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PHYSICAL LITERACY: DEFINITION AND DIDACTIC-METHODOLOGICAL APPROACHES. TOWARDS AN ITALIAN MODEL?

PHYSICAL LITERACY: DEFINIZIONE E APPROCCI DIDATTICO-METODOLOGICI. VERSO UN MODELLO ITALIANO?

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Abstract
The multiple definitions of Physical Literacy (PL) show how scientific research proceeds, frequently, in a fragmented and not unitary way, with studies and experiences not always in mutual relation and continuity, adopting, often, an analytical and not global approach to the educational process. The scientific evidence emphasized the educational and pedagogical role of motor activities as "accelerator of processes" for the physical, cognitive, emotional-relational and social child's development. This contribution aims, starting from the definition of the disciplinary and intervention areas of the PL, to analyze some European and extra-European theoretical-organizational models, to propose, finally, some educational and methodological approaches with which to translate PL into practice.

Le molteplici definizioni della *Physical Literacy (PL)* evidenziano quanto la ricerca scientifica proceda, frequentemente, in modo frammentato e non unitario, con studi ed esperienze non sempre in reciproca relazione e continuità, adottando, spesso, un approccio analitico e non globale al processo educativo della persona. Le evidenze scientifiche hanno infatti sottolineato il ruolo educativo e pedagogico delle attività motorie come "acceleratore di processi" per lo sviluppo fisico, cognitivo, emotivo-relazionale e sociale del bambino. Il presente contributo intende, partendo dalla definizione degli ambiti disciplinari e di intervento della PL, analizzare alcuni modelli teorico-organizzativi di riferimento Europei ed Extra-Europei, per proporre, infine, alcuni approcci didattico-metodologici con cui tradurre praticamente l'educazione alla PL.

Keywords
Model-based teaching; non-linear teaching; physical literacy; teaching styles.
Didattica basata sui modelli; didattica non-lineare; physical literacy; stili di insegnamento.

1. Introduction on Physical Literacy

Physical Literacy (PL) and the educational value of motor and sport activities constitute key pillars of the motor and sport sciences due the interdisciplinary theoretical and practical links continuously and dynamically updated.
The multiple definitions of Physical Literacy show how scientific research proceeds, frequently, through studies and isolated experiences – often disjointed – focused on to the development of cognitive, emotional, social or motor functions separately, limiting the holistic approach to the educational process of the children.
In the field of research methodology in the sports and sports sciences, these disconnection between the different domains (physical, cognitive, psychological, emotional, etc.) emerge more clearly in concrete learning experience in relation to contextual (*where*) and methodological (*how*) implications, requiring necessary and frequent updates of the scientific frameworks. Health promotion in different ages through motor and sport activities in different context - and according to different organizational modalities - involves navigation in a complex maze of biological, social, environmental and contextual factors interconnected and changing over time (Stodden et al., 2021). Scientific approaches, however, do not have a significant and positive impact -immediately suitable - on the development trajectories of these factors, which remain (still) relatively isolated in academia and are generally specific to each discipline (e.g. physiology, developmental psychology, etc.). It is the interconnections between the different factors of the motor behavior and the specific socio-cultural and environmental contexts in which children lives and gains experiences that give sense and direction to the PL. However, the different approaches require strong integrations between methodological and practical implications for teachers' continuing training.
A new front of investigation, therefore, emerges for researchers and teachers regarding the search for the most appropriate models to develop the epistemological areas of physical education and motor activities according to the teaching-learning processes of the person (Casey & Macphail, 2018). Model-based didactic (MBD) becomes a necessity to propose a personalized educational process regarding motor activities aimed at different ages.

2. Definitions and models of Physical Literacy

The process of PL promotes, simultaneously, the confluence and the links of the knowledge's stages of development gained in different scientific fields (e.g., neuroscience, developmental psychology, etc.), that are the setting in which knowledge are *exchanged*, *transformed* and *oriented* to the motor skills learning and the educational process of the person.
The PL establishes also the functional interconnections between learnings, that are the cognitive-motor "connectors" structured through the variability of the practice, due to motor tasks, organizational modes, teaching styles and different teaching methods.
The design and implementation of a motor curriculum should be oriented, especially during the developmental age, to the motor skills learning representing the starting point for subsequent learning.
The individual motor repertoire of the student is, in fact, constituted by the interaction of the following factors:

1. Fundamental movement skills (e.g. running, rolling, jumping, throwing, etc.);
2. Executive variants: spatial, temporal, quantitative, qualitative, tactical and environmental;
3. Sensory and perceptual abilities (visual, auditory, tactile, vestibular, kinesthetic and proprioceptive);
4. Motor abilities: coordinative (motor combination, balance, space-time orientation, kinesthetic differentiation, rhythm, adaptation and transformation) and conditional (strength, speed, resistance and joint mobility).

