

**BODILY AND ECOLOGICAL APPROACHES TO INCLUSIVE AND SUSTAINABLE OUTDOOR
EDUCATION**
**PROSPETTIVE CORPOREE ED ECOLOGICHE PER UN'EDUCAZIONE OUTDOOR INCLUSIVA E
SOSTENIBILE**

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ABSTRACT

English

Outdoor education, viewed through an inclusive lens, highlights the body as a key lever to ensure accessibility and participation. The body acts as an epistemic and relational mediator, facilitating learning for all students, including those with disabilities. The article proposes pedagogical models based on UDL and ecological design, integrating nature and body to foster a transformative and sustainable pedagogy.

Italiano

L'educazione in natura, letta in chiave inclusiva, valorizza la dimensione corporea come leva per garantire accessibilità e partecipazione. Il corpo diventa mediatore epistemico e relazionale, facilitando l'apprendimento per tutti, anche per studenti con disabilità. L'articolo propone modelli pedagogici fondati sull'UDL e sulla progettazione ecologica, integrando natura e corpo per una pedagogia trasformativa e sostenibile.

KEYWORDS

Outdoor education; Body; Inclusion; Accessibility; Sustainability.
Educazione outdoor; Corpo; Inclusione; Accessibilità; Sostenibilità.

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Introduction

In recent decades, education has been confronted with increasingly complex, interconnected, and global challenges. Environmental crises, growing urbanization, digital transformation, and rising social inequalities are profoundly reshaping the relationships between people, spaces, and educational practices. Within this framework, schools are called not only to address traditional educational needs but also to regenerate their pedagogical action in order to prepare conscious, resilient citizens capable of inhabiting the world in sustainable ways.

One of the most critical aspects of this transformation concerns the progressive loss of connection with the natural and bodily dimensions of educational experience. Contemporary society is marked by an unprecedented acceleration of social life, where the pace of living and learning is becoming increasingly frenetic and disembodied, producing phenomena of alienation and disorientation (Rosa, 2015; Rivoltella, 2023). This condition is reflected in educational settings: learning risks being confined to closed, digital, or abstract spaces, overlooking the role of the environment and the body in the construction of meaning.

In response to this scenario, outdoor education is emerging as a pedagogical perspective capable of reactivating the connection between body, environment, and community, fostering situated, experiential, and transformative learning processes (Dewey, 1938; Lave & Wenger, 1991; Varela et al., 1991; Lakoff & Johnson, 1980; Louv, 2016; Barra, 2021, 2023; Paparella, 2023). It does not merely involve moving classroom activities outdoors, but rather entails a comprehensive rethinking of educational relationships, restoring centrality to the body as an epistemic and relational mediator.

Corporeality represents a key element for understanding and acting within natural contexts: through the body, individuals perceive, explore, communicate, and learn. From this perspective, outdoor education is not a neutral or ancillary practice but a transformative pedagogical device capable of expanding opportunities for participation, particularly for students with disabilities or from disadvantaged backgrounds (Paparella, 2023). The body thus becomes an inclusive lever, both unifying and differentiating, capable of valuing pluralities and building meaningful connections with the environment.

The urgency of adopting ecological and inclusive educational perspectives is intertwined with both international and national policy frameworks that emphasize sustainability as a guiding principle. The United Nations' 2030 Agenda, particularly

Goal 4, underscores the importance of ensuring inclusive and equitable quality education for all (UN, 2015). In Italy, Legislative Decree 62/2024 on the *Progetto di Vita* reinforces this vision, promoting personalized and participatory educational pathways that place the enhancement of individual differences and resources at their core.

In light of these considerations, this article explores the potential of outdoor education through bodily and ecological perspectives, with particular attention to the dimensions of inclusion and accessibility. The aim is to outline pedagogical models capable of integrating nature and the body within a sustainable and transformative educational framework, connected to both theoretical dimensions and educational policies and practices.

1. Embodiment, Ecology and Situated Learning

Outdoor education is rooted in a pedagogical perspective that recognizes the centrality of bodily experience, the ecological dimension, and situatedness in learning processes. It is not simply a matter of moving activities outdoors but of deeply rethinking the educational relationship, valuing the body and the environment as co-constitutive agents of knowledge. Education thus becomes an embodied, relational, and contextual process in which body, space, and community act in a dynamic and co-evolving relationship.

