

Future perspectives for physical education in primary school to promote innovative co-planning practices

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Abstract: The fundamental role of motor and sports activities in educational settings has been widely documented by international literature. The physical education (PE) in primary school is a transversal discipline aligning the educational goals to key competencies' development from a life-long learning and inclusive-design for learning perspective. This paper through an argumentative theoretical approach aims to provide a series of insights into the current teaching scenario that over the next few years will see the involvement in shared planning and programming for all primary school classes of generalist teacher, teacher specialized in motor sciences and support teacher, highlighting strengths, challenges and future research directions of co-planning processes.

In the light of some critical issues that differ according to the various school contexts what clearly emerges is the enormous potential of a complementary and integrated approach in the design and planning of teaching that can enhance the holistic dimension of learning in awareness of the complexity of the variables involved and the dynamics of individual(s) and environment interdependence that characterize the teaching-learning process.



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1. Introduction

In recent decades, national and international documents, consistent with scientific research, have highlighted the importance of motor and sports activities in educational contexts, recognizing their fundamental role in fostering integral personal development (Bailey, 2006, 2013; Holt, 2016). In particular, UNESCO (1978, 2015, 2021), referencing the rights enshrined in the International Charter for Physical Education, Physical Activity and Sport, assigns the educational system the task of making physical education and sports compulsory in primary and secondary schools by promoting health education, motor literacy and active citizenship.

The recommendations for key European competences (2018) highlighted the importance of promoting the acquisition of various skills within education. These included functional literacy, multilingualism, mathematics and technology, digital skills, as well as personal, social, and metacognitive abilities related to learning how to learn. They also emphasized social and civic competences in citizenship, entrepreneurship, and cultural awareness and expression (Recommendations, 2018; D.M. n. 139/2007).

According to the European framework, the national context has increasingly emphasized the importance of focusing educational design on the development of competencies for life by emphasizing the role that certain learning tools play in supporting the holistic development of individuals, especially in light of the socio-economic and cultural changes affecting the new generations. Among these tools, computational thinking and physical education have assumed particular prominence (MIUR, 2018).

The change of course that has been defined in recent decades calls for the need to design educational pathways capable of responding to society's new demands. Schools must provide pupils with the keys to give value to experiences and recompose knowledge, creating the prerequisites for acquiring a 'cognitive flexibility' that gives them the ability to be able to search for information, select it, analyze it, interconnect and make the multiple learning experiences coherent (D'Anna & Ambretti, 2023).

Physical education in this pedagogical perspective, in order to fully contribute, alongside other disciplines, to the development of the key competencies for lifelong learning, must necessarily transcend the technical-performance view, often linked to recreational activities and cognitive compensation, in order to assume the role of methodological glue by placing the well-being of all pupils at the center of the teaching-learning process, enhancing potential and accommodating weaknesses. This process "humanizes" the school by focusing attention on the depth of values and meanings related to the personal, cognitive and emotional abilities of pupils and students (D'Anna, 2020). In this regard, it is essential to overcome the vertical linearity of individual disciplinary epistemologies by moving towards an integrated and complementary didactic approach, capable of highlighting the transversality of the body in learning processes (Danish et al., 2020; Kosmas et al., 2019).

The understanding of bodily experiences and the implications of the functioning of our body-brain have been a primary focus in the field of cognitive neuroscience over the last two decades (Borghi & Caruana, 2015) and, have continuously empha-

sized the educational potential of the body in education in order to enhance learners' experiences and reinforce learning in other disciplines (Forte et al., 2024), fully in line with the Embodied Cognition approach (Barsalou, 2008; Gallese & Cuccio, 2018; Fedeli et al., 2022). According to this approach, corporeality facilitates the construction of knowledge as the active participation of the body allows the learner to experience and nurture deep emotions, understood as reinforcing input, produced by the total involvement of the person as a whole (Gomez Paloma, 2013).

