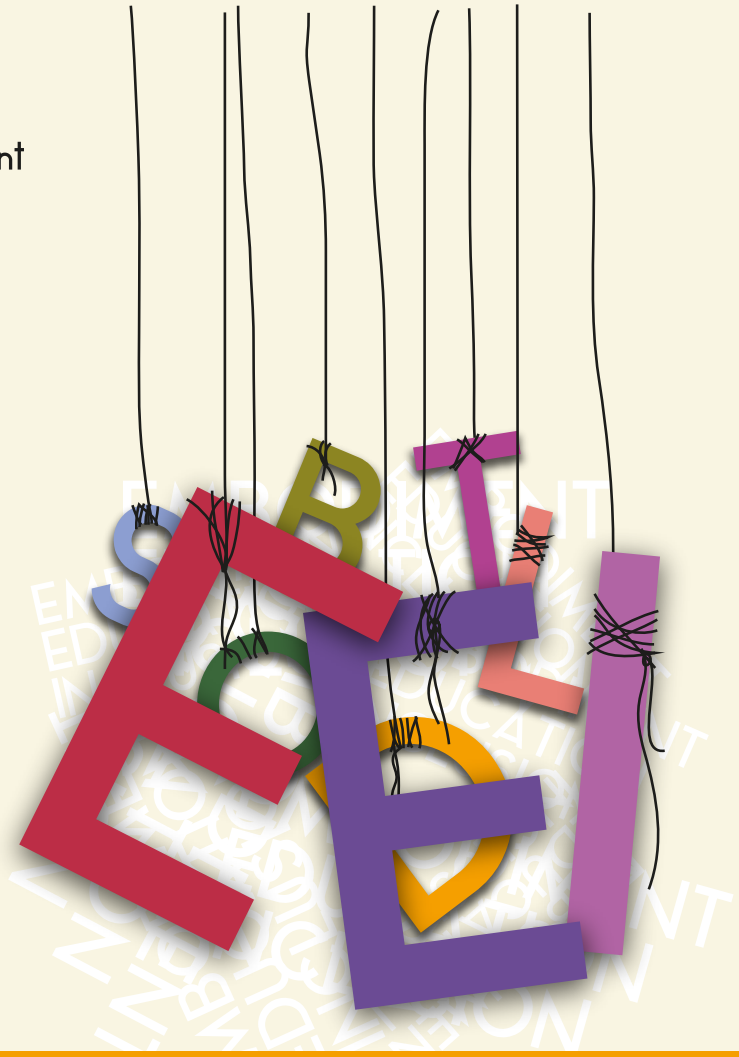
Embodiment
Education
Inclusion



EMBODIMENT & SCHOOL

a cura di

Filippo Gomez Paloma

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Filippo Gomez Paloma è Professore Ordinario di Didattica e Pedagogia Speciale presso l'Università di Macerata. Già Dirigente Scolastico, è Dottore di Ricerca in Pedagogia dei Processi Formativi e Costruzione della Conoscenza ed ha conseguito una Laurea Magistrale in Psicologia, due Lauree quadriennali (una italiana ed una francese) in Scienze Motorie e Sportive, un Perfezionamento, tre Specializzazioni e un Master in ambito educativo. È membro di molte Società Scientifiche nazionali ed internazionali di Area Pedagogica e Didattica (AIESEP, SIREM, SIRD, SIPeS) i cui oggetti di ricerca sono legati al mondo della formazione, della valutazione, della didattica inclusiva e dell'educazione motoria nella scuola. È stato Coordinatore Scientifico del Convegno Internazionale "Embodiment & Scuola" nel 2019 presso l'Università di Salerno. È attualmente consulente presso l'INVALSI come Esperto Senior in Ricerca Didattica e Educativa per il Progetto Nazionale di Ricerca e Formazione Valu.e for School.

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Filippo Gomez Paloma
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73100 Lecce • Via Arturo Maria Caprioli, 8 • Tel. 0832.230435
25038 Rovato (BS) • Via Cesare Cantù, 25 • Tel. 030.5310994
www.pensamultimedia.it • info@pensamultimedia.it

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Introduction

Embodiment & School. From New Approach of Teaching/Learning Interaction to ECS School

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Embodiment & Scuola. Dal nuovo approccio dell'interazione insegnamento/apprendimento alle Scuole ECS

Filippo Gomez Paloma
Full Professor of Didactic and Special Education, Department of Education Science, Cultural Hermitage and Tourism, University of Macerata (filippo.gomezpaloma@unimc.it).