Theories of *embodied cognition* emphasize that cognitive processes emerge from sensorimotor interactions between organism and environment (Dewey, 1938; Lakoff & Johnson, 1980; Varela, Thompson, & Rosch, 1991; Wilson, 2002; Pulvermüller, 2005; Barsalou, 2008; Glenberg, 2010; Gallagher, 2011). Thinking about an object involves reactivating previous bodily simulations (Glenberg, 2010; Pulvermüller, 2005). In educational contexts, embodied cognition highlights that learning involves dynamic cycles of perception, action, and reflection (Gallagher, 2011; Wilson, 2002).

This perspective implies that the body is not a simple vehicle of mental action but an epistemic structure through which knowledge and meaning are co-constructed. In natural contexts, this function is amplified: the body explores, perceives, manages spatial relations, and activates sensory resources often inhibited in traditional indoor settings (Louv, 2016; Barra, 2021, 2023).

The natural environment is not a neutral background but an active educational agent, capable of modulating relationships, interactions, and cognitive processes. Outdoor experiences reactivate the senses — sight, touch, hearing, movement —

expanding perceptual and relational possibilities compared to indoor spaces (Louv, 2016; Barra, 2023).

Education is therefore configured as ecological education, in which learning processes emerge from the interdependencies between individuals, material contexts, and communities (Dewey, 1938; Paparella, 2023). According to the sinecological perspective, learning does not occur in isolation but within complex networks of biological, environmental, social, and symbolic relations that co-evolve over time (Paparella, 2023). Outdoor spaces thus become living and transformative pedagogical settings.

Theories of situated learning emphasize that knowledge develops in practical and social contexts, not in abstract environments: learning takes place *with* and *through* the context itself (Lave & Wenger, 1991). Natural environments function as active cognitive partners, integrating bodily, social, and symbolic dimensions in the construction of knowledge.

Recent research has shown that educational practices integrating bodily movement and environmental interaction enhance motivation, memory, and conceptual understanding, especially when physical activity is meaningful and context-embedded (Wilson, 2002; Gallagher, 2011; Tancredi et al., 2025). A significant example is the SpEED – Special Education Embodied Design model, which proposes an inclusive approach based on full-body participation, showing how inclusion can be conceived not only in terms of technological accessibility but also as embodied design of educational contexts (Tancredi et al., 2025).

This integrated theoretical framework allows for a unified understanding of body, environment, and community. The body is not peripheral to the mind but the center of experience and knowledge; the natural environment acts as a co-designer of cognition; and situated learning recognizes the relationship between learner and context as constitutive of educational practice.

From an inclusive perspective, bodily experience and movement reduce communicative and sensory barriers, offering multiple forms of participation (Gómez Paloma, Ascione, & Tafuri, 2017; CAST, 2018; Barra, 2023). This approach is consistent with the principles of Universal Design for Learning (CAST, 2018) and with the framework of the *Progetto di Vita* in Italian educational policy (D.lgs. 62/2024).

From a design perspective, this implies that inclusive outdoor environments should not be conceived merely as “green spaces” but as embodied learning ecosystems that enhance sensory affordances, movement, spatial modulation, and coherence between bodily experience and educational content.

2. Accessibility and Barriers in Outdoor Education: Towards an Inclusive Pedagogical Ecosystem

Addressing the issue of accessibility in outdoor education requires more than simply extending the classroom to outdoor spaces. It involves a profound rethinking of the entire pedagogical ecosystem to ensure equal opportunities for access, participation, and learning for all students, regardless of physical, sensory, cognitive, or socio-cultural differences. When carefully designed and mediated, the natural environment can serve as a powerful catalyst for transformative learning processes. When accessibility is neglected, however, it can reinforce or even amplify existing educational inequalities (Imrie, 1996; Oliver, 1990; Nairn, 1999; Beames, Higgins, & Nicol, 2012; Kudryavtsev, Stedman, & Krasny, 2012; Goodley, 2016; Imms et al., 2017; Castelli & Ragazzini, 2020; Sandseter & Beames, 2020).

Barriers to meaningful educational experiences are multiple and not limited to physical obstacles. While material barriers—such as inaccessible pathways, uneven terrain, or lack of sensory supports—play a crucial role, sensory, cognitive, and symbolic barriers are equally significant. Outdoor spaces are often implicitly designed for “standardized” bodies: mobile, neurotypical, and capable of engaging without mediation. As highlighted in the work of Oliver (1990) and Imrie (1996), exclusion often arises not from disability itself but from the ways environments and educational practices are structured.