Basic Physical Literacy, therefore, helps to organize and propose systematic experiences that allow the child to enjoy experiences that are realized *with* the body and *through* the body, as a fundamental process to advance to subsequent activities oriented to the technical-sports field.
For example, to play baseball, basketball, cricket, football, handball, rugby, and softball, a child would first need to have learned the motor skills that involve throwing-catching patterns and related executive variants (near-far, loud-flat, high-low, inside-out, right-left, forward-back, etc.).
Interventions aimed at the promotion of Physical Literacy through motor activities, moreover, feed on the contexts in which they take place, based on theoretical organizational and methodological-didactic models which are defined in a specific time frame. However, these models are not static, but vary and evolve dynamically in relation to socio-cultural factors, economic status and geographical location of a country.
The contexts, the socio-economic and cultural variables of a population, a region or a country, therefore, have a significant impact on the promotion of certain activities considered more significant for the development and growth of the person than others (just think of basketball in the USA, football in South America, or martial arts in the East).
However, at the global level the definitions of the PL and the theoretical models of reference, while all agree on the important educational value of motor literacy in the process of psycho-physical development of the child, differ from each other in some concepts, sometimes making the recognition of aims, methodologies, teaching strategies and pedagogical backgrounds more chaotic.
The French model, for example, defines Physical Literacy as the indispensable prerequisite for physical and sports activities, promoting active lifestyles in adulthood and old age.
It is possible to compare the PL to a complex system in which, through teaching styles and the teacher-educator-trainer's mediation adapted to individual needs in different contexts (school, sport, leisure time, etc.), the growth, development and maturation processes are interconnected and are integrated to foster the development of the individual repertoire of motor skills and abilities (Sport For Life, 2022).
In the motor and sport sciences field, the *physical literate* person:

- is able to perform a wide range of basic, technical and sports-specific skills (more or less complex);
- is able to perform a wide range of motor skills easily, with effectiveness, creativity and competence, and to apply and transfer them adapting depending on environments and contexts (indoor and/or outdoor environment, in water, snow, sand, etc.);
- is able to define, recognize, describe, analyze and apply the main characteristics of the learned skills;
- practices physical, recreational or sports activities to improve personal psycho-physical health and to achieve – according to the personal abilities and motivations - goals and aims increasingly greater.

The Australian model emphasizes the holistic approach of Physical Literacy, understood as a process aimed at motor skills learning, and knowledge and behaviors acquisition for the adoption of active lifestyles that involves multiple areas of the person, involving the following factors:

- the practice of physical and sport activity for the promotion of psycho-physical health and personal well-being;
- the attitudes, motivations, socio-relational and emotional factors leading the person to be physically active;
- the ability to understand, describe and analyze the benefits of physical activity on health status, and its relations with other sciences.

From the reciprocal interaction and integration of the elements described above, the result is a permanent and significant inter-disciplinary learning that are achieved through movement and physical activity with positive effects on the physical, psychological, social and cognitive domain of the person (SportAus, n.d).
Considering the health benefits and psycho-physical well-being, the "Sport Australia Position Statement on Physical Literacy" emphasizes the need to promote the practice of physical activity especially in childhood (SportAus, n.d)..
The Youth Sport Trust has developed a new model of Physical Literacy in primary school called "Physical Literacy Framework", commissioned by a Sport England National Lottery award and developed in collaboration with Sport England, County Sport Partnership Network, Association for Physical Education, a British sports organization supported by governmental sports institutions and national associations.
Physical literacy in schools, in fact, concerns physical education programs structured on the basis of scientific evidence and psycho-pedagogical and methodological assumptions aimed at promoting motor development, as well as motivational factors, self-perception and the metacognitive processes necessary to make the primary school children motor competent.
The Physical Literacy Framework aims, therefore, to guide, through examples and models of good practices and methodological-didactic content, the design, management and evaluation of the teaching activities of physical education teachers (Association for Physical Education, 2013).
The International Physical Literacy Association (Canada) (2017) defines motor literacy as "the set of motivations, self-perception, motor skills and knowledge to be physically active throughout life", identifying the following domains:

- Affective Domain: includes the personal motivations of an individual, the pleasure during the practice of physical activity, the self-perception related to his/her skills and the desire to be physically active during the course of life;
- Motor Domain: refers to the ability of an individual to learn a wide range of motor skills at different levels of intensity and executive difficulty. A competent child from a motor point of view is able to experiment and actively participate in multiple activities (for example, team sports, individual sports, fitness, gymnastics, etc.);
- Cognitive Domain: includes the ability to define, distinguish and describe the fundamental characteristics of human movement, understanding the benefits and the effects on health status, preventing any risks in order to ensure the safe practice of physical activity in different environments;
- Behavioral Domain: refers to the personal awareness of the benefits of motor activities, regularly practiced, as an integral part of personal lifestyle.

