



REVISIÓN TEÓRICA

Environmental and motor education for shaping personality in preschool: a systematic review

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ABSTRACT

The aim of this article is to research and better understand the advantages the natural environment can provide to the overall development of the child, particularly to the shaping of personality between three and five years of age. Thanks to educational theories and studies and thanks to the findings of fourteen recent scientific research papers, numerous advantages of physical activity in a natural environment were found, for the growth, for the cognitive, motor and socio-emotional development in preschool age. All the works that we have examined have had natural environment as background and the preschool child as "budding" protagonist. The results show that in nature there is possibility to undertake important learning processes through: exploration and direct discovery of knowledge on the field; a better understanding and command of one's own motor skills through a wide range of movements; strong and deep socio-emotional connections with a group of peers collaborating towards shared goals; bravery and self-efficacy when autonomously solving challenging situations and when approaching risk, which are all fundamental aspects for the future adult and citizen's education.

Educación motriz y ambiental para favorecer el desarrollo de la personalidad en educación infantil: una revisión sistemática

RESUMEN

El objetivo de este artículo ha sido estudiar y comprender mejor las ventajas que el entorno natural puede brindar al desarrollo general del niño entre los tres y los cinco años de edad, en particular, en la configuración de la personalidad. Gracias a las teorías y estudios y a los hallazgos de catorce trabajos de investigación científica recientes, se han encontrado numerosas ventajas en el ejercicio de la actividad física en un entorno natural; ventajas para el crecimiento, para el desarrollo cognitivo, motor y socioemocional en la edad preescolar. Todas las obras que se han examinado han tenido un entorno natural como contexto de aprendizaje y, el niño, en edad preescolar, como protagonista. Los resultados muestran que en la naturaleza existe la posibilidad de emprender importantes procesos de aprendizaje a través de la exploración y el descubrimiento directo: mejor comprensión y dominio de las propias habilidades motoras a través de una amplia gama de movimientos; conexiones socioemocionales fuertes y profundas con un grupo de compañeros que colaboran para alcanzar objetivos compartidos; valentía y autoeficacia cuando se resuelven de manera autónoma situaciones desafiantes y riesgosas; aspectos que son fundamentales para la futura educación de adultos y ciudadanos.

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Introduction

The present study aims to review a series of works to know the benefits and the advantages that a natural learning environment can offer to the overall growth of children of preschool age.

We decided to investigate this particular age, since it represents a tender age, delicate for laying the foundation of personality, considerably affected by the cognitive, motor and social growth and poorly studied. Nowadays, the toddler has a much richer, differentiated and complex personality (Mussen et al., 1981). Children have learned from the media and it gives them independence and can, therefore, explore autonomously the world that surrounds them (Vayer, 1979).

Pierre Vayer, French expert in psychomotricity of developmental age, states that the organization of personality happens in two ways: in the informal relationship, that is autonomously, and in the formal relationship, that is through social behaviours" (Vayer, 1979). The first one refers to the knowledge of oneself and one's body and that happens from perception to global experiences. The formal relationship relates to the psychosocial aspect of development that starts from family and then moves to school and socio-cultural environment; in fact, in order to build his/her personality, the relation with others is necessary, and it is obtainable through communication.

All the elements that affect children's personality formation inevitably pass through their bodies. It is from the body plan that various behavioural modes combine and peculiarities are born, characteristics making us unique; through the body we customize our me, marking our identity.

The body is thus a fixed reference point and the body plan is a human being's core element (Vayer, 1979).

The consolidation of the body plan, of perception, of the understanding and awareness of one's own body and the control of motor skills take place when exploring and dealing with the surrounding environment. Therefore, the environment characteristics and structuring are fundamental in order to favour and encourage a child to discover new things.

In this work, the aim is to underline how the natural environment, the wood or the river shore, the sea etc., present locally on the territory, represent the ideal environment for a child to learn, train one's motor skills and establish relationships with the group of peers. Outdoor activity like in the garden or in the school courtyard has a great learning, educational and health value because: all the senses are stimulated, the contents acquire play value, it's a rewarding activity and it improves oxygenation. Great educational value is bestowed to nature: novelty and the ever changing aspect that are typical of nature trigger children's curiosity and attention and they are encouraged to explore in and with nature; all that is unknown and still unexplored becomes attractive and magical. It is through exploration and constant discovery that children improve and develop their cognitive and motor skills and the sense of adventure prompts them to try experimenting different problem-solving strategies while stimulating divergent thinking.

These aspects were highlighted and confirmed in the fourteen researches taken into account: the studies are born from a careful analysis and a systematic selection of articles coming from countries that are different and far from each other, which however all show a particular attention for the environmental education and for learning in nature.

The aim of this research is to prove the educational value of nature, to know the advantages offered by the outdoor learning environment, the children's healthy growth, and the positive aspects which are much more than the possible risks and disadvantages.

