear in the difference in behavior of the parts when they are isolated and when they are in some configuration at a higher level” (von Bertalanffy, 1983, p.72). The transformative action, which arises from circular and retroactive mechanisms, makes each system a “different system” compared to the original entities, thanks to a dynamism and action that involves it in a totalized way (Miller, 1986).

In this direction, the new cognitive sciences come to an embodied vision of cognitive processes (Gomez Paloma, 2013, 2017; Gomez Paloma & Tafuri, 2016). These processes originate from the sensorimotor substrate of the individual which, according to the neuro-phenomenological perspective, is constantly in relationship with its environment (Varela, Thompson & Rosch, 1992; Varela, 1996; Thompson, 2007). Considering perception exclusively as the channel through which it is possible to collect information about the outside world gives us a reductive image of the potential of the body in action. This limited vision of the body and movement prevents us from considering “a significant aspect of our perceptive life, namely the automatic ability to grasp only some information and to perceive it directly as a possibility of action” (Caruana & Borghi, 2016).

Perception does not precede action but implies it and in turn produces changes in situations. The action of the perceiving person is linked to the “affordances of the object” (Gibson, 2014; Norman, 1997) but also to the possible interactions offered by the object itself. This occurs as a function of the aims, context and specificities of a task and through higher cognitive processes. It is precisely these processes that also imply flexibility and adaptability (Borghi & Iachini, 2004). There is a link between perceptual and motor dimensions and a multisensory integration that lead us to reflect on how impossible it is to study cognitive processes excluding the environment, the experiences of the subject and his relationships (Gallese 2003, 2007). Every action and every gesture is mediated by corporeality which becomes a “favorable/necessary condition for the development of cognitive processes. According to this vision, cognitive activity is always “situated”, what we do physically and/or emotionally perceive, the structure and dynamics of the environment are all aspects that strongly condition learning” (Gomez Paloma, 2015, p. 338) and are connected to each other. Different studies (Shams & Seitz, 2008; Calvert, Spence, & Stein, 2004), in this sense, recognize that multisensory interactions are present in our nervous system and it is precisely this integration that has constituted an opportunity for the evolution of man and his cognitive development. This research also recognize that stimulating environments may represent a learning benefit due to the remarkable brain plasticity present from early childhood (Shimojo & Shams, 2001; Majewska & Sur, 2006; Pascual-Leone, *et al.* 2005).

These theories open a further window of investigation and reflection on the role of education, mediation and teaching. They constitute “systems of practical knowledge, centered on action” (Damiano, 2008, p.17; 2013) and, at the same time, they also imply the development of a professionalism, such as that of the educator, attentive and sensitive in preparing an *educational action* (Perla & Riva, 2016) focused on the perceptive and action potentials of the body. The meanings of the body are defined and developed in the “space of inter-individual action in which intra-individual variables are intertwined” (Sibilio, 2016, p. 19); this highlights how the teaching-learning process is far from the simple acquisition and organization of pre-existing data: each learning process constitutes an active path and participation of the person in the construction of his knowledge (Bruner, 1967, 1993; Vygotskij, 1934).

2. Educating to multi-sensoriality

Scientific research, through the study of biologically determined aspects, has favored a vision that is anything but “disembodied” of cognition. The approach of the ECS, in the pedagogical field, has in fact created the premises for the construction of different educational paths ready to enhance the relationship between body and cognition in environments where inclusive processes can be favored (Chiappetta Cajola & Ciraci 2013; de Anna 2014; Pavone, 2014; 2015).