In general, this theoretical framework adopts the idea that in order to fully understand the functioning of cognitive processes, it is necessary to recognize the brain as 'embodied' (Damasio, 1994). In other words, the way human beings gather information and construct their perception of the world depends on the body, its experiences and movements; the only way the brain comes into contact with the environment is through the body, sensory tissues and organs (Ferreira, 2021). The embodied dimension of learning in didactic design can foster the holistic development of students, which goes beyond the discipline of Physical Education alone, integrating with other curricula through interdisciplinary teaching (Forte et al., 2023, 2024), in which corporeity itself is conceived as an indispensable entity for activating a learning process that has a real and significant value on the acquisition of competencies (Whitehead, 2010; Nicolosi et al., 2016).

This is why the current panorama of scientific literature agrees and focuses attention on the search for an educational methodology that considers the bodily and relational dimensions of learning. The current research perspective suggests to the educating community an idea of teaching that goes beyond the static nature of the classroom (of spaces), encouraging mobility and physical interaction between teaching staff and learners in all areas of learning (D'Ambrosio, 2020).

It is therefore relevant to focus on the possible teaching practices and thus the potential of the current school organization. In this sense, the co-presence of teachers, implemented in a co-teaching perspective, represents a valuable resource for co-designing meaningful learning environments by valuing the differences of each pupil (Zach, 2020).

It is the adoption of the ICF (International Classification of Functioning, Disability and Health, 2021) in the Italian school context that transforms the educational environment into a space of co-design, where collaboration and active participation are the fundamental pillars to guarantee the well-being of all learners.

The biopsychosocial perspective of the ICF offers useful elements for observing the wholeness of the person, through the analysis of personal factors and contextual (physical-environmental) factors, in terms of barriers and/or facilitators of the possibilities of 'functioning', creating favorable conditions for understanding the needs of individual pupils and the class groups, which are indispensable for designing inclusive and effective learning environments (Dyson et al., 2010, 2011; Gillies, 2014).

It is clear that in order to implement quality planning that enhances the embodied dimension of learning, it is necessary to establish a process of didactic innovation aimed at promoting dialogue and comparison among the various disciplines so that a didactic approach can be adopted that simultaneously involves the body, action and interaction in an educational process that enhances the affective, relational, cognitive and motor aspect: a didactic that, in all disciplines, uses corporeality as a mediator of learning (D'Anna, 2020).

The 2022 Financial Law (L. n. 234 of 31st December 2021), after a lengthy regulatory process, introduced the new figure of the Master's Degree in Sports Sciences in primary schools. The specialized teacher supports, complements and collaborates with the generalist teacher by quantitatively and qualitatively enhancing the educational offer. This new didactic organization places all primary school teachers at the forefront who, with a view to co-responsibility and sharing, design and implement effective learning environments by adopting appropriate teaching styles (Mosston & Ashworth, 2008; Colella, 2016, 2019) aimed at ensuring the educational success of each and every pupil.

This should not only contribute to improving the quality of motor and sports education, but above all encourage the concrete implementation of innovative didactics capable of enhancing the mediating function of the body in learning processes. It is clear that for this purpose the construction of an adequate curriculum is not enough; what completes and makes effective the teaching-learning process is the effective implementation of educational actions related not only to organizational and structural aspects of the educational context, but also closely related to the professionalism of teachers and the effectiveness of the skills deployed. In this regard, educational co-design and co-planning, which are the focus of this work, play a crucial role in ensuring the implementation of quality learning environments. A fundamental aspect of the quality of what is defined collectively in planning is the shared vision of educational choices that are the result of careful analysis, planning and ongoing monitoring of processes. It is a set of routines that through confrontation, discussion, collective commitment and the coming together of different and complementary perspectives and skills can foster the realization of effective and meaningful actions in terms of learning and educational success (Abate et al., 2023).

The new regulatory and organizational scenario provides a favorable context to improve innovative co-design and co-planning practices that primarily involve the teachers and their responsibility in being able to respond adequately to the needs of pupils and an increasingly complex society.

The co-presence of teaching staff with specific professional skills (support teacher, generalist teacher and specialized teacher in motor sciences) creates ideal conditions for the implementation of effective co-design and co-planning processes.

In light of the above, this paper, taking advantage of the potential of educational co-planning, aims to focus attention on the new organizational and educational scenario of physical and sports education in elementary school, highlighting its strengths and weaknesses and future prospects.