Method

Starting from the month of January to June 2017, the University of Urbino UrbIS searching engine (Urbino Integrated

Search) was used to search through a wide collection of articles and journals from all over the world, covering an extended period of time and grouped by topic. Eighteen publications on the topic "the child's environmental and motor education" were selected, examined and analyzed in this article.

The electronic databases taken into account were: PsycINFO (11 articles), PsycARTICLES (1 article), Eric (1 article) e ScienceDirect (1 article).

Inclusion and exclusion criteria.

The fourteen articles were chosen according to predefined criteria, as useful indicators during the research process.

We considered only the papers where the following words were traceable: "natural environment", "motor activity", "childhood" (that is "ambiente naturale", "attività motoria", "infanzia").

Hence, only those that identified and valued the natural environment importance:

- in the cognitive, motor, emotional and social development of the child during the developing age;
- in creativity and imagination;
- in playing activities;
- in health and wellness;
- in the development of autonomy and courage;
- in needs and attitudes.

The natural environments considered were woods, forests, rivers, seas on the local territory of the chosen schools. Outdoor green areas like courtyards, gardens and parks with natural elements and structures were also considered.

All researches take place in preschools, during the age period called *early childhood or preschool age*, between three and six years of age: so important an age period, as long as it doesn't leave anything to chance and makes children protagonists of their own growth. In the fourteen studies, most of the students were familiar with the natural environment and have had the chance to experience nature in numerous occasions and situations.

The teachers who were interviewed and observed used nature as setting where to encourage teaching/learning processes, supporting outdoor education and recognizing the advantages of the child-nature relationship; the staff was made of experts that were briefed on the topic. Researches on the general learning environment importance were not considered; therefore, we considered just those studies relating to natural and outdoor contexts.

Moreover, the selected articles come from countries that are different and far from each other, but all with a particular attention to the world of environmental education in nature. Among them, there are: Island (1 article), England and South Korea (1 article), USA (4 articles), South Wales (1 article), Switzerland (1 article), United Kingdom (2 articles), Norway (1 article), Canada (1 article), Turkey (1 article), North Carolina (1 article). They are developed countries also from an economical point of view and with a very important history in education.

A further criterion for selection was the publication year, as we chose only those articles published since 2010 until today; we tried to identify the most recent researches to have data and results that are innovative, relevant and updated about the population presently in developing age.

All the articles are written in English.

In brief, the main indicators of the fourteen researches are: the title, the key-words and the summary. Then, theoretical framework, objectives, contents, methodology, materials, verification and evaluation were drawn by reading and analysing the full texts (Table 1).

In the fourteen studies, data and results were gathered in four different ways:

- Field observation of the children (4 articles)
- Interviews and questionnaires to teachers/students (3 articles)

- Observation of the children and interviews to the teachers (5 articles)
- Analysis of the regulatory framework (1 article)
- Analysis of the outdoor spaces (3 articles)

Table 1

Author	Year	Country	Children's Age/Number	Setting	Activity	Results
Jane Waters and Trisha Maynard	2010	South Wales	Three classes: 4-5 year-old, 5-6 year-old and 6-7 year-old children	Local Park	Excursions in the natural park; research question "which particular elements of the outdoor environment attract the children's attention?"	Natural elements attract children's attention and enthusiasm
Natalie Canning	2010	United Kingdom	Area 1: 4 five-year-old children (two males and two females) Area 2: 5 three/four-year-old males Area 3: three 3-year-old and 5-year-old children	Play area outside the nursery school and local forestry area	Building a shelter in three different contexts	Autonomous choices, relation with the peers, creativity development and play based on children's interests
Julie Ernst and Ladona Tornabene	2011	USA	110 students attending Minnesota university (USA) to become future preschool teachers.	University	Interview to the future preschool teachers to understand their perceptions on outdoor teaching/ learning and what educational opportunities, motivations and barriers they associate to these spaces	Acknowledgment of the advantages of the relationship with nature. Preference for semi-structured outdoor spaces, that are also easy to use with the children
Petra Lindemann-Matthies and Sarah Knecht	2011	Switzerland	1°-2°-3° year children in preschool	Local woods	Interview to the teachers on Forest Education and observations of excursions in the woods	Forests as educational structures where to comply with general school objectives
Sue Waite	2011	United Kingdom	Preschool children (3-6-year-olds)	Play area outside the nursery school	Interview to the teachers and observation of 5 case studies	Values found: freedom and fun, responsibility and autonomy, authenticity, love for the rich sensory environment and motricity
Kristín Norðdahl and Ingólfur Ásgeir Jóhannesson	2014	Island	Preschool children (3-6-year-olds) and 25 Icelandic teachers	Outdoor areas	Interview on the role of outdoor environment for children's education	Three topics were found: a) children's play and education; b) children's health, wellbeing and courage; c) children's opinions, knowledge and actions on sustainability
Habibe Acar	2014	Turkey	Preschool children (3-6-year-olds)	Outdoor play areas of the nursery schools	Natural environment contributions during children's development; instructions to design appropriate outdoor spaces	Appropriate outdoor spaces with areas for the cognitive, motor, social and emotional development

