Chapter

Introductory Chapter: Teacher Education between Science and Consciousness

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1. Introduction

Teacher education has been—is and will always be—a topic dear to my heart and of great social impact and significance. Perhaps it is because my career began with teaching in a middle school, or perhaps it is because, albeit for a little more than a year, I served as a headmaster; what is certain is that, although I am now a scholar (of course in Education Science), my heart always beats for and within the school world.

This strong passion and motivation of mine prompted me to study teacher education pathways not only from a mono-perspective point of view, hence pedagogical, but also an interdisciplinary one, starting with cognitive psychology and cognitive neuroscience. This is because in recent decades, the mentioned disciplines, together with philosophy, linguistics, and anthropology, have invested major energy and substantial funding toward investigating the topic of learning and training.

That is why this introductory chapter of mine will focus on the necessary dialog of these disciplines, without which teacher education risks failure. Its fragility, in fact, will manifest itself very soon if the cultural and deontological heritage of the teacher is not supported by a rich scientific knowledge of the neurobiological mechanisms, which include the processes of learning and training, as well as by an examination of the person/teacher, aimed at a deep awareness of the emotional significance and subjective value attached to the role and mission of a teacher.

To enhance this view of mine, I will articulate this contribution according to two paragraphs: the first on recent neuroscientific research that has elevated and detailed the knowledge of the mechanisms underlying learning processes and that, therefore, underpins the quality of methodological approaches inherent in teacher education; the second, consequently, on the pedagogical, didactic, and training implications that the aforementioned research has induced, focusing on an innovative, internationally recognized paradigm—embodied cognitive science—that, in order to qualify the professionalism of teachers, allows the indispensable richness of science to be combined with the ethical, emotional, intimate, and singular depth of each teacher's consciousness.

2. Educating, starting with the learning and forming brain

Recent contributions of neuroscience in pedagogy and education begin to consider the body as an integral part of the learning moment in that "…the mind must not

only move from a nonphysical cogito to the realm of biological tissues but must also be related to a whole organism, possessing an integrated brain and body and in full interaction with a physical and social environment" ([1], p. 341).

Learning, moreover, is a process that can take place even without the appearance of new behavior; the fact that learning has taken place, in fact, can also be inferred from changes in preexisting behaviors, since "both observable changes in behavior and other changes that cannot be inferred from simple observation of external behavior reflect learning-induced brain changes" [2].

Concerning the topic of embodiment and corporeality, the dialog between psychological studies, cognitive research, neuroscience, and mathematical models on the one hand and phenomenology, cultural studies, and semiotic studies of language on the other could nowadays foresee a new breakthrough: the creation of intermediate models, such as the study of spatiotemporal patterns through which we humans perceive ourselves in an environment as well as in relation to body/space coordination and coordination between body and objects [3]. We could say with a slogan: neither bottom-up nor top-down, but levels that are the result of continuous mutual translation.

As we all know, excitable cells specialized in receiving stimuli and conducting impulses from nerves transmit information to other parts of the body thanks to synapses which, as H. Maturana and F. Varela argue, "...are the point of close contact between neuron and neuron or between neuron and other cells; at these points the membranes of both cells, besides adhering closely, are specialized for the secretion of special molecules, the neurotransmitters. Therefore, a nerve impulse, which travels through a neuron and finally reaches a synaptic termination, causes the secretion of the neurotransmitter that crosses the space between the two membranes and triggers an electrical change in the following cell" [4].

"The main consequence of this arrangement," writes Antonio Damasio, "is that whatever neurons do depends on the group of neurons that surrounds them...; that whatever systems do depends on how groups influence other groups, in an architecture of interconnected groups" (1995, p. 66). It is in the body, then, that there is an uninterrupted activity of information exchange, processing, and storage. This demonstrates the enormous pliability of the brain, especially in the early years of life, and the capacity for change in relation to environmental stimuli: the cognitive functions that have helped to establish the architecture of the mind are nothing more than the result of continuous interactions between precreated structures at the genetic level and the environment, in a feedback system that has enabled man, from the very beginning to process information, storing the data necessary for his adaptation.