1. Why an international conference on "Embodiment and School"?

In recent decades there has been a strong need for scientific reflection on the body as a cognitive, affective and relational tool at the core of a convergence of interests from different disciplinary fields, ranging from Philosophy to Psychology, from Anthropology to Neurobiology, and from Education Sciences to Linguistics. By recognizing this request for reflection, the international symposium Embodiment & School, held at the University of Salerno in October 2019, proposed itself as a multi/interdisciplinary dialogue on the role of the body in fostering learning processes. The aim was to create opportunities for discussion between the different formal places of education and training – School and University first of all – and scientific research, so that they could confront each other in the light of an innovative plurality of contributions, hoping that the project ideas could be translated into a didactic action rich in educational values. The focus of the symposium was a learning process strongly associated with the intentional teaching process, in a space-time frame marked by situated and strongly embodied intrapersonal and interpersonal dynamics. The event was divided into several sessions – 3 plenary sessions and 4 parallel sessions – and a panel discussion was enriched by the presentation of an international book on Embodied Cognition (EC), edited by me.

A central and very topical theme, the teacher training, started the debate on the meaning that the body assumes in the revaluation and enhancement of the role of teachers, (Embodiment and Teachers Training), emphasizing and promoting new integrated skills for the improvement of school inclusion processes (Embodiment and

Inclusive Processes). The theoretical framework of the EC and the recent scientific research have offered new insights on the educational purpose of the teaching-learning processes in the educational context (Embodiment and Education), also in terms of the evaluation of the processes themselves and of the quality of the school system (Embodiment and School Evaluation). The new didactic practices, designed according to the EC approach, have suggested a new setup of learning environments and architectural spaces (Embodiment and Educational Spaces), in which the body feels, moves, acts and interacts. A dynamism that has reflected the bio-psycho-social dimension of motor and sports activities, today increasingly recognized and valued in the school world (Embodiment, Physical Education and Sports). Finally, the transversality of the Embodiment emerged in the advanced and sudden technological evolution (Embodiment and Man-Machine Interaction), inviting participants to express themselves on the virtual and real boundaries and meanings that the body assumes in relation to technologies in the school context.

This volume, in addition to collecting the contributions of the speakers involved - according to an articulation that reflects, chapter by chapter, the topics of the sessions developed - ends with an appendix of reflections and perspectives, within which other interested colleagues and specialists in the area offered their scientific contribution.

2. Short heuristic overview on Embodiment

Following a significant interest of the international community in the topic of Embodiment, there has been a remarkable development of the literature on the function and role of the body in the learning process, which allowed broadening the knowledge about this tool, both from a neurobiological and phenomenological point of view.

In this paragraph I will briefly try to list some key points, scientific cornerstones that are the foundations of this paradigm; even if they are not fully framed by the community in a uniform international and interdisciplinary way, they can still be used as a framework on which to develop further research, possibly with a more applicative character. Precisely for this reason, on the basis of these pillars, new research designs are recently being developed, investigating the role of the body and its influence on human behaviors that are significantly relevant and useful for the school world (creative thinking, social skills, emotionality, logical skills, and so on). The question now is just whether or not the latest research on Embodiment directly inspires the school world and the policy-makers who govern it.

A first cornerstone, which, in my opinion, represents the genesis of the EC, is George Lakoff's program on the revolution of cognitive science; being it intellectually rooted in the works of European philosophers such as Heidegger or Merleau-Ponty, it was developed thanks also to Mark Johnson's efforts (Stanciu, 2015). Both suggested

that, contrary to the dominant opinion of that time, mental representations are intimately linked to "direct physical experiences" (Lakoff & Johnson, 1980, p. 57), a fact that makes most, if not all concepts, intertwined with the body movements and human anatomy. At the heart of his new program was the idea of the Embodied Cognition, meaning that the categories in which we think are shaped, modified and strongly limited by the way we spatially explore our environment (Lakoff & Johnson, 1999; Lakoff, 2003).

While this principle holds the merit of having promoted a revolutionary new trend in cognitive sciences, we cannot simply think that there is only one version and one perspective about the EC. There are those who reflect on the compatibility with standard computational visions of the mind (Shapiro, 2011), or those who, according to conceptions and analyses of the relationships that are assumed to exist between the mechanisms of mind and body (Moravec, 1988; Varela, Thompson & Rosch, 1991; Clark, 1997; Damasio, 1999), have developed their own peculiar vision with specific characteristics. This led to a further fragmentation of the whole field into various subprograms existing to date. As such, 21st century embodied cognition no longer refers to a unified and cohesive paradigm, but to a whole family of theses bonded together by the idea that various aspects of cognition are influenced and shaped by bodily states and processes (Wilson, 2002). The nature of this influence and its magnitude, therefore, vary significantly from perspective to perspective.