2. Inclusion and design of inclusive motor learning environments

In the ICF (International Classification of Functioning), published in 2001 and in the version for children and adolescents in 2007 (ICF-CY), the World Health Organization (WHO) has introduced a model in which "human functioning" is explained from a bio-psycho-social perspective, allowing the concept of disability to be reconsidered in terms of different abilities. The ICF specifically defines disability as a condition determined by an adverse interaction between the functional and/or structural deficits of the person and the context in which he lives; the context of life is central to the condition of disability, which should no longer be read solely on the basis of individual characteristics outlined by the diagnosis, because the effects of

disabilities on daily life can be very different due to the supports or barriers present in a given environment (Pasqualotto & Ghirotto, 2019). It changes the paradigm in the conceptualization of disability: with ICF it takes its opposite meaning by recalling the need to pay attention to four elements: body structures, body functions, daily life activities and social participation. The terminology evolution internationally shared and disseminated by the ICF shifts the focus on a re-conceptualization of disability from a minority condition definable based on a "malfunction" of functions or bodily structures, a complex relationship between health (bio), personal (psycho) and environmental (social) factors. The shift of focus from a functional-structural model to a bio-psycho-social model proposes a revision of the ways of reading and interpreting not disability but different ability, Applicable to any person. It goes without saying that through an integrated approach is possible the detailed analysis of all existential dimensions of the subject, placed.

Thanks to the ICF, it is therefore possible to describe the functioning of an individual in a comprehensive way while at the same time implementing individualized educational plans to respond to the different needs of students by including the implementation of inclusive strategies. The teacher must therefore plan strategies and tools that will allow the student to achieve self-regulation and self-determination in their learning and, through daily teaching, the creation of neural networks of recognition, of strategies and emotions that preface the breaking down of those barriers and obstacles that prevent the learner from accessing epistemological knowledge. Fundamental is the construction of educational teaching paths to support the achievement of the goals for the skills at the end of each school path.

As reported by the European Commission for Education and Training in the Recommendation of 22 May 2018, to promote key competences, the aim is to:

- provide quality education, training and lifelong learning for all;
- support teaching staff in implementing competence-based teaching and learning methods;
- encourage multiple learning approaches and contexts in a lifelong learning perspective;
- explore approaches to assessing and validating key competences.

Universal Design for Learning, an approach to universal, based on the ethical values of equity and aimed at eliminating all possible labelling that mortifies the inclusion process.

Universal Design for Learning is based on early, systematic and the educational curricula in order to cope with individual differences. The assumption from which this paradigm is to think in advance to take action without making any subsequent adjustments. To be prepared to apply the principles of universal design in teaching is

It is important to build pathways that can use different types of resources and strategies

Robust and reliable, new content and already programmed for accessibility.

Universal Design for Learning is based on seven principles which are: a) equity; b) flexibility; c) simplicity; d) perceptibility; e) tolerance of error; f) restraint of physical effort; g) dimensions and spaces for access and use. The didactic declination of these principles allows design in an inclusive way, especially if you take into account the needs of each person.

An inclusive "learning environment" consists of a wide range of tools that allow all members of the community to create autonomous, independent paths of knowledge, which allow them to exploit their knowledge to produce new ones and to be able to have a cognitive structure solid but, at the same time, flexible.

A learning environment "is a place or a space where learning takes place ... and is composed of the learner and a" place "where the learner acts, uses tools, collects and interprets information, interacts with other people " (Wilson, 1996).

Direct consequence of the learning environment is situated learning.

Situated learning is an educational approach for which knowledge is built through a process of constant exchange between the subjects of the learning group and the context in which they operate.

This approach contrasts with traditional teaching because there is no transmission modality of knowledge, but it is carried out in its construction.

Therefore, the proposed activities should be characterized as authentic experiences, as close to the real world as possible, similar to the problems faced in specific professional.

The distinctive feature of soft skills involves, for the school, a paradigm shift in teaching methodology, aimed at increasing the synergy between formal, informal and non-formal contexts in which learning takes place.