Inputs from a stimulating environment can decisively affect synaptic formation because, although there are billions of them, the neurons that characterize an adult human brain are connected in a specific way; there are, in fact, orderly and well-defined connections and what comes to be, as Elisa Frauenfelder explains, is a kind of "...neural Darwinism: cells assemble, forming sets, groups of cells, that repeat themselves thousands of times and tend to compete to acquire the possibility of transmitting the greatest number of reproductions of themselves, thus fitting into the law of evolution" (2002, p. 46).

In a broader sense, such plasticity is identified with man's own ability to learn, through mechanisms of synaptic connection and disconnection. The phenomenon of *sprouting*, which literally means sprouting, explains how the number of synapses can increase exponentially during the early years of childhood. This is mainly due to an

environment rich in stimuli and the presence of critical periods so defined because of their sensitivity to external stimulation that causes synapses to increase.

"It can be hypothesized that the first 10–15 years of life constitute the most fruitful period in which, in fact, new conceptual structures are formed: new cellular assemblies arising directly from sensory stimulation, or new higher-order assemblies. It is a period in which both the structural parts and the patterns of later thinking are developed. And this process may come to an end with the progressive channeling and control of perception by the earlier perceptual structures: new wine goes into the old barrels. After that, in adult thinking, each new concept is a reorganization of the pre-existing ones; the possible quantity of new ideas depends on the quantity and variety of the more primitive ones, which were formed earlier" [5].

Another element to be considered in the study of the body/learning relationship is the assurance that affectivity conditions the learning and cognitive processes. On a biological level, in fact, there is a part of our brain, namely the limbic region, that is the seat of emotionality. It is connected to the environment by afferent nerve pathways, which convey sensations and perceptions to the brain, and is integrated with the cerebral cortex. Affections, therefore, are "the original magma of the self," and "the building blocks of its identity," as they dominate the subject and structure it. There is a deep connection between emotional processes and learning since it "always develops within an affective relationship." The educational relationship means the existential presence of the educator for the learner [6].

The emerging view of embodied cognition considers cognitive processes deeply rooted in the body's interaction with the world. This position, as read by scholar Margaret Wilson of the University of California at Santa Cruz, currently harbors several distinct versions, some of which are more controversial than others. The following six versions are distinguished and evaluated:

1. cognition is situated;

2. cognition is subject to time;

3. we reduce cognitive workload through the environment;

4. the environment is part of the cognitive system;

5. cognition is for action;

6. autonomous cognition is body-based.

Of these, the first three and the fifth appear to be at least partly true, and their usefulness is best assessed in terms of the range of their applicability. The fourth version, the scientist argues, is very problematic. The sixth has received less attention in the literature on embodied cognition, but may in fact be the best documented and the most powerful. To arrive more clearly and functionally at this concept, it is appropriate to start with some basic mechanisms of neural networks.

Understanding how these individual molecular axon guidance systems function at the individual axon level and how they compete to initiate and divert axon migration is, in fact, one of the main goals of neurobiology. Neural networks have been shown to be capable of adaptation and learning, although a deep and comprehensive study of the activity of their circuits has so far been prevented by the complexity of

mammalian networks. Network plasticity can be defined as the modeling of network morphology and as the function induced predominantly by experience.

This process is based on the complex, activity-dependent changes in neurons that modulate the ability of the neural network to transfer, process, and store information.

After the first period of genetically determined development, neural circuits are continuously modified and shaped by experience (epigenetic development). Therefore, synaptic connections that are sparsely used are weakened, even to the point of disappearing, while frequently used synapses are strengthened and eventually grow in number [7].