The Universal Design for Learning (UDL) framework offers an alternative to this compensatory logic by emphasizing accessibility as an initial design principle, not a subsequent adjustment. Outdoor environments developed according to UDL principles offer multiple means of representation, expression, and engagement, thereby creating conditions for genuinely inclusive learning (CAST, 2018). In this framework, the body functions as an epistemic and relational mediator, connecting diverse bodily experiences, perceptual modes, and languages (Gómez Paloma, Ascione, & Tafuri, 2017; Barra & Corona, 2023).

Research in environmental and educational fields confirms that inclusive access to nature is achieved when spaces and practices are multimodal and situated, taking into account the diversity of sensory and embodied experiences. The presence of accessible pathways, tactile and visual supports, comprehensible signage, technological mediation, and flexible activity design can significantly reduce barriers for students with physical, sensory, or cognitive disabilities (Beames et al., 2012; Kudryavtsev et al., 2012; Sandseter & Beames, 2020). Accessibility, however, is not merely a technical matter: it implies a paradigm shift in how we conceive

learning spaces, where the body is not a limitation to be compensated for but a resource to be valued.

It is equally important to address the socio-cultural dimensions of barriers. The idea of “nature” is often presented as neutral and universal, but in reality it reflects social and cultural representations that may exclude certain groups, bodily identities, and abilities. Inequalities in access to outdoor experiences stem not only from physical constraints but also from intersectional factors such as gender, social class, cultural background, and disability (Oliver, 1990; Goodley, 2016; Nairn, 1999; Imms et al., 2017). Schools play a key role in counteracting such dynamics by promoting inclusive, embodied, and relational practices that make nature an open, mediated, and shared space, rather than a selective frontier.

The embodied and sinecological perspective adopted in this article allows us to conceptualize accessibility not merely as an infrastructural requirement but as a complex, situated, and relational educational process. Interactions between bodies, environments, and communities can generate new learning opportunities—if design is intentional and participatory. For this reason, the active involvement of students, families, and inclusion professionals in the co-design of outdoor spaces and practices is essential. Accessibility becomes both a pedagogical principle and a political value, capable of transforming educational practices and promoting equity and belonging.

Finally, bodily movement itself can be seen as a privileged form of access and participation. Embodied practices, as exemplified by the SpEED – *Special Education Embodied Design* model (Tancredi, Rossi, & Di Pietro, 2025), offer effective tools for creating inclusive learning environments based on bodily plurality rather than standardization. In this view, outdoor education becomes a space for connection across differences, where environmental and pedagogical design intersect with the sensory, emotional, and symbolic dimensions of experience.

3. Inclusive Pedagogical Design in Outdoor Environments: An Integrated Paradigm

The pedagogical design of inclusive outdoor environments represents both a challenge and an opportunity to rethink how schools construct accessible, sustainable, and transformative educational experiences. From this perspective, design is not about simply “transferring” teaching practices outdoors; it requires a profound reconfiguration of the relationships between body, environment, and knowledge, integrating epistemic, social, and political dimensions. Natural spaces thus become active pedagogical agents, capable of co-constructing meaning and

stimulating multiple forms of participation and agency (Dewey, 1938; Varela et al., 1991; Lave & Wenger, 1991; Paparella, 2023).

Recent evidence indicates that inclusive outdoor education design must be based on a systemic and multimodal approach that values sensory, bodily, cognitive, and socio-cultural differences. Kelly et al. (2022) demonstrate that applying Universal Design for Learning (UDL) principles in natural settings significantly increases opportunities for access and participation for students with different functional profiles, through multiple means of representation, action, expression, and engagement (CAST, 2018). In this sense, pedagogical design becomes an enabling tool, rather than a compensatory one, broadening the pedagogical horizon beyond the traditional classroom.

An embodied and sinecological perspective allows us to conceptualize design as a dialogic pedagogical act between body and environment. The multisensory affordances of natural spaces enable the construction of situated learning experiences, fostering processes rooted in bodily action and perception (Gallagher, 2011; Lakoff & Johnson, 1980; Gómez Paloma et al., 2017; Barra & Corona, 2023). Neville et al. (2023) highlight that the quality of outdoor learning experiences depends on the balanced interaction of three fundamental components — environment, learner, and educator — and that intentional and participatory design enhances agency and belonging.