The new sciences of the mind have found roots and nourishment in the bioeducational approach (Debesse & Mialaret, 1974; Frauenfelder & Santoianni, 2002; Frauenfelder, Santoianni & Striano, 2004) which, envisaging an alliance between biology and pedagogy (Frauenfelder, 1994) - since its origin - it saw the possibility of recognizing an equal dignity to the cultural and biological heritage of the individual. This relationship is concretized precisely in the relationship with the environment: “the process is continuous: the two principles of continuity and interaction are not separable and the measure of the meaning and educational value of an experience is born from their active reciprocal action” (Frauenfelder, 1994, p.30). The bio-educational sciences recognize in educability an essential principle of educational and didactic action: in this way non-linear horizons are outlined (Aiello, 2015; Sibilio, 2016b) of research and educational and didactic practice and new “pedagogical responsibilities” with the aim of enhancing the relationship of the subject with the context. In reality, the ability to adapt (Lakoff & Johnson, 1999; Johnson, 2017) is a characteristic of living organisms which, according to their individual and environmental specificities, act and assume behaviors that reflect the cultural dimension of which they are part. Similarly they represent micro-systems that are a part of the large class of adaptive complex systems (Sibilio, 2017). This perspective includes didactics and education and redefines directions and fields of investigation (Rossi, 2011).

In the educational and didactic field, the declination of the *Theory of Simplicity* (Berthoz, 2011), in fact, constitutes an example of how research has been able to explore and look at the complexity of the didactic action (Sibilio, 2014), pushing the professionals of the education for greater reflection and awareness regarding the potential of one’s actions, the resources possessed and those ‘derivable’ from the context. Such education professionals must be able to find solutions that arise from simple principles, which “allow complex situations to be processed very quickly, in an elegant and effective way, taking into account past experience and anticipating the future” (Berthoz, 2011, p. 5).

These orientations, which root cognitive processes in the body, look at corporeality as a “bridge” of communication with the environment and as a “device of action” through which to learn and know (Rivoltella, 2012). All these aspects are not far from the pedagogical reflections of the last century based on the capacity for action and adaptation, on the relationship between corporeality and cognition, action and perception. Although these issues have not been investigated with the modern analysis techniques offered by neurophysiology, they have formed the basis of many lines of research that have considered the dimension of the body and movement as the basis of cognitive, emotional, relational and communicative processes (Caruana & Viola, 2018; LeDoux, 2003).

The same studies on the history of special pedagogy (Crispiani, 2016; Mura, 2015, 2016) show how the educational paths have been focused on embodiment and have explored the

numerous expressive and cognitive opportunities of corporeality even in the presence of intellectual disabilities. The methods of Jean Itard and Édouard Séguin, for example, were based on the systematic observation of the child and on the study of the physiological and cognitive phenomena that emerged from the relationship with the other and with the environment. These theories have inaugurated research paths through which it was possible to demonstrate the effectiveness of education. The purpose of the educational path was to bring out the needs of each child and stimulate human sensitivity by trying to give the person back opportunities for growth, learning and socialization instead of considering the person with disabilities the object of cultural and educational deprivation (Sandri, 2014).

Similarly, worthy of note are the studies by Maria Montessori which take into account the theories of John Dewey (1938, 1954) according to which educational paths had to be based on experience and stimulate “the instinct to do, the impulse to build” (Dewey, 1969, p. 30). This impulse in the child is expressed through the dimension of play and movement. Both scholars recognized the effectiveness of a pedagogical path based on sensoriality and practical life experiences. Scientific pedagogy, in fact, has the merit of having identified spontaneous sensory experience as a preferential path for discovery and learning. He also recognized the importance of “materials for the education of the senses [...] a kind of key to open a door to the exploration of external things, like a light that shows more things and more details than in the dark (in the uncultivated state) they could not be seen” (Montessori, 1975, p. 181).

Educating through sensoriality therefore implies a spontaneity and freedom in acting. This gives us an image of an active child, participant and gradually more aware of his own training and growth path, avoiding making, as Maria Montessori wrote, “educational errors” such as having let “thoughts and imagination wander in vain, allowing the senses to remain languishing and the muscles inert” (Montessori, 1953, p. 87). At the same time, it is not a question of looking at the senses as passive and independent but of investigating *multisensory* and the set of perceptual phenomena from a different perspective. These are interconnected and active systems: not only educational paths that only stimulate visual, tactile, olfactory or gustatory perception but, on the contrary, integrate them (Bruno, Pavani & Zampini, 2010). Sensory education can foster open learning, creativity and exploration (Weyland, 2017), it can accommodate the often overlooked benefits that derive from sensory practice even for students with special educational needs (Cooke, 1993; Coralli & Carbone, 1998).