As mentioned above, synaptic efficiency can be modulated, very finely and on a widely varying time scale, by a set of factors, including previous network activity, generation of second messengers, and functional changes in pre- and postsynaptic proteins, as well as regulation of the expression of genes involved in synaptic growth, survival, and transmission.

This results in changes in the efficiency of synaptic transmission, which can last from fractions of seconds to minutes in the case of short-term synaptic plasticity, to hours, days, or months in the case of long-term synaptic plasticity. These changes profoundly affect information processing between inputs and outputs of the network, ultimately shaping its flow.

Wanting to outline the salient points of the new neuroscientific research in order to reflect on possible spillovers in the field of teaching, particularly on the body/learning relationship, we can consider the following points incisive.

1. LeDoux's studies argue that changes in synaptic connectivity underlie learning and that memory represents the consolidation of these changes over time "...when weak and strong inputs to a cell are active at the same time, the weak pathway is enhanced through its association with the strong pathway" [8].

2. The theory of Giacomo Rizzolatti in which it is inferred that mirror neurons are a class of neurons that are selectively activated both when an action is performed and when its performance is observed by others. The observer's neurons thus "mirror" what is taking place in the mind of the observed subject, as if the observer himself were performing the action [9].

3. Vittorio Gallese's Embodied Cognition ("EC") theory encapsulates a notion of cognition rooted in the body's states and in the specific systems of our brain, emphasizing the fundamental role of the sensorimotor system in representations and cognitive operations [10].

A deepening of the discovery of mirror neurons, specifically the theory of language evolution proposed by Rizzolatti and Arbib [11], the discovery of audiovisual mirror neurons [12] and the discovery of mouth mirror neurons [13] lay the groundwork for new research aimed at investigating the involvement of linguistic cognitive activity in action understanding.

Very interesting has been the research already undertaken to understand whether and how far the conjugation of verbs in the future and past tenses can be related to the motor representations required to drive an upper limb movement forward or backward, respectively, referring to the studies conducted by Buccino et al. [14] regarding the representation of space and time.

For this purpose, a pilot experiment was performed involving 18 subjects who were required to semantically decode acoustically presented verbal stimuli conjugated in the present, future, and past tense and give a behavioral response involving a forward or backward movement of the upper limb. In the pilot experiment, analysis of the results was performed by analysis of variance (ANOVA), which considered past, present, future, forward movement, and backward movement as factors within groups and movement and time as factors between groups.

There was evidence of a tendency for subjects to respond faster in performing the forward motion associated with a future-conjugated hand motion verb. The faster reaction time of the subjects' forward movements following the presentation of the verb in the future tense is related to the direction of the movement itself; it is easier for the subject to perform a movement that goes in the same direction as the movement spatially evoked by the presented verb. In the present experiment, the acoustic stimulus itself represents the motor priming that modulates the response, as the subject listens to the verb and has plenty of time to discern and understand it before receiving the arrow stimulus that indicates the direction of the movement eventually to be made. The innovation brought by the results of this experiment lies in the modulatory effect on the motor response exerted by an implicit representation of the movement contained in the cognitive processing of the time that takes to conjugate the verb. In fact, the stimulus we presented explicitly does not actually manifest any reference to the direction of the movement to be made in the response, unlike studies conducted so far [14], in which the stimulus phrases explicitly reproduced spatially directed hand and foot motions. The experimental data thus seem to confirm that semantic comprehension modulates the motor system differently depending on the experimental delivery and the stimulus presented to evoke it. This data is, however, in the same vein as studies that confirm the involvement of the motor system not only in observing action but also in processing linguistically presented actions, both in reading and listening.

3. From science to consciousness, the step is short but complex

Recognizing the value of neuroscience, many scholars have been engaged for years in the study of links between new theories that have emerged from the latest research and psycho-pedagogy, in an attempt to understand, build, and possibly adopt new approaches to educational intermediation with respect to an interdisciplinary view of the subject of teacher education. However, it is essential, in our opinion, to point out some aspects in order to better understand how to make effective use of these findings and how to avoid their inappropriate use and/or distorted cultural dissemination.