Author	Year	Country	Children's Age/Number	Setting	Activity	Results
Kwi-Ok Nah and Tim Waller	2015	England and South Korea	England: eighty 3-4-year-old children; South Korea: 80 children	Outdoor play areas of the two nursery schools	Interview on the role of outdoor environment for children's education and field observations in two contexts	Both contexts give importance to outdoor activities; comparison between contrasting educational methods as an enriching experience
Stephen Berg	2015	Canada	Preschool children (3-6-year-olds)	Outdoor play areas of the nursery schools	Levels of physical activity at school	50,6% sedentary activities; 29% moderate physical activities; 20% energetic physical activities
Jacqueline M. Swank and Sang Ming Shin	2015	USA	Preschool children (3-6-year-olds)	Natural areas	Play therapy focussing on the child and based on nature - NBCCPT	Effective therapy with social, emotional and behavioural disorders improves school performance
Allen Cooper	2015	North America	Preschool children (3-6-year-olds)	Outdoor play areas of the nursery schools	Outdoor areas complying with the E.C.E. regulatory framework	Poor consideration and evaluation of natural environments following E.C.E. regulatory framework
Zahara Zamani	2015	North Carolina, US	36 preschool children (3-5-year-olds).	Outdoor play areas of the nursery schools	<i>Affordances</i> and <i>behaviour setting</i> importance in children's behaviour	<i>Affordance</i> and various and moveable <i>behaviour setting</i> provide many opportunities for cognitive and creative play
Cara McClain and Maureen Vandermaas-Peeler	2016	USA	11 children in preschool age (33-59-month-olds), including 5 males e 6 females (6 Caucasians, 2 Afro-Americans, 2 Asians e 1 Latino)	Semi-structured environment (cove) and wild natural area (river)	Behaviours and skills promoted by the two different natural environments <i>affordances</i> and characteristics	Trust in risk, solitary exploration, positive social support, involvement with peers and positive emotional responses to physical and cognitive challenges
Kirsti P. Gurholt and Jostein Rønning Sanderud	2016	Norway	Preschool age children (3-6-year-olds)	Summer camp	Curious Play	Dynamic and changing natural elements attract children's curiosity; innate desire to know, discover and grow up

Results

In all the studies that were examined and analysed, the value of education in a natural environment during developmental age is deemed paramount. From the teachers' and childcare workers' statements, from the observations on the field on children's behaviour and from the researchers' considerations, we have gathered many contributions witnessing and confirming the importance of the relationship between children and nature.

We will summarize the macro topics identified in this systematic review.

The teacher as a leader and a supporter

The significant interaction between teachers and children is one of the characteristics highlighted and present in all observations, it represents a constituent important for the development of an education that is careful of children's interests. Studies claim that the teacher's ideal behaviour in natural contexts consists in letting children be free to explore, to carry

out autonomously their discoveries and to experiment the play. Free to fully experience nature, they start building some first knowledge and skills (Waters and Maynard, 2010).

Also, when faced with difficulties, risks and physical challenges, children are encouraged to challenge themselves and teachers don't help them overcome the obstacle by giving their hand, but supporting them emotionally with words. They are sensitive adult-educators, great experts of children's play world, ready to intervene only when it is appropriate, without inhibiting. By not interfering in play processes, teachers can observe and investigate on interactions, learning processes and needs (Nah and Waller, 2015).

This ideal behaviour strongly depends on teachers' confidence in the benefit of promoting growth in nature: they claim a learning program on environmental education and on ecological sense is essential for teachers.

To confirm this, the case-studies considered in the following articles (Table 2), witnessing the role of adults as supporters, careful observers and "designer" of suggestions and functional educational spaces.

Table 2

Authors	Country	N. children age	Activity	Results
Jane Waters and Trisha Maynard	South Wales	Three classes: 4-5-year-old, 5-6-year-old e 6-7-years-old children	Hiking in natural parks; research question "which particular elements in the outdoor environment catch children's attention?"	Natural elements catch children's attention and enthusiasm
Kwi-Ok Nah and Tim Waller	England and South Korea	England: 80 3-4 year old children; South Korea: 80 children	Interview on the role of outdoor environment for children's learning and field observations of two contexts	Both contexts give importance to outdoor activities; comparison between contrasting teaching methods as an enriching opportunity
Cara McClain and Maureen Vandermaas-Peeler	USA	11 preschool children (33-59 months), including 5 males and 6 females (6 Caucasians, 2 Afro-Americans, 2 Asians e 1 Latino)	Behaviours and skills encouraged by the <i>affordances</i> and the characteristics of the two different natural environments	Braving risk, solitary exploration, positive social support, interaction with peers and positive emotional responses to physically and cognitively challenging situations
Kirsti Gurholt and Jostein Rønning Sanderud	Norway	Preschool children (3-6 years old)	Curious play	Dynamic and changing natural elements attract children's curiosity; intrinsic desire to know, discover and grow up
Sue Waite	United Kingdom	Preschool children (3-6 years old)	Interviews to teachers and observations of 5 case studies	Discovered values: freedom and fun, responsibility and autonomy, authenticity, love for the rich sensory environment and motor skills