Therefore, new meanings of didactic transposition are outlined (Chevallard 1985, Develay, 1995) “based on the elaboration of the body in action which translates into ways of using spaces, objects and codes” (Sibilio, 2017, p. 32): classrooms, green spaces, gyms can become “other” by providing, within them, also a flexible and different use of objects and tools:

“A bouncing ball transforms its playful use into an experiential opportunity that allows an agitated and embodied knowledge of the elasticity [...] of a piece of clay, whose prevalent use is to modify itself in reference to the object to which giving shape can contribute to the perceptive exercise of touch or the discovery of the difference in applying the same force, that of the fingers, to solid objects more or less permeable action” (Ibidem, pp. 32-33).

Flexible teaching and ‘opening up’ to new experiences of reflection and educational action should be fundamental pieces of the varied mosaic of educator’s knowledge and skills. Its function is also expressed in the organization of learning *settings* (Gomez *et al.*, 2017a) that take “into account our (embodied beings), in which minds, bodies, environment and culture are connected to each other different levels” (Mallgrave, 2015). Similarly, paying attention to noise, brightness, furnishings and, more generally, the climate of the classroom (Mitchell, 2018) - in the direction of better interaction with adults and peers - can facilitate the creation of collaborative moments and foster practical experiences which, mediated by sensoriality, can in turn constitute an opportunity for inclusion as well as learning. All this also better responds

to the personalization and social participation needs of each one (Ianes & Canevaro, 2015). It is necessary to guarantee a “pedagogy of the body - as Gamelli argues - tested, introjected and not only studied, so that the adult educator is authentically made sensitive to recognizing deep needs that the child expresses mostly through play and movement” (Gamelli, 2015, p. 49). These are dimensions that facilitate the emergence of vicarious and creative aspects (Berhoz & Ferraresi, 2015) and that make it possible, even for the person with special educational needs, to face new challenges and compensate for shortcomings by drawing on their own resources in a divergent way (Aiello, 2016).

3. The educator as a competent and inclusive professional

With Law 205/2017, which regulates the professions of educator and pedagogue, we finally see the recognition of these professional figures, qualifying them as specialists, capable of reflecting on their own skills, decisions and responsibilities (Crispiani, 2017). In Italy, in the period prior to the reform, there was no mandatory university training and this concession caused a real “improvisation” of the service (Iori, 2018). The law has, therefore, regulated the work of all educators and pedagogues active on the national territory, protecting even those without a title and providing for them a specific university training path. The objective of the Reform, in fact, is not only to regulate professionals, but also to equalize the qualification at European level and throughout the country by promoting a redefinition of the role of the educator “today even more relevant, because of the condition of extreme economic and social difficulty in which the country is, which penalizes minors in their cognitive and emotional development, but also adults and the elderly in social inclusion and lifelong learning processes” (Chamber of Deputies, 2014), emphasizing - in this way - the incisive role of the figure in the promotion of inclusive practices.