While the criticisms made by some psychologists, who conceive of neuroscience and, in particular brain scanning techniques, as a new phrenology seem to us to be frankly excessive and misplaced, it remains true that the evidence provided by brain imaging is to be read as correlation data and not causation data. It is not enough, in our opinion, to identify which neural areas are activated to fully understand and possibly justify the mechanisms that regulate behavior.

Moreover, the risk of uncritically adopting a pure functional localization approach, or more or less explicit forms of phrenology, is always around the corner. In other words, it is not enough to stop proving that a given process corresponds to a

given pattern of neural activation. We need to question not only the correspondences but the underlying mechanisms—not only the where but also the why.

Let us begin by reflecting on the recent discovery of mirror neurons, a discovery that testifies to the identification of a powerful mechanism, which can be referred to by the sometimes-debated term motor simulation [15, 16]. The research on mirror neurons has been conducted with an approach that, in our opinion, should be taken as an example; in fact, it represents an area of study that, far from a merely phrenological approach, identifies simulation as a mechanism that can help to better elucidate a variety of phenomena, ranging from the understanding of imitation to the development of empathy and the evolution of language.

However, this very hypothesis and discovery hints at the urgent need for intermediate models of applied translation; a conversion of the brain's neurological structures and related mechanisms into phenomenological justifications that function as filters linking bodily dynamics to the space in which bodies live and move: a space that, let us not forget, is perceived through a cultural and social construction.

In fact, as previously mentioned, from a theoretical and content point of view, a risk that the development of neuroscience has entailed and may entail is to emphasize the prominence of the brain and neural processes in explaining behavior. Highlighting the importance of the neural basis of behavior is crucial and helps to overcome the traditional Cartesian dualism between mind and brain, which has long influenced cognitive science. Nonetheless, the emphasis on the brain can lead to neglecting the role that the body plays in interacting with the environment. Only in recent decades has a new, embodied perspective emerged taking into account not only neural processes, but also emphasizing that organisms are endowed with a body as well as a brain, that the mind is not something separate, and that cognitive processes are based on sensory-motor processes.

Relatively recently, therefore, it has been emphasized in several areas that cognition is not information processing but is movement and action. The question now is whether it is sufficient to consider the body as a situated device of action or whether it is necessary, as we believe, to arrange such a view according to a constructivist perspective in the educational and didactic sphere, an even more complex element.

It is evident, therefore, that our reading of the listed scientific phenomena leads us to think that we need to shy away from forms of biological essentialism and from reductionism that do not help us understand complex behaviors. In more technical terms, embodiment and situatedness travel together. Cognition is not only embodied but also situated, variable, and contextually conditioned. And our body is our first context, our first element of cognitive genesis.

It must be acknowledged and socialized that the cultural hurricane brought about by the irruption of biology on the scene excites us greatly, but it also finds us somewhat unprepared, exposing us to new challenges as well as new risks. Within this framework, we really believe it becomes essential to invest in people who are open to the recognition of the synergy of multiple disciplines, who know the methods but are not confused by the new techniques, who have depth and theoretical aptitude, who are not naive in the uncritical adoption and misuse of the concept of the body, and who eschew the easy reductionism that the biologizing of phenomena can entail.

In short, make use of that healthy competition that drives us to scientifically delve deeper into our field, but which always keeps us aware that every discovery acquires value and expendability only if it is meaningfully and functionally connected to the web of studies of the phenomena of life and everything around us.

But what does all this mean for the world of education? And even more precisely, what do such neuroscientific theories imply in the dynamics of educational relations in the field of education?