Environmental education and Ecopsychology

Environmental education and Ecopsychology are two disciplines studying the relationship between individuals and the natural environment, in particular they strongly support the idea of nature bringing benefits to human beings' growth and health. The schools considered in the research recognise the educational value of nature and have been promoting outdoor teaching for a long time, according to the principles of these two disciplines.

Ecopsychology was born from the union of psychology and ecology: reconnecting of the individual with the natural world contributes to the psychological wellbeing and to the rediscovery of an intrinsic sense of belonging to the natural dimension, by promoting a responsible and sustainable behaviour towards it. It introduces an innovative perspective on the human being, as it moves the focus from the anthropocentric vision, placing humans at the centre of the universe, to an *ecocentric* vision, where all the living beings are elements of a complex and interconnected system (Danon, 2006).

Ecopsychology is a discipline that focuses on re-establishing the connection between these two elements and on bringing human beings closer to that ecosystem which they are an inseparable and influencing part of, by designed walking experiences in nature.

Beside the therapeutic and business fields, Ecopsychology works also in the educational field: the fusion of its principles with Environmental Education ones gives birth to the idea of walking experiences able to bring children closer to the natural

world, in order to establish that intrinsic relationship between humans and nature already in the first years of life (International Ecopsychology Society. www.ecopsychology.net).

By promoting the relation with the natural environment from the most sensitive and absorbing age in an individual's life, it is possible to contribute to educate future citizens careful of the ecosystem wellbeing and preservation (Bonfanti, Frabboni, Guerra and Sorlini, 1993).

Raising people's awareness on respect and care for nature with programmes that begin from the early childhood is a goal that school can't just pursue but must reach in an active, natural and emotional way. *"With this state of mind the wood universe and the natural environment will return to their condition of living space and of a space that is privileged by the 'Culture' of the past, as an enigmatic presence, sometimes hard too but alive and wonderful, which has filled the collective imagery of the rural and farming culture of the past"* (Federici, 1993).

Environmental Education aim is to *"educate people around the world to be aware of and to worry about the environment and to the related problems, and to have the knowledge, the expertise, the state of mind, the motivation and the sense of duty, which enable them to act as individuals and as groups to resolve the current problems and to prevent others from arising"* (Schema mondiale per l'Educazione Mondiale, Carta di Belgrado 1975).

The aim is to get individuals closer to nature, by promoting programs starting already from the preschool years; to encourage the educational system to create the conditions for children to be daily in contact with nature, in order to understand its value and advantages (Table 3).

Table 3

Authors	Countries	Children's number/age	Activity	Results
Jane Waters and Trisha Maynard	South Wales	Three classes: 4-5-year-olds, 5-6-year-olds and 6-7-year-olds	Hiking in natural parks; research question "which particular elements in the outdoor environment catch children's attention?"	Natural elements catch children's attention and enthusiasm
Kwi-Ok Nah and Tim Waller	England and Korea (South)	England: 80 3-4 year-old children; South Korea: 80 children	Interview on the role of outdoor environment for children's learning and field observations of two contexts	Both contexts give importance to outdoor activities; comparison between contrasting teaching methods as an enriching opportunity
Cara McClain and Maureen Vandermaas- Peeler	USA	11 preschool children (33-59 months), including 5 males and 6 females (6 Caucasians, 2 Afro-Americans, 2 Asians e 1 Latino)	Behaviours and skills encouraged by the <i>affordances</i> and the characteristics of the two different natural environments	Braving risk, solitary exploration, positive social support, interaction with peers and positive emotional responses to physically and cognitively challenging situations
Kirsti Gurholt and Jostein Rønning Sanderud	Norway	Preschool children (3-6 years old)	Curious play	Dynamic and changing natural elements attract children's curiosity; intrinsic desire to know, discover and grow up

Cognitive skills and exploration-based learning

All studies stressed the fact of nature being a learning environment. By first-hand experimentation and exploration, children enter an environment that is rich in stimuli and knowledge; they ask themselves questions and find the answers thanks to their experiences, their behaviours, the collaboration with other children and the teacher's suggestions. The adult doesn't predict answers to questions children haven't asked themselves, but all is born from curiosity: it's the beautiful, varied and immense nature *answering*.