The basic idea is to guarantee all students access to learning through a flexible educational curriculum attentive to the educability potential of kinesthetic body activities consistent with the current vision of educational sustainability recalled by the 2030 Agend (UE, 2015). Teacher co-design and co-responsibility are concepts that are gaining increasing relevance in the contemporary educational context, particularly in relation to teaching innovation, The personalisation of learning paths and the active participation of all those involved in the educational process. Co-design implies a collaborative approach to the definition of educational paths, while educational co-responsibility refers to the sharing of roles between teacher, students and families in the construction of the educational experience.

The educational innovations suggest the need to develop forms of collaboration between teachers (Truijen, 2013). Indeed, such cooperation not only benefits teachers but also has positive effects on students, as it offers them a model of teamwork and helps to train them as professionals capable of working in collaborative environments. Co-design processes can be seen as a dialectic of proposals, an exchange of arguments for shared knowledge, based not only on the acceptance of others' ideas, but also on constructive criticism.

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Collaboration between teachers is one of the most relevant experiences for an active and inclusive teaching (Ciani, 2019; Calvani, 2015). Trying different modes of collaboration allows you to adapt lessons to the specific needs of students, creating a stimulating and diverse learning environment.

The most effective methods to be adopted are:

- Parallel teaching: Both teachers deal with the same subjects with different

- groups of students, thus promoting a personalised and varied learning.
- **Team-teaching:** The teachers work together, interacting with the class, alternating explanations and discussions to make the lesson more dynamic and interactive.
- **One teaches, the other supports:** One teacher focuses on the main explanation while the other provides individual assistance to students who need support, creating an immediate help system.
- **Alternated teaching:** While one teacher works with the main group, the other deepens or simplifies content for a smaller group, responding to the specific needs of students.

At the same time, the need in schools to ensure a pedagogical function of the body in motion; requires the transition from a purely training and performance-oriented vision of motor activities to a conception that considers motor experience as a necessary precondition for the development of the entire personality of Subjects in training. The "recapitalization" of body culture in education has allowed to broaden the interpretative boundaries of the teaching-learning process, affirming the function of the didactic corporeities able to take on the different forms of it. In the didactic-motor field, the specific constraints of the docimological actions have led to a reflection on the possible use of forms of corporeo-kinesthesian accessibility for "understanding" the semantic and vicarious plurality that motor experience can assume in educational-training contexts.

3. Physical education for promoting the development of key competencies in school setting

In school setting, as provided for by the National Guidelines (2012), ensuring and promoting physical literacy in primary schools are prerogatives and developmental goals for physical education (PE) teachers (Figure 1).

Learning objectives at the end of the first grade	
<i>Thematic Clusters</i>	<i>Learning Objectives</i>
<i>The body and its relationship with space and time</i>	- Coordinate and use different motor patterns combined with each other initially in a successive form and then in simultaneous form (run/ jump, grab/ throw, etc.); - Recognize and evaluate trajectories, distances, execution rhythms and temporal sequences of motor actions, knowing how to organize one's movement in space in relation to oneself, objects, others;
<i>Body language as a communicative-expressive mode</i>	- Use expressive and corporeal modes in original and creative ways, including forms of dramatization and dance, ensuring effective transmission of emotional content; - Develop and perform simple movement sequences or basic individual and collective choreographies;

<i>The game, sport, rules and fair play</i>	- know and correctly apply the execution methods for various sports; - be able to use numerous games derived from popular tradition while applying guidelines and rules; - Actively participate in the various forms of play, including organized competition, and collaborate with others; - Respect the rules in sports competition; To accept defeat with balance, and to live the victory expressing respect towards the losers, accepting differences, showing a sense of responsibility;
<i>Health and well-being, prevention and safety</i>	- Adopt appropriate behaviors for accident prevention and safety in various living environments; - Recognize the relationship between diet and exercise in relation to healthy lifestyles. Develop awareness of physiological functions (cardio-respiratory and muscular) and their changes in relation to physical exercise.