Regarding the first point, starting from Donald Hebb's [5] "download and connect" theory, scholar Ivano Gamelli's [17] pedagogy of the body, and Maria Grazia Contini's [18] pedagogy of the emotions have researched a series of scientific elements to empirically justify the emotional valence of corporeality and its related spillover in the field of education. Plurisensoriality as well as a pedagogy that exalts emotional education have, in fact, outlined the cultural framework within which it was necessary to intervene with scientific discoveries of a biological nature; a framework that welcomes and tends to functionally metabolize the innovative neuroscientific theories, almost as if it expected them.

The discovery of mirror neurons, in fact, helped to revisit the way of conceiving the relationship between action, perception, and cognitive processes. It is at this point that the encounter with education through the phenomenology of perception takes place.

This means that when we are about to perform a given action, we are also able to predict its consequences. This kind of prediction is the result of the activity of the action model. If it were possible to establish a process of motor equivalence between what is acted upon and what is perceived, thanks to the activation of the same neuronal substrate in both situations, a direct form of understanding of others' actions would be made possible. And it is impossible to deny the value of such spillover in education [19, 20]. It is useful to recall that already Alain Berthoz was among those scientists who corroborated the proactive function of the brain, recognizing in movement not only the "physical and dynamic form of action" but also the tool that comes closest to a 'sixth sense' for the ability to anticipate action (1998).

Perceiving an action—and understanding its meaning—therefore, amounts to simulating it internally.

In this way, the strategy of mirror neurons provides the scientific basis for overcoming those solipsistic and egocentric logics hinging on the reductive mind-brain pair: their action can be encoded from the perspective of a "virtual resonant cavity," in which neural encoding makes dialog interactive and shareable. The resulting neural representations are thus shared, jointly, already at the intentional level. The existence of the other, of others, is in a sense written in our neurons; in fact, the mirror neuron system determines the emergence of a shared space of action, in which the process of communication and intersubjective understanding is generated. The root of human subjectivity is actually an original intersubjectivity. Husserl [21], for example, in the second volume of the Ideen, argues a comparison with recent findings in neurophysiology. According to the phenomenologist, in fact, every human being, thanks to his or her corporeality, stands in the spatial context, among things; within every other living body inheres its own empathetically posited psychic life, so that, when a living body moves and comes to be in new places, its psyche also moves; the psyche is in fact constantly fused to the living body.

Neuroscience, then, in order to contextualize its research, needs the contribution of the humanities, a contribution that, with what is asserted by Maurice-Merleau Ponty, we fully support. Indeed, he asserts the need to "find the origin of the object in the very heart of our experience. Our experiences suggest meanings to us, enable us to make hypotheses, and …such a procedure brings out the spontaneous method of perception that sort of life of meanings, which makes the concrete essence of the object immediately legible and only lets its sensible properties appear through it

(1945). In fact, the object/subject of our research pathway turns out to be the body in its interaction and full integration with a specific learning environment in which sensory stimuli, appropriately arranged, offer an original key to access disciplinary and nondisciplinary knowledge; in fact, "the influx of information from sensory organs and the continuous interaction with the environment then determine how the brain takes shape" [22].

Awareness of this information is also essential for understanding how knowledge construction takes place and is of fundamental relevance for teachers who aim to implement meaningful teaching through which students can be enabled to achieve authentic learning. As teachers, it is necessary to provide space for the widest possible expression through the practical and lived experience of students; indeed, if we want to form a solid foundation for their creative activity, we need to make them experience school actively, as the more they will explore, experience through their senses and assimilate, the more fertile their imaginative capacity will be [23].

Apart from the models just mentioned, which have long been studied by many scientists, embodied cognitive science to date represents one of the scientific approaches that is most influencing, especially internationally, in the research field of educational neuroscience [24]; the latter, thanks to the establishment of a virtuous dialog between different fields of study such as pedagogy, didactics, psychology, neuroscience (i.e., between the so-called soft sciences and hard sciences), has provided in the last two decades a solid contribution in explaining the functioning of the human mind, bringing evidence in favor of a close connection between mental functions and the relationships that exist between the body and the environment [25].