Seeing, being close and daily exposed to natural sites enhance concentration and improve cognitive skills.

Changes at brain level happen all the time: when one walks, handles something, socializes or deals with the environment. Some studies claim that, between age three and five, the brain grows rapidly and significantly: the amount of brain matter in some areas doubles, compared to the first year of life, and the brain constantly keeps reorganizing itself (Nelson, 2011).

Specifically, between age three and six, the highest degree of development happens in the frontal lobes areas, responsible for planning and organizing new movements and for maintaining attention levels (Nelson, 2011). According to the psychologist Piaget, as people's bodies are characterized by structures allowing them to adapt to the environment, so their minds are made up of brain structures helping them adapting to the surrounding world.

In this development stage, the so called brain patterns develop, that is cognitive activities. These basic cognitive units are created by the interaction with the environment, by assimilation and adjustment; by interacting with the surrounding reality, children constantly modify their brain patterns (Berti and Bombi, 2001).

Therefore, the learning processes are based on experience and on the exploration of the environment. As a consequence, a space that is rich in stimuli, varied in its structure, with changing and surprising characteristics like the natural and wild environment, will provide numerous opportunities for the cognitive growth (Lindemann-Matthies and Knecht, 2011).

Decroly considers that the natural environment can perfectly adapt to the learning processes of a child's mind, which is made to absorb those environmental information attracting the child's curiosity and interest: moreover, he adds that necessity and curiosity are the main engine of learning (Travaglini, 2009).

Children need to move and explore, put their neuromotor system into action, which develops the most during the developing age and requires specific environmental stimuli.

Motor skills and wellbeing

The developing age represents a very sensitive period for the motor skills development and the natural environment has proved to be the perfect space where to experiment and to learn about one's own body. Motricity development during childhood is defined as the adapting process and the interaction between motricity with the surrounding environment characteristics (Schilling, 1979).

In fact, movement doesn't improve in an intrinsic and independent manner, but evolves from its constant relationship with the space. Considering that, with growth and motricity improvement, children show increasing skills to adapt to the context, it is deemed significant to guarantee a space that is rich in stimuli and differentiated opportunities.

A natural and wild space, like a wood a forest, can't but provide numerous movement opportunities (Gurholt and Sanderud, 2016). Arnold Gesell's dynamical systems theory establishes that motor development isn't an innate and passive process, due to a person's genetic evolution, but it is an aware and intentional evolution in the child, through clear objectives, inside a precise environment (Thelen and Smith, 2006). In fact, dynamism and constant relationships between child and environment will contribute to a healthy development of the growing subject. Overcoming prejudice and obstacles, the teachers of the following researches have allowed the children freedom to explore the natural space, with its irregularities and challenges.

Students playing outdoors are generally more in shape than those who spend the most of their time at home; those who play

in natural areas, moreover, show a significant coordination, balance and agility improvement. It has been demonstrated that an increased experience in nature makes them more skilled, self-confident and autonomous (McClain and Vandermaas-Peeler, 2016).

Moreover, through exploration they learn to know not only what surrounds them, but also themselves. Researchers claim students playing with natural elements (like climbing a tree of a water activity) are driven by a deep curiosity that encourages them to know themselves and the surrounding environment (Gurholt and Sanderud, 2016).

Social skills and cooperation between peers

Cognitive, motor and social skills were confirmed in the studies that were examined. Playing in nature also favours relationships, collaboration and socialization with peers. Children share games and new experiences, learn by observing peers, help each other, share ideas and solutions to problems; in a wide and unexplored space, like a wood or a river shore, they join forces in order to face it and discover it together (Canning, 2010; McClain and Vandermaas-Peeler, 2016). Albert Bandura affirms that children develop their learning through observation, imitation and constant interaction (Eggert and Schuck, 1979).

Some researches show that children living a preschool experience, outside their household, spend more time playing with peers. In particular, we refer to clear moments, spent outdoors or in natural setting, where they share games, ideas and new experiences, learn by their peers when observing their behaviours, help each other, challenge themselves with solutions to problems. The natural environment offers a wide space such as to encourage socialization and the relationship in the group of peers, which is fundamental to the social development. In a group, children start comparing, challenging themselves, find a source of information external to their households. They receive feedback from their peers on their skills and with it they can evaluate themselves and their actions (Santrock, 2013).

Affordance

In various researches the term affordance is recurrent, and it means the possibility of interaction that an object offers in an environment, in order to allow a person to carry out acts. The first author speaking about affordances was the North American psychologist Gibson, in his researches on perceptual development during childhood (Gibson, 1986). In fact, in his ecological theory of perception he uses this terminology to explain how human perceptual mechanisms work in a specific environment. Through perception, humans receive information indicating possible actions with a specific object (Gibson, 1986). The term *affordance* outlines both the subject and the object characteristics, that is complementarity, availability and interconnection between individual and environment (Farneti and Grossi, 1996).