Within this framework, participation emerges as a central element. Co-design practices involving students, families, teachers, and educational communities are essential to creating environments that truly respond to individual needs and prevent implicit exclusion. International research confirms that effective inclusivity must be embedded from the earliest design phases, integrating multimodal access strategies and valuing diversity (Bruwer, 2025; O'Carroll, 2023). Outdoor environments should not be conceived as “neutral spaces” but as places intentionally shaped by social, political, and cultural practices.

A crucial aspect concerns the informational and logistical dimensions of access. O'Grady (2023) demonstrates that the lack of clear information on distances, pathways, signage, and accessibility of facilities constitutes a barrier as significant as physical obstacles. Accessibility, therefore, is not merely a spatial issue but also one of communication and transparency, aligning with an extended and systemic conception of the right to education.

Technology plays an important role as an enabling and augmentative tool: digital and sensory devices, augmentative communication systems, adaptive interfaces, and orientation tools can enhance the readability and usability of natural environments, supporting multiple forms of interaction and learning (Beames et al.,

2012; Castelli & Ragazzini, 2020). This integration maintains the centrality of the body and expands accessibility for students with physical, sensory, or cognitive disabilities.

This perspective aligns with the principles of the 2030 Agenda for Sustainable Development, which identify inclusive and equitable quality education as a cornerstone for building just, resilient, and sustainable societies (United Nations, 2015). In Italy, *Decreto Legislativo* 62/2024 on the *Progetto di Vita* strengthens this vision by promoting personalized and co-designed educational pathways that integrate formal and non-formal learning experiences. Outdoor education can thus become a generative pedagogical space, linking autonomy, agency, and sustainability.

Designing for inclusion ultimately means embracing complexity as a resource. The environment is not merely a backdrop for learning but an educational actor capable of interacting with bodies and symbolic systems to generate shared knowledge. Embodied and situated experiences are not deviations from educational standards but an epistemological expansion of them. Inclusive outdoor education, therefore, is not an appendix to traditional practices but an integrated pedagogical paradigm grounded in corporeality, interdependence, and social justice.

4. Educational Agency and Bodily Self-Determination

The reflection on educational agency and bodily self-determination is situated at the intersection of inclusive pedagogy, cognitive science, philosophy of education, and educational policy. Within this framework, outdoor education provides a privileged context for observing and activating authentic agentic processes rooted in embodied and situated experiences. Agency is not understood as an individual attribute but as an emergent property of dynamic relationships between bodies, environments, material artifacts, and social norms. The natural environment, with its variable and multisensory affordances, represents a fertile ground for the development of intentional, self-determined, and participatory forms of action (Bandura, 2001; Emirbayer & Mische, 1998; Gallagher, 2011; Lakoff & Johnson, 1980; Varela et al., 1991).

Bodily self-determination can be understood as the capacity to intentionally orient oneself in the world through embodied experience, negotiating spaces, gestures, postures, and relational modes. This dimension implies that learning is not merely received but co-constructed and enacted in an embodied and relational way. Self-Determination Theory emphasizes that intrinsic motivation and self-determination emerge when the basic needs for autonomy, competence, and relatedness are met

(Deci & Ryan, 2000). Recent research confirms that the sense of agency grows in educational contexts that provide opportunities for active bodily and environmental control, particularly in open, natural spaces that foster initiative and shared responsibility (Burke et al., 2024; Shogren et al., 2024).

In this perspective, the body is not simply a support for learning but an epistemic and transformative structure. Bodily experience becomes a vehicle for meaning-making, emotional activation, and decision-making orientation. Outdoor environments, which are less rigidly structured, allow students to explore, choose, and redefine interaction modes, directly impacting self-determination and perceived self-efficacy. Bodily negotiation of space—movement, exploration, proximity, and distance—becomes a primary form of educational agency (Glenberg, 2010; Barsalou, 2008; Faella et al., 2025).

Inclusive pedagogical design, viewed through embodied and sinecological perspectives, must consider the body as an active device of interaction with the environment. Conscious motor experience—walking, touching, building, manipulating, interacting with objects and other bodies—enables the generation of embodied and situated knowledge that is more robust and meaningful than purely verbal or abstract forms of learning (Gallagher, 2011; Varela et al., 1991; Lakoff & Johnson, 1980). In outdoor contexts, agency manifests itself as the capacity to read and modify the environment to pursue personal and collective goals, strengthening perceptions of competence and autonomy.