For some time, various authors have contributed to highlighting how complex phenomena need a nonlinear, manifold glance, more representative of the variety and unpredictability of developmental and educational dynamics and outcomes [26–29]. Thanks to this interdisciplinarity, and the studies derived therefrom, the notion takes shape that the mind is not independent and unrelated to the body but is one with it. Therefore, cognition results to be embodied or embedded, that is, it sees in the body the dimension from which the mind emerges. Based on this condition, cognition requires not only the participation of the brain and the body but also that of the environment in which it is immersed; this has opened an interesting, constructive, decade-long dialog between pedagogy and architecture [30]. Learning environments, as an extension of the human mind [31], therefore play a fundamental role in the interconnectedness of cognitive processes. The realization that cognition is embodied and dependent on bodily features, particularly our perceptual and motor systems, should therefore be acquired by all those working in the field of education.

A number of preliminary exploratory studies have been conducted in recent years [32]. During these studies, the structuring of the constituent elements of the EC-based integrated training approach has been gradually defined.

The EC-based approach is defined as integrated into that it involves the articulation of three nonhierarchical phases: theoretical training, practical experiential workshop, and final discussion. Each aims to influence and, in turn, be influenced by the others, through reflective practices [33] designed to activate metacognition.

Confirming the extent to which teaching professionalism is composed of elements of identity, personality, and value, in literature, reflection on one's core qualities has been found useful "[...] in consciously directing one's own professional development, establishing a harmonious link between one's personal identity and one's aspirations and enthusiasm for the profession" ([34], p. 91). The sharing of personal perceptions respects the observation of certain rules of communication, such as respecting one's

own and others' elocution time, suspending judgment, practicing active listening, and exercising positive feedback; this is to sharpen each teacher's empathic and relational skills as well as derive the appropriate reflections on communication with and among students.

The main objective of EC-based Integrated Training is the possibility of generating in the learner embodied awareness and skills, strongly linked to concrete and simulated experiences "so that the elements of cognition are linked to experiential and pragmatic ones, so as to guide future decisions, leaving a sensitive, emotionally tangible, meaningful trace in the bodily memory of each learner" ([32], pp. 232–233).

So, in summary, reflexivity and narrative, action, sharing, and self-evaluation are the strategic principles and guidelines, which can direct the construction of educational experiences consistent with EC theory.

4. Conclusions

From this quick excursus, it can be seen, in addition to the many variations that have occurred over the years that, as much as we aspire to break away from it, the logic behind school teacher training courses is still predominantly transmissive, content-driven, and tied to disciplinary programs and theoretical knowledge of various teaching methodologies and strategies [35].

Although teachings regarding pedagogical and didactic areas, through inconsistent alternations, have been introduced over the decades, it cannot be thought that these teachings, concentrated in a few exams, are sufficient to establish a real dialog between disciplinary knowledge and the didactic approach based on interaction [36]; that is, an approach that is constructive in nature, offering space for expression and critical thinking to students, so as to allow their real growth, aimed at the autonomous construction of their own knowledge.

We also know that teachers tend to reintroduce the styles and attitudes they have experienced, which they have seen their teachers adopt, in a sort of consolidation of habits, conscious and unconscious, by reintroducing them to their students. This is because the teachers themselves continue to feel as a direct experience only the mode of teaching that they have already experienced, even in their internship experiences. All this generates the comfortable and reassuring conviction that "this is how it has always been done" is the best and easiest way to go.

To train professionals capable of implementing a change, universities should also change their approach, offering their students the possibility of experiencing these new teaching models in the common practice of teaching classes, not limiting them only to laboratory or internship activities. This would allow fostering the creation of a motivating learning environment that engages students through practical experiences, aimed at reducing the disconnect that occurs between what is learned at the theoretical level and what will be later and actually done in the classroom.