Moreover, affordance of a specific object is subjective for a specific animal or person, it's unique and exclusive for a person's skills and peculiarities; for example, a pot can offer kitchen affordance for an adult person, whereas for a child it can carry the affordance of a percussion instrument (Santrock, 2013).

Children associate their perceptions with their actions and this allows them to adapt to a particular situation in an environment and to identify the best action to use as response. With growth, exploration of the world and particularly with perceptual development, children acquire better skills to discover and use affordances (Adolph et al., 2010).

Therefore, natural space provides a wide range of possible affordances, unlike indoor contexts. In particular, one observation study on three five-year-olds found a great number of activities, games and movement in two natural contexts, the cove and the river, as compared to time spent in classroom (McClain and Vandermaas-Peeler, 2016).

In the open air and in nature, children climbed steep rocks, hills slopes, experimented balance on a moving bridge, jumped from a rock to the other and swam, facing the river current.

The sample experiences with the typical affordances of the two contexts encouraged the development of motor, cognitive and perceptual skills (Table 4).

Table 4

Authors	Countries	Children's number/ age	Activity	Results
Habibe Acar	Turkey	Preschool children (3-6-year-olds)	Natural spaces contributions on children's development; suggestions on how to design appropriate outdoor spaces	Appropriate outdoor spaces areas for cognitive, motor, social and emotional development
Zahara Zamani	North Carolina US	36 preschool children (3-5-year-olds).	Affordances and behaviour setting importance in children's behaviour	Affordance and different and movable behaviour settings offer many opportunities for cognitive and creative play
Cara McClain and Maureen Vandermaas-Peeler	USA	11 children in preschool age (33-59-month-olds), including 5 males and 6 females (6 Caucasians, 2 Afro-Americans, 2 Asians and 1 Latino)	Behaviours and skills promoted by the two different natural spaces affordances characteristics	Braving risk, solitary exploration, positive social support, interaction with peers and positive emotional responses to physically and cognitively challenging situations
Kirsti Gurholt and Jostein Rønning Sanderud	Norway	Preschool children (3-6-year-olds)	Curious play	Dynamic and changing natural elements attract children's curiosity; intrinsic desire to know, discover and grow up

Curious play

The term “curious play” is made up of two significant words: “play” and “curiosity”, two engines encouraging to explore, know and discover the world. The notion of curious play implies individual innate desire, from the first years of life, to know and discover the unknown; this instinct traces back to the word *curiosity*. It is defined as “*gusto, piacere di accrescere il proprio sapere, di fare nuove esperienze*”, that is the pleasure to improve one’s knowledge, to make new experiences (www.dizionari.corriere.it/dizionario italiano/C/curiosità).

Curiosity, together with wonder and experience is able to motivate and lead them to acquire deep and durable knowledge. This desire for discovery is obviously influenced by the environment characteristics and many researches confirm the importance of nature in stimulating curiosity and so divergent thinking. Also from a psychophysical view point, curiosity brings physical benefits to the individual: when children become curious, their brains release dopamine, a chemical messenger that is necessary to cerebral metabolism; this neurotransmitter triggers a pleasant feeling in the subject and improves observation and memory (Muller, 2014).

Curiosity becomes a driving force for growth and movement, desires take over, along with the urge to discover the novelty of environment. Therefore, the more explorations and experiences, driven by the curiosity of the surrounding environment, greater will be the skills adapted in that specific context (Gurholt and

Sanderud, 2016). Children explore not only out of curiosity, but also out of play.

It is the main activity since the early stages of life, through which they indirectly undertake both cognitive and physical learning processes. Moreover, during Nursery School years, they deal with their peers and share play experiences with others. Therefore, they enter a dimension of confrontation and mutual relationship with the group, they learn to respect their own role and their peers’, who they plan ideas with, they face and deal with conflicts, learn to share and to control their own feelings and difficulties (Canning, 2010).

Play combines with curiosity, giving birth to curious play. Curious play is born as opposed to risky play, which is the typical view of play in natural spaces, with the claim that children are driven by curiosity and enthusiasm for the unknown natural world (Gurholt and Sanderud, 2016).

Children have an innate desire to know, discover and grow up; they test themselves and the environment through constant movement, from here to there, from safe space to unsafe space, from what is known to what is unknown. Joining a game implies desire for discovery and curiosity for the unknown and the unusual, a pleasant way to search information that would increase knowledge.

A natural space, like a wood or a forest, can’t but represent the ideal environment where to venture to discover new, unusual and extraordinary things (Table 5).