To make it easier to read, let me make a brief examination according to the orientations of the scholars Wilson and Golonka (2013). On the one hand we have one end of the spectrum of the cognitive embodied program where there is the not so radical idea that cognition can be influenced by body states (Eerland et al., 2011) and those of a higher order; it follows that abstract mental representations are founded in these states (Lakoff & Johnson, 1999; Jostmannet al., 2009; Miles et al., 2010). This view is the result of the above mentioned scholars' work who, over the years, have analyzed an enormous amount of metaphors to support this perspective.

Of all the various sub-programs of the embodied cognitive paradigm, the aforementioned thesis, sometimes called "conceptualization hypothesis" (Shapiro, 2011), is undoubtedly the least controversial one. However, it is true that, by paying some attention and analyzing scientific work carefully, there is no premise within this thesis that prevents cognition from developing in a disembodied central processing unit (or at least its total negation is always omitted), as the orthodox perspective suggests. Basically, the scientists working within this program seem to be working on standard cognitive sciences, using another mediatically more engaging and more attractive name in its scientific exploration (Wilson & Golonka, 2013).

In stark contrast, on the other side of the spectrum, we find the much more radical, unorthodox perspective that cognition goes beyond the boundaries of the brain and spreads through mind, body and environment (Beer, 1995; Clark & Chalmers, 1998;

Clark, 2008; Wilson, 1994). Although this is more a philosophical thesis than a pure research program, this perspective suggests that objects found outside the brain do not simply cause mental states and processes, but actually represent a part of them.

The fact that this thesis is based on rather unintuitive and sometimes even twisted ideas makes it unpopular for the majority of scholars in cognitive psychology. These two extremities risk disorienting young scholars who, interested in the topic of Embodiment and its applicability, find it difficult to understand on which valid thesis to base their application research. It must be recognized that, in this historical moment, the vast majority of scientific contributions dedicated to this topic follow the "conceptualization hypothesis" (Shapiro, 2011), rather than the more radical and, perhaps, even more fruitful ideas.

An interesting article by De Bruin & Michael (2016), for example, analyzes the framework of prediction errors minimization (PEM)[1], the supporters of which are divided on the idea of how we should conceptualize the relationship between brain, body and environment. Clark (2013), in fact, argues that some bodily and extensive processes can qualify as cognitive knowledge and thus reduce the complexity for the brain, making it possible to "interact with", exploiting some characteristics of the environment without representing them. Hohwy (2014), on the contrary, does not recognize this version of Embodied Cognition and Extended Mind Hypothesis, as he argues that the PEM actually involves a boundary between cognitive systems and their bodies/environments, thus denying the recognition that an external object is part of a cognitive process.

This different perspective, although framed in a specific perspective related to PEM, invites us to reflect on how much the surrounding world is or is not recognized as an integral part of our embodied mental processes, and consequently, leads us to make real cultural and research approach choices.

This discrepancy is one of many examples that we could provide to accept the idea that the fragmentation of the EC paradigm is a risky point that should not be underestimated. However, there also remains the positive consideration, which is the other side of the coin: how many opportunities for investigation could be created in the doubtful gaps that the various perspectives generate? If we want to understand the absolute value of the EC, we would probably make a mistake, also because the EC paradigm itself, having implicitly a nature that allows scholars to investigate through different research models, must be understood and studied with respect for this intercultural peculiarity (edited by Gomez Paloma, 2017).

In the next paragraph, therefore, while respecting the polysemy of the EC and its

1 PEM essentially treats the brain as a probabilistic inference system, which is hierarchically organized in levels and tries to predict the input it receives by building models of the possible causes of this input (Clark, 2013; Friston, 2010; Hohwy, 2014). The main objective of the system is to minimize the "prevision error", or the discrepancy between the expected and effective input.

interdisciplinary nature, I will try to explain possible reflections that can be spent in the school world.