Figure 1. National Indications, Thematic Nuclei and Learning Objectives at the end of the fifth grade of primary school (MIUR, 2012)

These learning objectives represent a declination of the so-called *Physical Literacy*, defined as a learning process that enables children to acquire as broad and articulated a motor repertoire as possible to promote healthy lifestyles and help structure increasingly complex motor skills transferable to daily life and sports (Whitehead, 2013).

According to this concept, postural patterns (i.e., bending/extending, adducting/abducting, lifting, slanting, pushing, etc.) and basic motor patterns (i.e., walking, running, jumping, crawling, rolling, climbing, throwing, grasping, etc.) represent the matrices for the production of any movement. These basic patterns when combined with executive variants enable the learning of increasingly complex motor skills geared towards sports initiation and participation. However, this process involves the whole person as it is concerned as a multidimensional construct, including knowledge and understanding, motivation and confidence, and personal physical competence (Whitehead, 2013; Colella, 2018).

It follows, therefore that the Physical Literacy model is in line with the current Italian school model based on competence-based teaching: due to the multidimensional features of physical literacy, the definition and acquisition of motor competence – declined in terms of skills, knowledge and behavior - allows not only for the gradual learning of more complex basic and sport-specific skills, but also achieving learnings that can be applied and transferable in different disciplinary and complementary areas of knowledge (co-planning), as well as in relational life more generally.

According to recent findings in the field of educational neuroscience, the continuous changes and adaptations that occur at the cortical level during learning episodes allow to consider the nervous system as a learning organ (Chéreau et al., 2022). Furthermore, the neuro-cortical plasticity, and the consequent creation and stabilization of neuronal maps and circuits are the result not only of the learning object (what), but also of the learning modes (how), which refers to how the brain learns a certain content (Gola et al., 2022). These discoveries have opened the way to new reflections

of didactic-methodological character, giving increasing importance to how to teach the brain (that learns) (Gola, 2020, 2021), fostering the needs for co-planning in school setting.

The Teaching Brain perspective reflects the dynamism that characterizes the educational relationship and reflects the complexity of the teaching-learning process (Battro, 2010). In fact, this approach is based on the study of neural markers that activate differently depending on the strategies and methodologies employed by the teacher and, consequently, the responses and actions exhibited by the learners (Dubinsky et al., 2019; Chow, 2013).

Therefore, interventions aimed at improving the quality of learning processes and development of motor skills in primary school (6-11 years) require a careful analysis of the strategies, content and methodological approaches utilized.

3.1 Co-planning in physical education: possible scenarios and suggestions

From a methodological point of view, the way in which PE teacher proposes motor tasks is functional for achieving specific educational objectives set in the individual learning units, and is strictly related to the choice of organizational modalities (e.g., individual tasks, pairs, small groups, circuits, relays, routes, team games, etc.).

The implications in physical education enhance implicit experiential learning, by discovery and trial and error. Learners, through practice acquire procedural knowledge and skills in the first instance and, subsequently, through retention and the development of increasing awareness of movement (metacognitive processes), acquire declarative knowledge that, from the perspective of a circular process, continually nourished and feeds them through the experiential nature of bodily activities. This approach therefore values the role and mediating function of the teacher in associating the most appropriate and adequate verbal/visual/graphic exemplifications with the learning content.

For example, a possible operational proposal for 6-7-year-olds is the 'Cloud Game', in which the teacher asks children to turn into a cloud and move only when the wind (the teacher) blows in their direction. The teacher may also ask children to take turns playing the wind.

What are the practical implications?

The movement and displacement of clouds in the sky cannot be attributed to a single codified movement (there is no universally recognized pattern associated with the cloud movement), but the shape, size, and the color of each cloud differ from those of others. The association child = cloud and teacher = wind is, therefore, functional in learning different movement patterns (walking/ running in various directions and at different speeds): the teacher does not explicitly tell students what to do, but indirectly and implicitly provides directions to guide students toward the desired performance.