This vision finds a concrete normative and pedagogical framework in Legislative Decree No. 62/2024 on the *Life Project*, which promotes personalized and participatory pathways centered on the person in their wholeness. Bodily self-determination becomes a foundational dimension for supporting meaningful choices and responsibilities in the educational trajectories of students with and without disabilities, enabling an educational design that does not impose standardized forms of participation but builds accessible and plural agentic spaces (D.lgs. 62/2024; CAST, 2018; Paparella, 2023).

Embodied and situated experiences contribute to the construction of agentic identities, understood as the capacity to perceive oneself as a subject acting in the world, transforming environments and relationships. Outdoor education, due to its open and relational nature, offers privileged conditions for the development of such identities, particularly in accessible and inclusively designed contexts. This is especially relevant for students with disabilities, for whom bodily experience often constitutes the primary channel of expression and self-determination (Shogren et al., 2024; Gómez Paloma et al., 2017).

Embodied and sensory technologies can further enhance these opportunities when they support rather than replace bodily experience. Tactile interfaces, adaptive sensors, and immersive environments expand the capacity for orientation and action, making the boundaries between body, environment, and knowledge more porous (Zhang et al., 2025; Lehrman et al., 2025). However, such tools must be integrated into a pedagogical design that keeps embodied experience at the center as the foundation of educational agency.

This vision requires a radical rethinking of didactic and organizational models, in which outdoor education becomes not an optional practice but a structural pedagogical strategy to foster self-determination, participation, and responsibility. The school thus transforms into an open, generative, and inclusive ecosystem where bodies are not trained but enabled to act. Educational agency becomes a fundamental educational right, rooted in the body, acknowledged in educational policies, and sustained by intentionally designed learning environments.

Conclusions and Future Perspectives: Body and Nature as Levers for Educational Transformation

The conceptual and pedagogical trajectory outlined in this work highlights how the connection between body and nature represents a strategic lever for rethinking educational paradigms in a transformative, inclusive, and sustainable way. Outdoor education, interpreted through the lenses of embodied theories and sinecological perspectives, allows us to overcome transmissive and abstract models of learning and move toward an experiential, situated, and dialogic pedagogy. In this framework, the body is not an accessory, but an epistemic and relational device that shapes processes of knowledge construction, fosters self-determination, and activates educational agency (Varela et al., 1991; Lakoff & Johnson, 1980; Gallagher, 2011; Bandura, 2001; Deci & Ryan, 2000).

Nature, understood as an active and multisensory educational environment, becomes a co-protagonist in the construction of learning ecologies. Natural spaces support situated knowledge, enhance participation, and allow for multiple expressive and cognitive modalities, contributing to making educational processes more accessible and meaningful (Louv, 2016; Barra & Corona, 2023; Paparella, 2023). This perspective is consistent with the principles of Universal Design for Learning (CAST, 2018) and the inclusive framework of the Life Project (D.lgs.

62/2024), which promotes personalized and participatory educational pathways that value individual differences and potential.

The theoretical and design analysis suggests that the combination of body and nature produces transformative effects on multiple levels: on the cognitive level, enhancing attention, memory, motivation, and embodied meaning-making; on the emotional and relational level, strengthening belonging, agency, and self-determination; on the pedagogical level, broadening accessibility and diversifying expressive languages; on the political-educational level, contributing to the construction of resilient and inclusive learning communities.

This trajectory opens up critical future research and development pathways. Empirically, it is necessary to consolidate the evidence base on the effectiveness of inclusive outdoor education through longitudinal and comparative studies that examine its impact on agency, self-determination, and well-being. From a design perspective, it is crucial to develop integrated models of embodied and sinecological learning environments capable of supporting the participation of all students, particularly those with disabilities. From a professional development standpoint, building reflective and situated competencies for teachers and school leaders is essential for a genuine transformation of the educational system.

More broadly, body and nature become pedagogical levers for imagining new educational ecologies: open, dynamic, and relational learning spaces where knowledge is constructed through interaction with the environment and others. This implies a systemic shift: the school no longer as a closed, standardized structure, but as a generative educational ecosystem, capable of fostering self-determination, social justice, and sustainability.

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