In summary, all the proposed models and the resulting strategic actions provide for the creation and enhancement of opportunities to practice, experiment and learn basic motor skills in different contexts: school, leisure time and family. In addition, PL literacy includes the development of knowledge and behaviors that, through related factors - such as enjoyment, motivation, and self-perception - enable active lifestyles to be adopted and maintained in adulthood. This can be achieved through structured physical education, sport or physical activity interventions adapted to individual needs and different age groups, based on sound methodological and didactic principles (evidence-based didactic) that recognize the significant and unavoidable value of motor activity for children personal development.

3. **Physical Literacy Education: Teaching Styles and Non-linear Teaching**

Socio-cultural transformations, reduced opportunities (in terms of environments and contexts) to be physically active, and the increasingly sedentary lifestyles are progressively

impoverishing the personal repertoire of motor skills: a large percentage of children and adolescents manifest difficulties in the execution and variation of basic motor skills.
The learning of the motor alphabet (combination of fundamental movement skills associated with *N* executive variants) is a process which integrates and completes the other alphabets, from the linguistic to the logical-mathematical ones.
In this research field, international literature has shown that the regular practice of motor activity in children and adolescents, and therefore the increased PL and levels of motor competence, as well as determining a better general health status, is positively associated with the achievement of competency goals and learning objectives of other disciplines (e.g., Italian, mathematics, history and geography, foreign language, geometry, science and technology, etc.).
As highlighted by Gola (2020) it would seem that the teaching-learning processes, and in particular the type of bi-directional relationship established between the teacher and the student/s, are able to activate, modify and adapt certain brain areas designated for the cognitive development of the child who learns.
These neuroscientific goals can further support and enhance the pedagogical effects of the teacher's behavior (Ní Chróinín et al., 2018), as it would not only be important the amount of motor experiences experienced, but also, and above all, the quality and the ways in which one experiences influencing the brain plasticity and cognitive development of the students.
The study by Pesce et al. (2019) suggests that learning experiences to be meaningful must be new, different, variable and challenging, as well as expected by the ecological and dynamic approach to learning motor skills.
The conditions of the learning environment allow students to experiment, learn, master and explore different variations of a certain motor skills (Gallahue et al. 2019), applicable in multiple situations, areas and contexts that may be similar but not identical. The variability of children's motor responses is, therefore, strongly conditioned by what the teacher says, proposes, does, and how he does it.
What methodological implications?
In order to structure a teaching-learning process that enhances the motor skills of each student and tends to Physical Literacy it is necessary for the teacher to carry out a specific selection among various methodological options. The model of the Spectrum of Teaching Styles (Mosston & Ashworth, 2008), in this regard, indicates the transition from teaching in which the teacher expresses the highest degree of responsibility and decision in the choice of activities and executive and organizational methods (reproduction styles) to an approach in which, on the contrary, motor decisions and responses mainly concern the student and the group (production styles).
The intentional and programmed proposal of executive variants, related to the various motor tasks, is adapted through the interaction of teaching styles (Mosston & Ashworth, 2008). The selection of one or several styles has different effects on the learning processes because it is in relation to the motor skills of children, the proposed task and the contexts in which the activity takes place (e.g. playground), the constraints imposed by spaces and equipment (baskets or nets of team sports, obstacles to overcome, climbing walls, size of usable spaces, uphill or downhill or slalom trails etc.).
The interaction of teaching styles, in fact, allows children to: a. promote different ways of access to skills and knowledge; b. foster the connections between skills, knowledge, behaviors, functional to motor competence; c. foster the relationships between cognitive and social functions necessary for interdisciplinary learning; d. personalize the didactic action.
Proposing motor tasks through production teaching styles allows to highlight the mediation functions for the motor, cognitive and social development of the child (Robinson et al., 2015; Lubans et al., 2008), soliciting non-linear learning processes based on the variation of spatio-