In the field of developmental motor activity teaching, the use of the spectrum of teaching styles (Mosston & Ashworth, 2008) represents a possible solution for orienting learning from a model in which the teacher expresses a greater degree of responsibility and decision in the choice of activities through reproduction styles, to one in which, through production styles, pupils are given greater autonomy in decision-making for executing the motor task. In fact, these two models presuppose not only a different teacher's behaviors but also different modes of learning (explicit versus implicit):

- Reproduction styles: the teacher explains, presents, demonstrates and gives feedback about the correct/incorrect execution of the proposed task; this type of approach-directive and explicit-fosters (at least in the early stages) the acquisition of declarative knowledge;
- Production styles: the teacher poses a motor problem to learners to enable them to learn a particular movement implicitly (for example, "How does the kangaroo jump? Let's try to run as fast as a cheetah? Let's move slowly like an elephant", etc.).

Finally, applying through the Spectrum of Teaching Styles, the teacher not only enables students to learn different motor skills and patterns of movement, but also allows them to develop topological (above, below, inside, outside, high, low, large, small, etc.), temporal (first, after, during, at the same time, afterwards, fast, slow etc.), quantitative (all, little, whole, part) and qualitative (heavy, light, hard, soft, strong, flat, etc.) – common to and across literature, mathematics, geometry, geography, and history – with the body and through the body, enhancing the educational character of motor activities. Although multiple studies have highlighted the positive effects of the movement on school performance (Barbosa et al., 2020; Liu et al., 2022), future research could be directed toward evaluating the possible didactic-educational effects of motor activity.

However, despite the potential benefits and strength from the implementation of Spectrum of Teaching Styles, some limitations can occur. In fact, according to findings in these fields, reproduction teaching styles were commonly employed over the production styles, with reproduction ones being the most prevalent, limiting the promotion of interdisciplinary and co-planned didactic paths (Monacis et al., 2024; Chatoupis, 2018).

4. Conclusions

Pedagogical research, although recognising the importance of educational co-planning, highlights some critical issues that hinder its real and effective implementation: the lack of co-planning procedures (Carter et al., 2009; Van Garderen & Whittaker, 2007), implementation timeframes, which teachers say are often insufficient for planning and sharing educational choices (Bouck, 2007; Magiera & Zigmond, 2005). real difficulties in defining shared choices and/or finding collegial solutions due to different styles of planning and approaching problems (Brown et al., 2013; Murawski, 2009; Rice et al., 2007; Sileo, 2011). In addition to this, in the specific projects that intend to enhance the role of the body, movement and bodily experience in learning, the necessary integration of specific professional competences for the design of learning environments according to an embodied approach.

It is possible to deal with these critical issues, starting from a strong motivation on the part of all teachers to increase the quality of teaching practices in the light of greater commitment and participation, creating favourable conditions to optimise the processes of collaboration, confrontation, and discussion among teachers. After all, teachers who adopt collaborative practices have a greater sense of satisfaction and self-efficacy, and tend to use more innovative teaching methodologies (Hattie et al., 2021; Meirink et al., 2010). Teaching can be complex for teachers, but an effective solution to address such difficulties could lie in creating opportunities to make col-

laboration between teachers all more functional (Kloo & Zigmond, 2008, Minghelli, 2023).

The project 'CO-designing learning environments from a Bio-Psycho-Social perspective. Identification of needs and co-construction of a digital didactic design model' promoted by the Pegaso Telematic University, seeks to respond to the needs and requirements highlighted, with the aim of offering a contribution to educational innovation with a view to enhancing the embodied dimension of learning; carrying out an analysis of the needs of teachers functional to the improvement of teaching practices through the identification of the real weaknesses/threats and the strengths/opportunities that influence the realisation of co-planning processes of innovative learning environments; activating a process of co-construction of teaching design tools; carrying out a software demo of the teaching CO-Design and co-planning model that is able to respond to the needs of teachers.

The project, currently under implementation by the authors of this contribution, intends to take advantage of the opportunities of the primary school context, responding to the need to create a technological application that can make the processes of educational co-designing effective, activating synergies of action and sharing of choices. Technology, with its multiple functionalities, can foster the activation of interdisciplinary connections and links with positive repercussions on the effectiveness of teaching-learning processes and the development of skills for life, but it is clear that its potential use is closely linked to teachers' professional skills and a whole series of contextual and personal variables that are closely interdependent in determining the quality of teaching.

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