Table 5

Authors	Countries	Children’s number/age	Activity	Results
Habibe Acar	Turkey	Preschool children (3-6-year-olds)	Natural spaces contributions on children’s development; suggestions on how to design appropriate outdoor spaces	Appropriate outdoor spaces areas for cognitive, motor, social and emotional development
Kristín Norðdahl and Ingólfur Ásgeir Jóhannesson	Island	Preschool children (3-6-year-olds) and 25 Icelandic teachers	Interview on the role of outdoor environment for children’s learning	Three topics were found: a) children’s play and education; b) children’s health, wellbeing and courage; c) children’s opinions, knowledge and actions on sustainability
Kirsti Gurholt and Jostein Rønning Sanderud	Norway	Preschool children (3-6-year-olds)	Curious play	Dynamic and changing natural elements attract children’s curiosity; intrinsic desire to know, discover and grow up

The value of risk

Activities and play in a natural environment make children face various risks and both cognitive and physical personal challenges.

Nature, with its characteristics and its unexpected changes, represents an environment that is unknown and unexplored for many, especially for the little ones.

However, many researches claim that the progressive relationship between the child and these spaces represents an opportunity for cognitive, motor and emotional growth (McClain and Vandermaas-Peeler, 2016).

The attitude and the positive emotional response to physical challenges and risks in nature are confirmed by 5 articles. The different risk levels and the many physical challenges presented by the wild natural environment, together with the teacher’s supportive and non-invasive attitude and with children’s little

movement restriction, provide many opportunities to explore, play intensely and develop physically and cognitively.

It is important to give space to free exploration, challenges and to building progressive self-confidence with danger and risk; in fact, from experience children gain autonomy and command of their body, courage and self-esteem (Norðdahl and Ásgeir Jóhannesson, 2014).

It can be said, therefore, that by overcoming obstacles, risky situations and dangers, in a natural context always under the teacher’s watchful eye and in safety, children gain confidence in their own skills and abilities to face complex situations in future life.

They experiment and explore new situations, make experience of themselves, as for their abilities, and of the surrounding environment, as for the objects peculiarities (Fjørtoft, 2001).

Moreover, a game presenting challenges promotes socialization and cooperation, since children join ideas and abilities to face and overcome an obstacle or a danger (Table 6).

Table 6

Authors	Country	Children's number/age	Activity	Results
Petra Lindemann-Matthies and Sarah Knecht	Switzerland	1°-2°-3° -year children in preschool	Interview to the teachers on Forest Education and observations of excursions in the woods	Forests as educational structures where to comply with general school objectives
Kristín Norðdahl and Ingólfur Ásgeir Jóhannesson,	Island	Preschool children (3-6-year-olds) and 25 Icelandic teachers	Interview on the role of outdoor environment for children's learning	Three topics were found: a) children's play and education; b) children's health, wellbeing and courage; c) children's opinions, knowledge and actions on sustainability
Cara McClain and Maureen Vandermaas-Peeler	USA	11 children in preschool age (33-59-month-olds), including 5 males and 6 females (6 Caucasians, 2 Afro-Americans, 2 Asians and 1 Latino)	Behaviours and skills promoted by the two different natural spaces affordances characteristics	Trusting risk, solitary exploration, positive social support, interaction with peers and positive emotional responses to physically and cognitively challenging situations
Kirsti Gurholt and Jostein Rønning Sanderud	Norway	Preschool children (3-6-year-olds)	Curious play	Dynamic and changing natural elements attract children's curiosity; intrinsic desire to know, discover and grow up
Kwi-Ok Nah and Tim Waller	England and South Korea	England: 80 3-4-year-old children; South Korea: 80 children	Interview on the role of outdoor environment for children's learning and field observations of two contexts	Both contexts give importance to outdoor activities; comparison between contrasting teaching methods as an enriching opportunity

Suggestions to use outdoor spaces at best (Table 7).

Some studies have highlighted possible characteristics and modes of use of natural spaces in Nursery Schools. Examples:

- using moveable structures;
- arranging wide green spaces where to move and run;
- organizing motor activities and environmental education;
- considering the characteristics of the spaces where to design on and the available opportunities;
- creating special divisions in the area;

- identifying instruments and materials that could increase the activities;
- listening to and welcoming children's opinion and including them in decision-making processes (it's easy to get attached to spaces that one has contributed to create);
- using natural materials, because these can be shaped and changed, differently from artificial and stiff structures;
- providing outdoor areas (every school reality should have some);
- planning open-air excursions in parks nearby or public spaces.

Table 7

Authors	Countries	Children's number/age	Activity	Results
Habibe Acar	Turkey	Preschool children (3-6-year-olds)	Natural environment contributions during children's development; suggestions on how to design appropriate outdoor spaces	Appropriate outdoor spaces with areas for the cognitive, motor, social and emotional development
Stephen Berg	Canada	Preschool children (3-6-year-olds)	Levels of physical activity at school	50,6% sedentary activities; 29% moderate physical activities; 20% energetic physical activities
Allen Cooper	North America	Preschool children (3-6-year-olds)	Outdoor areas complying with the E.C.E. regulatory framework	Poor consideration and evaluation of natural environments, accordingly to E.C.E. regulatory framework

Discussion

The results of the fourteen studies considered in this work highlight advantages of the natural environment in preschool age growth, cognitive, motor, social, relational-emotional development.