In accordance with the indications formalized in the European Qualifications Framework¹, it is necessary that the socio-pedagogical professional educator is competent in activating educational practices that contemplate the design, planning, implementation and evaluation of interventions and is able to operate in educational and training contexts aimed at people with special educational needs, also intervening in the “life project” with paths aimed at job placement, in a perspective of team working and in order to enhance resources and management of integrated systems (DDL 2443, Art.6, p. 7). This new professional identity assigns a leading role to the educator, understood as a promoter of active, responsible and inclusive citizenship (Council of Europe, 2010) and highlights his role in helping in situations of difficulty, deviance or social marginality. The helping relationship that the educator establishes with those who manifest educational needs “facilitates and supports the process of re-structuring of educational relationships” (Simeone, 2002, p.10), in a logic of respect and recognition of the other, but also of sharing and overcoming the social distance that the new pandemic rules are dictating (Musaio, 2020). Certainly the “social distancing” - a term widely abused and criticized by the political and civil world - has inevitably led the educational professions and rethink strategies and methodologies to put in the field and this rethinking has led educators to the adoption of new reflective strategies and practices adaptable to the needs of the context in the direction of greater inclusiveness.

The theoretical background of an approach curved around the importance of reflexivity in action is Schön (2006) who introduces the concept of synthesis between action and context in order to produce educational practices. According to the scholar, professionals operate within a set of constraints, laws, and opportunities dictated by the context that produce specific technical

¹ The QEF is a European certification that unifies professional qualifications and the degree of training in different European countries. The classification ranges from level 1, which is equivalent to the achievement of compulsory education, to level 8, which corresponds to the highest level with the acquisition of a doctoral degree or equivalent (European Commission, 2009). The socio-pedagogical professional educator falls under the 6th level of the European Qualifications Framework. The pedagogue falls under the 7th level of the European Qualifications Framework.

expertise (Schön, 1993). In this regard, Fraunfelder's studies suggest that the environment (also understood with its limitations) acts on biological modifiability (Fraunfelder, 2011) producing a "medium of learning between the individual, the sense-motor system, the biological body, and the physical/social environment" (D'Ambrosio, 2019). The spirit devoted to listening, to care, make particularly inclusive the profile of the educator who is increasingly in demand both nationally and internationally as qualified to operate in different services and contexts and with different types of users (Magni, 2018). This professional figure, therefore, can not only be defined as a professional of care, but also capable of implementing a well-defined planning and programmatic action (Traverso, 2016), able to harmonize reflexivity, empathy, observation and active listening: it is precisely through a reflexive approach that she is able "to maintain a plural gaze on the educational experience, able at the same time to grasp and recognize the context of reference, its formal and non-formal characteristics, her own "self in situation", and the knowledge acquired for the interpretative reading of the experience" (Miatto, Rossi, Saltarelli, 2021, p. 90).

The figure of the educator stands, therefore, as a competent and reflective professional in recognizing and adapting his or her educational actions to changes in the context, to the needs and different cognitive styles of people with special educational needs; precisely because of his or her definition as an expert in education, he or she is a promoter of reflective practices and pedagogical planning (Oggionni, 2019), skills aimed at choosing which multisensory educational strategies or tools might be most suitable according to the constraints or opportunities of the context.

4. Strategies and tools for promoting multisensory education

In the history of scientific pedagogical literature, there are many researches on multisensory in didactics and education that aim to promote learning and inclusive processes. It would suffice to mention the role that the Agazzi sisters have had in the creation of educational materials, such as those used in didactics for daily life exercises or those used during outdoor play experiences that teachers created ad hoc respecting the developmental stages of children (Schenetti, Guerra, 2016; Agazzi, 1985, 1962); or, the importance exerted by Fröebel's² seven gifts that stimulated children's discovery of themselves, the world around them, unitary rules, and spiritual insights (Jacobs, 1871; Fröebel, 1967); similarly, Pestalozzi's approach recognizes the importance of the sensory and holistic aspect in order to meaningful learning (Dovigo, 2020; Pestalozzi, 1948; 1974).

In line with these theorizations, which recognize the role of sensory experience in the harmonious development of the person, fits the pedagogical thought of Rudolf Steiner who "is based on a tripartite conception of the human being, composed of the 'physical body', the 'vital body' or 'etheric body' and the 'sentient or astral body' (where the first would constitute the material expression of the second, which in turn encompasses the activity of sensory perception, while the third concerns the sphere of feelings)" (Colaci, 2018, p.11; Steiner, 2012). Corporeality and multisensory would seem to be closely linked, as experiences allow them to "penetrate us and become perceptual constructs that are fundamental for orienting our person and our actions" (Terenghi, 2015, p. 17).