3. Motivations and reflections on the contextualization of the Embodied Cognition approach in schools

The EC is based on the thesis that human cognition is fundamentally rooted in sensory and motor processes, and in the morphology and internal states of our body. Today, it is no longer considered amodal, and therefore fundamentally different from absolute perception and from acting (Smith & Sheya, 2010). Instead, it is understood as dependent on the body and context (Barsalou, 2008a; Clark, 2011; Ionescu, 2011; Laakso, 2011; Schubert & Semin, 2009; Stapleton, 2013). Therefore, we can say that the EC approach is, among the post-cognitivist ones, the most recognized as it supports and develops this vision.

In this sense, having levasu carried out recent research studies related to the world of school, several results today show, regardless of the type of study area to which they refer, that the cognitive system is highly dependent on sensory-motor processes, in a way that makes – and therefore consciously considers them – an intrinsic part of higher level cognition. Examples of research on numerical cognition (Crollen et al., 2013), on conceptual knowledge (Barsalou et al., 2003; Boncoddo, Dixon & Kelley, 2010; Borghi, Glenberg & Kaschak, 2004; Vankov & Kokinov, 2013), on learning mathematics (Goldin-Meadow & Singer, 2003; Goldin-Meadow, Wagner Cook & Mitchell, 2009; Wagner Cook, 2011; Abrahamson, 2014), on language comprehension (Glenberg, Sato, Cattaneo, Riggio, Palumbo & Buccino, 2008), on foreign language learning (Maouene J., Sethuraman, Laakso & Maouene M., 2011) and on cognitive development in general (Smith, 2009) develop day by day, and are increasingly available and introduced at international conferences. As a result, there are clear reasons to make this change of pace; in particular, it needs to focus on a new vision of education, where perceiving and acting should be considered as part of the thought itself (Rivoltella, 2011; Rossi, 2011; Sibilio, 2020).

If the two general statements (summarizing the main characteristics of the EC), such as the non-abstract and amodal nature of cognition (Barsalou, 2003, 2008a, 2008b; Boncoddo et al., 2010; Glenberg et al., 2008) (the first statement), and the presence of the "non-cognitive" side in the mental process such as emotions, actions and perception (Barsalou et al, 2007; Smith & Sheya, 2010; Glenberg, 2008b; Stapleton, 2013) (the second statement), are recognized and confirmed for all cognitive processing; thus education, as still practiced and organized today, will have to face and face strong challenges.

Yes, we speak of challenges, because in the school world the radicalization of the

classical/transmission-based didactic model, grafted onto the Cartesian dichotomy, continues to direct teachers towards a so-called "disciplinary" didactics. Shifting the focus of studies and training on learning didactics would mean first of all breaking down the teacher/discipline pair – thus overcoming the strong and exclusive link between teaching and disciplinary content – and, subsequently, would mean working to privilege the construction of the teacher/student dialogical relationship (Gomez Paloma & Damiani, 2015).

For this to happen, it is not enough to discuss the research works carried out by many international scholars on EC, which, in turn, share and converge in this new scientific approach to cognitive processes; instead, it is necessary to demonstrate the real potential of educational contextualization that the EC approach enjoys. This is why, in this second part of the third paragraph, I will list some field studies that highlight, with great significance, the value of EC in education, so as to understand its real degree of applicability in the school world.

The theme of creativity related to cognition, for example, has been the focus of much international research lately. In one of the studies carried out in the Journal of Experimental Psychology (Slepain & Ambady, 2012), the authors demonstrated that the embodiment of a metaphor really helps internal cognitive processing, increasing performance in divergent thinking tasks. Going into detail, the researchers asked two groups of university students to follow, by using a pen, two shapes drawn on a sheet of paper: a round, continuous, snake-like drawing, and an angular, ruffle-edged one. As expected, subjects who had to trace the smoothest drawing showed better results in both divergent thinking tasks and in solving a small number of RAT (Remote Associates Test)[2] problems. Based on these findings, the authors concluded that the body really influences the mind, since the mood of the subjects and the difficulty of tracing tasks are related. In other words, at least according to the authors, fluid body movements lead to fluid and original ideas. Similar conclusions were also reached by Leung et al. (2012). In a series of ingenious experiments carried out with university students, the authors showed that walking freely in an open space can encourage free thinking. In addition, the incorporation of an expression, such as "thinking outside the box", can improve performance in tests such as the RAT. This was achieved by comparing the results of subjects who were asked to solve the test literally into a box with those who were asked to complete the task while sitting on it.