It was widely demonstrated and confirmed that the natural environment becomes an open-air classroom, ideal for education, with its affordances, its changing characteristics and its hidden and unexplored aspects. The youngest can learn by direct experience, driven by their interests and curiosity, they can challenge their body in its entirety, learn from their

peers, as well as become, little by little, independent, brave and autonomous.

The advantages pointed out by the researches are:

- Children gather some first knowledge and start learning by exploring, discovering and challenging the environment; they insert themselves in a context that is rich in information and knowledge, ask themselves questions and find the answers from their experiences. Being close, seeing, being exposed on a daily basis to natural sites increase concentration and improve their cognitive skills; nothing is preconstructed or planned in advance, but learning begins from experience.
- They are provided with natural areas that are wide and varied in their structures, they will have a broad range of opportunities to move and experiment new skills. It's the difficult situations, the obstacles and the perils of a safe environment that offer the chance to fully experience oneself and the surrounding environment. In fact, results show that collecting experiences in nature makes children more skilled, safer and more autonomous.
- Activities in nature offer the opportunity to share surprising discoveries or challenging situations with the group of peers. In a broad and unexplored space, like the woods or a river shore, they join forces to face it and discover it together, socialize, help each other, learn by observing the peers and cooperate towards a shared objective.
- By playing they learn and explore any environment type surrounding them; we refer in particular to curious play in natural places. It is born as opposed to risky play, which associates activity in nature only to risks and dangers; actually it is not the risk or insecurity encouraging children to play in nature, but curiosity and enthusiasm that are specific of *curious play*.
- Confronting risk and challenges in natural and wild settings and overcoming them favour the development of a brave child and improves self-confidence. Facing a dangerous situation in a safe environment helps children facing future real life problems with more self-esteem.

To ensure more reliable results, the studies have gathered information and data from various sources: the interviews to the teachers of the chosen nursery schools were all recorded, the results of the questionnaires to teachers and university students were collected and video recordings and commentaries were done on children's behaviour in nature, the regulatory framework on environmental education programs was analyzed and, finally, the outdoor spaces of the nursery schools were observed. These sources confirmed the validity and the scientific value of the researches that were selected and examined in this systematic review.

Moreover, all the researches were carried out in school realities that had already tried natural and open-air education and have promoted for years natural education to their students. It is important, therefore, to keep into account that the data gathered from the field observations and the interviews to the teachers come from realities that are relevant, but isolated from the main tendencies in education.

It is deemed useful, therefore, to socialize and spread educational approaches that, unfortunately, still today are considered pioneering and alternative educational methods; positive results observed in students and educational experiences of specific school realities teachers. In one study, it was demonstrated that two distant and different educational realities meeting and interacting represent an opportunity for improvement and models contributing to a transformation of the educational system.

Conclusions

The aim of this systematic review was to examine and better understand the advantages that the natural environment offers to children's general growth. The results found in this analysis

contribute to spread and reinforce the educational value of nature, which is been present forever in human life.

The natural environment not only is a wide space where to run and have fun, but it also represents a micro-world where to acquire some first knowledge on nature, on one's abilities and motor possibilities, where to explore, experience new perceptions and emotions, share the joy of a discovery or the fear of an obstacle with the peers, as well as living with and in nature.

Theoretical studies and researches on the field claim that the benefits provided by the outdoor learning environment for the children's healthy growth during developmental age are way more than the downsides.

It was demonstrated that many negative aspects, traceable in open-air activities, are born from prejudice and distorted view of modern society, that is more and more estranged from and frightened by the natural world. In particular, these fears come from adults, who rightly place safety and protection at the first, without forgetting though that children need to play *natural-ly* in safety, for their healthy and complete development.

In the last year we have witnessed to a progressive change in society, in particular as the last generation is concerned: children spend less and less time outdoors and their original relationship with nature is almost entirely forgotten. Interestingly enough, the natural world becomes more and more alien to most of today's young people: it is more common to press a smartphone button to grab a video, take pictures, virtually see a landscape, a flower, a lawn rather than breathing perfumes, smells and sensations. The virtual seems to have taken over the natural, sedentary lifestyle over movement, bad manners over good manners, and selfishness over altruism: let's restore the right order!

A comprehensive discussion about the benefits resulting from the relationship between children and the natural environment, in order to raise awareness and reconnect future generations with their origins, with that very Mother Nature that was left a little aside, by us as educating adults too.

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