temporal, quantitative and qualitative constraints and their relationships (Renshaw & Chow, 2019).
The teacher, in fact, preferably using the guided discovery and problem-solving teaching styles, requires students to perform motor tasks with several executive variants, original and creative, resulting from the reworking of variants and skills already learned, in different contexts and situations. This allows the children to proceed in their own learning path in a reticular and autonomous way, that is open, not completely predefined or sequential, allowing a personal and conscious management of space-time-quantitative-qualitative constraints (Ausubel, 2004; Magill & Anderson, 2014; Chow, 2013).
On the opposite, the proposal of motor tasks predefined by the teacher through reproduction teaching styles, characterized by a reduced number and standardized executive variants, solicits in the child closed and sequential motor responses in the order in which they are requested.
It is up to the teacher to plan the learning paths in which previous acquisitions are related and made interdependent with the subsequent learning.
In other words, when the teacher proposes motor tasks not completely closed and predefined but through specific questions, solicits one or more answers/ executive variants according to a non-linear teaching, soliciting countless executive and logical connections (Chow, 2013; Rudd et al., 2021), to generate and re-generate links between motor learnings.
The non-linear educational approach can characterize the activities that the child performs spontaneously, e.g. in outdoor and other contexts, but can be intentionally mediated by the teacher to guide the student's learning methods, for discovery, problem solving and to promote self-perception and enjoyment, generating both motor performances functional to the personal repertoire of motor skills of each child and the prerequisites and interconnections for subsequent learning.
The teaching of motor skills provides, therefore, not only the definition of objectives and the selection of motor tasks and activities but also the adaptation of the ways of interaction and communication with students, to promote learning skills, knowledge and related factors.
The teacher's intentionality is necessary, not only to choose the motor activities but also to adapt the learning modalities to the contexts. In fact, through the selection of teaching styles, it is possible to modulate the degree of cognitive, motor and social involvement of the students, the time of motor engagement and the interdisciplinary and transversal interconnections. With the styles of guided discovery and problem solving, therefore, the focus is on the individual and the operational proposals will have to consider the dynamic and complex interactions that occur between the students, the task and the environmental constraints (Chow 2013; Chow & Atencio 2012).
Regarding the non-linear pedagogical-didactic approach (Chow 2013), therefore, the learning process and the execution of the student's motor skills are continuously shaped by the constraints of the interactions between activities-environment-individual that generate the variability of the motor proposal.
The use of non-linear pedagogical-didactic approaches, based on the variability of tasks and the variation of teaching styles, should be encouraged to stimulate in children a wide repertoire of different motor skills and learning modes.
The effects of non-linear teaching are described as follows:
a) personalization of the motor task (different learning times; duration, difficulty- intensity);
b) autonomy in the choice of executive variants and motor responses: originality and motor creativity;
c) interconnections between interdisciplinary and cross-curricular learnings;
d) educational inclusion and didactic obliquity, through various scaffolding (each child has its own level of motor performance and competence).

The learning process, from this perspective, is understood as a more complex process, linked to changes in the constraints emerging from the environment and is the consequence of the interactions between the task, the person and the environment.

5. Conclusion

Recently, motor activities have shown significant progress regarding the selection and revision of content and organizational methods in different educational contexts.
Similarly, a critical review of the teaching methods and the teacher's behaviour would be necessary to study, indirectly, the quality of the learners' experience. In addition, the reduction of the didactic setting in which motor activities are taught, the increase in sedentary habits, the excessive use of technologies, have limited the mature reflection on teaching methods that becomes an essential link to ensure the quality of the teaching-learning process.
In each physical education lesson, regardless of the context in which it takes place, the choice of ways through which to organize the educational setting, opens in the students well defined learning windows that become access ways for the development of disciplinary, interdisciplinary and transversal objectives and for their interactions.
Being able to produce numerous and diverse motor responses, as happens by choosing the production teaching styles, means equipping students with a wide repertoire, quantitative and qualitative, of ways to solve problems, whose amplitude is proportional to the motor opportunities received (e.g., team games, expressiveness and dramatization, gymnastics) and to the ways in which they were proposed. Therefore, while sports training focuses on the repetition of a particular skill or tactical concept, in physical education and in sport initiation, a significant amount of executive variability should be proposed through repetition without repetition (Ceciliani 2016; Chow, et al. 2007; Chow 2013).
Modifying the execution of a motor task, equipment and spaces (e.g., playgrounds, toold, duration) may result in modified and adapted game settings; modifying the proposal for a task (not only *what* to do but *how* to require the motor task) determines different learning modes, since a teaching style connects disciplinary content with the student's learning modalities.
The teaching styles have strong impact on the learning processes and, in particular, the production styles providing original, creative and transferable motor executions, as matrices for subsequent learning. Although there is no single way to teach, non-linear teaching provides researchers and teachers with a theoretical framework to develop effective and personalized learning projects complemented by the choice of contexts in which to implement them.

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