Another very interesting and relevant study is on the semantic representation of

2 The Remote Associates Test (RAT) is a creativity test used to determine the creative potential of a human being. The test typically lasts forty minutes and consists of thirty to forty questions, each consisting of three common stimulus words that appear to be unrelated. The person taking the test must think of a fourth word that is somehow related to each of the first three words. The scores are calculated based on the number of correct answers.

the second language (Xian Zhang et al., 2020). Thanks to functional magnetic resonance imaging (fMRI), a study was carried out to better understand the second language processing (L2).

The sample was composed of twenty L2 subjects (English) and ten native English speakers (L1); all were invited to judge the semantic relationship of the English words. The behavioral data showed that L1 subjects performed the task more quickly and accurately than L2 subjects, with nothing unexpected so far. Very interesting, however, are the neurocognitive data (fMRI) which indicated that the processing of L2 action words induced higher brain activation than the processing of object words in key linguistic regions. Furthermore, although both L1 and L2 subject processing involved a large brain network, significant differences were observed: L1 noun and verb processing involved a more integrated brain network connecting key linguistic areas with sensory-motor elements and semantic integration hubs; for L2 processing, the connections between the semantic integration hub and the sensory-motor regions were not strongly engaged. This difference confirms that L2 learning, being the result of teaching in conjunction with L1 and often carried out in a grammatical/syntactical and not embodied way, produces less significant results and limits the speed and accuracy of the semantic skills acquired (Gomez Paloma, 2017). To confirm the above, considering also the specific field of learning difficulties, there is a wide range of research studies carried out by my colleague Michele Daloiso on L2 learning, which confirmed the need to participate extensively in this process, especially through daily life experiences that activate sensory-motor circuits on a perceptual and action basis (2018).

Even the issue of emotions and feelings is today the subject of large-scale studies on EC. In recent years in the Italian school, among other things, while understanding and rationally recognizing the need to activate didactic interactions with students in order to achieve emotional education, there are few institutions that privilege this approach.

To prove this, an international research group led a study on the relationship between the neuro-scientific mechanisms of sensory-motor control and the language of emotions and feelings. The linguistic analysis showed that many words related to emotion and feeling could be assigned to stages of the sense-motor learning process, but the task was often arbitrary. The embodied nature of emotional communication means that action words are frequently used, but that the meanings or senses of the word depend on its contextual use, as well as the connection of an action with an emotion is also contextually dependent (Williams et al., 2020). This confirms the broader perspective of the EC in relation to an extended interpretation of the mind (Clark & Chalmers, 1998).

Another interesting reflection of current and significant relevance is the study on the EC related to technology. Based on the principle that the particular form of real-

ization (i.e. the characteristics of the body) of an organism and its sensory and motor skills determine the way the environment appears to that organism, as well as the way the organism can interact within it (Lakoff & Johnson, 1999; Varela, Thompson & Rosch, 1991; Wilson & Foglia, 2011), we wonder what happens if an organism with type A body structure embodies a body with substantially different body properties (i.e. type B body structure) and if, at this point, significant differences should emerge, both at low and high cognitive level.

Under normal circumstances, organisms cannot "abandon" their bodies to embody a different "body". However, in a successfully mediated embodiment experience (hence the role of technology), users feel their self sense situated within the boundaries of their avatar body and tend to experience it as if it were their own body (Aymerich-Franch L., 2018).

Faced with people's illusions about the property of the whole body, recent research studies, by starting from this paradigm, have investigated self-consciousness and, in particular, the possibility and the way to consider the spatial unity between self and body as an interruption. Studies based on this paradigm suggest that multisensory correlations, together with a manipulated visual perspective, are sufficient to convey the perceived sense of self-localization to an illusory body (Ehrsson, 2007; Guterstam & Ehrsson, 2012; Lenggenhager et al., 2007).

During mediated realization experiences, users feel present in the position of their avatars, and experience the latter as if they were actually themselves. The feeling of presence (Heeter, 1992; Lee, 2004; Lombard & Ditton, 1997) is one of the most sought after areas in mediated embodiment. When users feel present in the position of the avatars, they behave and respond emotionally almost just like they do actually. Furthermore, they tend to treat virtual people as if they were real people, showing social responses like maintaining such an interpersonal distance (Bailenson, Blascovich, Beall & Loomis, 2001, 2003).

Finally, I would like to bring you back to the issue of creativity from which we started at the beginning of this paragraph. Thanks to some neuroimaging research, the involvement of the motor system in originating creative thoughts was highlighted, including some evidence of its functionally necessary role in generating them. In particular, the embedded or embodied structure suggests that the generation of creative outputs can partly rely on the motor simulations of possible actions, and that such simulations can be partially implemented in the same motor areas. In such cases, action simulations (i.e. the reactivation or reuse of the motor system) do not give rise to explicit actions, but are instead used to support higher order cognitive objectives, such as the development of creative approaches or improvisation (Kenett, 2020).