In this sense, there are many documented experiences of pet therapy that propose educational-rehabilitative paths aimed at people with disabilities and in order to prevent this valuable educational intervention from becoming a passing fad, specific training of operators working in this field is needed (Del Negro, 2004). Although all these orientations are still used in the educational and didactic field, the current trend would seem to be that of using, in addition, immersive and participatory game-based learning technologies. Certainly, in this sense, technology plays

2 The "gifts" for Fröebel are: the ball, sphere, cylinder, and cube; a cube divided into eight parts; a cube divided into three parts cut both horizontally and vertically; a cube divided into 27 cubes; a cube divided into 27 bricks (Jacobs, 1871).

an important role, in fact, the well-known American linguist Paul Gee (2013) states that video games can promote learning in a playful way, but also the inclusive and participatory aspect (Rivoltella, 2014; 2020). Technology alone is not enough to promote these positive aspects as it must always be mediated by a competent tutor - such as the educator - able to read the context and operate in (and for) it (Rivoltella, 2020).

Closely related to the theme of technology is the Interaction Design that deals with understanding how people involve the body, the senses, in the use of digital tools (Saffer, 2007). In the wake of these scientific speculations, it is necessary to emphasize that the educator cannot find “solutions that can be considered necessary and sufficient to cope with the complexity of factors that often limit the activity and social participation” (Aiello, Di Gennaro & Di Tore, 2013, p.119)”, but can make a conscious choice with respect to which tool to use in their educational action. In this regard, we report the studies on the role of Assistive Technology, i.e., tools or products used to improve the functional capabilities of people with disabilities and that professionals are responsible for knowing - through specific training - to make social participation more accessible (Alper, Raharirina, 2006). In fact, in recent years, open source platforms are becoming increasingly popular, such as Arduino defined as a microprocessor that can create new programs and connect different devices to it (Craft, 2014). This innovation has allowed to revolutionize the role of didactics: an example is the multisensory prototype for science learning, where students can create multisensory artifacts that reenact the complicated “string theory” (Bossio, Rizzuti, 2016); similarly, the development of an interactive educational software to foster English language (Aiello et al., 2013) in children with Specific Learning Disorders. This software could be configured as a possible tool aimed, on the one hand, to promote good school performance through a playful and intuitive approach and, on the other, could promote the processes of inclusion (Aiello et al., 2013).

Other research, however, has been carried out in the field of museum education, understood as that set of methodologies and tools (especially immersive technology) that allow the enjoyment of otherwise inaccessible works of art (Scartabelli, 2014). Immersive technologies provide, in fact, a high degree of involvement of the body - therefore also of different sensory experiences - positively affecting the educational and didactic aspect (Di Tore et al, 2012).

In conclusion, the figure of the educator today appears to be strategic for the promotion of inclusive education (Iori, 2018); his highly specialized theoretical knowledge adaptable to different disciplinary areas and his strategic skills of management of work or study environments, make him a flexible figure able to read the context and choose a model or strategy of intervention functional to the singularities of each individual. From this point of view, the educator could formulate and adopt multisensory approaches aimed at creating opportunities and conditions that improve the quality of life, in line with a systemic and complex vision of human functioning that identifies the well-being of each individual also on the basis of his or her opportunities to participate and act in every living environment (WHO, 2007). The different types of multisensory strategies - ranging from artifacts (Agazzi, Fröebel) to innovative methods such as pet therapy or museum didactics, to technological tools involving the use of immersive realities - offer the educator a wide range of choices. These choices, however, must always be influenced by a solid theoretical framework (Sibilio, 2014) that considers first the reflective and then the design competence of an educator who can call himself inclusive.

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