Alongside this innovative mode of university teaching, a further significant breakthrough in forming/changing the mindset of future teachers is to lead them to a greater awareness of themselves, how first and foremost they themselves learn, as well as what teaching really means to them. For example, by beginning to understand how the brain works, namely being aware of the fact that in each student the mechanisms that are generated as a result of the teaching stimuli will determine new circuit activations and new synapses, changing the anatomy and physiology of each student's nervous system differently. These aforementioned modalities, at first glance exciting

and convincing, can acquire real significance only if the ways in which training actions are to be conducted respond, juxtaposedly, to a genuine rethinking of professional training. This implies that, in order to attribute significance to a real formative impact with the EC-based approach, first it is indispensable that trainers achieve deep awareness of the following cardinal principles of teacher education:

1. Too often the pedagogical focus of professional training turns out to be the cultural object (a specific topic to be studied in depth, the application of new reform, innovative methodological skills, etc.), without realizing that the real purpose is to make the person (future teacher) acquire a new mindset. In this delicate transition, what should often be considered the objectives to be learned become cultural mediators, objects of comparison, fields of experience, and experimentation. The active role of the trainee [37], on the other hand, enables participation by investing one's own ideas and one's own readings of the phenomenon to support a new construction of thinking and of actions to be taken. It is a training of the person, not of the knowledge and methodologies.

2. A rethinking that recognizes, not only in words but through attitudes and languages, the complex unity of body-mind. However much our rational minds may claim to recognize and marry such unity, the deep implicit world still directs actions and behaviors in education according to compartmental and dichotomous logics, denying the complexity of our body as a holistic entity through which knowledge and skills can be built [35, 38, 39].

3. Recognize and accept that emotions represent significant and indispensable elements in the learning process. It is precisely emotions, in fact, that attribute meaning and significance to cognition, making it permanent and usable even in different contexts [1].

4. Overcome the deterministic view of a being by approaching it in an anthropologically human way. The perceptual and action variables of each living being make up the configuration of the "synaptic self" [8], where the uniqueness of each reigns supreme and does not automatically respond to standards of intention and behavioral homologations.

5. A formative transformation that operationally recognizes the value of community as an integrating background on which to build personalization processes. Inclusion is not a phenomenon that concerns only people with disabilities but extends its gaze beyond, where cooperating in spite of differences is the greatest wealth that can be had [40].

6. A culture soaked with the acceptance of the complexity of phenomena [41], one that does not presume to govern them linearly and understands that immersing oneself within them is the only way to guide them. Rational control and governance are possible for what is predictable, not for the unpredictable world of educational complexity on which education "must feed."

7. Leverage especially the beliefs/cultures of the individual as the determining agent of the community to which he or she belongs. Each person's repertoire of knowledge always filters through cultural values constructed through experience

and is perceived implicitly by lived social patterns. The absolutism of knowledge clashes with the principles of the neuro-phenomenology of a living being (edited by Gomez Paloma [42]).

8. A rethinking that does not deny the value of technology and the opportunity it offers to learn about the world and to range culturally in divergent ways. At the same time, however, it does not deny the value of tradition, of "smells," and of affective experiences that represent the roots of our being a person. In this scenario, the local and the global are now not so "distant."

9. Deep awareness that providing fertile ground for sharing is the basis for the respect of everyone's rights/duties. Sharing does not only mean socializing one's ideas and skills but also autobiographically narrating one's experiences and lived experiences (edited by [43]), strong in the fact that, in a real way, only the stripping of roles and labels offers an authentic and respectful confrontation of differences to be accepted and valued.

10. In order to try to better understand dimensions and phenomena, as well as act effectively for their improvement, the formation of the person must take place starting from the principle of the extended mind [31], aware that, in light of the new neuroscientific paradigms, the mind is not enclosed in the person's head but expresses its full functions only when considered in its interaction with the world and its perceptual and action variables.

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