4. Towards ECS Schools

After showing the general framework and its heuristically-applicative expressions of the EC, I would like to conclude this introduction with a short paragraph on the strengths and characteristics of a school responding to this new approach. Thinking and implementing an Embodied Cognitive Science (ECS) School, in fact, means consciously assuming the logic of change at system level, by intentionally and collaboratively choosing the direction and purpose of this change, in order to try to control its impacts while overcoming and tolerating uncertainties. Our challenge is to make this inevitable path of change in education and school systems more sustainable, by making use of the "innovative and functional" scientific research mentioned above, through expert and constant support during the first years of experimentation, aimed at the development and full autonomy/generativity of each future ECS School (Gomez Paloma, 2017).

First of all, we would like to point out that the ECS School does not represent an alternative model of an out-out type of school, for which it is necessary to abandon the institutional frames of the Italian school and to turn into something completely different; on the contrary, the ECS School represents an idea of a school that fully develops the innovative and symbolic potential of the institutional-ministerial school, through the realization of "enriched paths" that are and didactically managed according to the EC approach (Damiani, 2017).

The choice to start from the valorization of the pedagogical and didactic institutional frames of the Italian school entails the need to ascertain and monitor the knowledge and the adequate implementation of these common frameworks, which are at the basis of the ECS school design. Actually, we know very well how much the logic of the planning of/by competences, started by the MIUR (Italian Ministry of Education, University and Research) in 2004/2007, is still rather unrecognized and problematic for most of the educational institutions of our country. The approach of the ECS School is based on the model of curricular design by competences, but proposes its specific implementation and structuring, through the realization of the "ECS-Based enriched curricular design". In this regard, it was considered necessary and useful to publish a specific Manual for the implementation of ECS Schools (Gomez Paloma, Damiani, 2020, in press), in order to provide school managers and teachers with a tool for information and comprehensive reflection, starting from the institutional frames and scientific contributions with which all schools should urgently begin to deal.

According to this concept of school, after having clarified the frames of the curriculum for ECS schools' competences (common to those of all Italian schools), I would like to present below some specific aspects that characterize the ECS-based learning environment model, which must be conceived, designed and implemented

within the curriculum (which we have already defined as ECS enriched curriculum). As pointed out, and according to the principle of Clark's Extended Mind (1998), the environment is represented by the designation of different components such as objects, devices, individuals, sociality, contexts and their culture, all framed as components and variables that play a primary role in students' learning processes.

In relation to what expressed above, we consider interesting the definition of "Wide ECS Environment" (WEE), understood as the extended and integrated environment able to enrich and enhance the curriculum of ECS schools, according to a threefold perspective:

– One personal (the mind-body of subjects, teachers and students as an internal environment);
– One physical-material (learning spaces and places as indoor and outdoor environments of school);
– One pedagogical (the ECS-based educational and didactic devices).

The quality of the school and the educational success of its students will be influenced by the characteristics of these elements, and above all, by the quality of the relationships between them (Gomez Paloma & Damiani, 2020, in press).

The characterizing aspect of the ECS perspective is the deep and continuous interconnection between the three dimensions (internal environment; physical environment; pedagogical environment) and the constituent elements; it is not possible to think about acting, modifying and evaluating each of them in a clearly separate way, as each change produces effects at all levels.

In line with the ICF model (WHO, 2001), the key element is the integrated and interconnected context of personal and environmental factors. In the context there is "the inseparable whole of objects, smells, sounds, colors and people who occupy and relate to it and with it, in a background that contains everything" (Borghi, Riggio, 2015, p. 119). It represents the physical, psychic and relational dimension where the educational process develops.

In short, this paragraph intends to represent a motivational key for all those who – like school managers, teachers, experts and trainers – are aware of the state of the art of our schools and who, while ready to invest effort and professionalism to help achieve the necessary change, face structural and mental obstacles that hinder the expression and implementation of their ideas. This short exposition of the key points and elements that characterize the ECS Schools represents the starting point to ignite curiosity and passion in trying to overcome these obstacles, in the awareness that the real change will be the result of an integrated, demanding, hard and uncertain work, where the only guarantee will be the conscious conviction to have made the right choice in one's own professional life (Gomez Paloma & Damiani, 2015).

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