"Ethnobotanical space": plants as a link between nature and culture

Author:
Rosa Buonanno

Affiliation:
UNIMORE, UNIVERSITY OF MODENA AND REGGIO EMILIA, ITALY

INTRODUCTION

The main aim of this study is to explore the relationship that children have with plants when they are placed in the set-up of the learning environment. The investigation took place in a primary school in Italy. The objective was to create a diverse learning environment and to observe subsequent changes in teaching strategies and movements in space by teachers. This was a collaborative effort involving the active participation of students and educators, who planned together with the researcher. The study was structured in two distinct phases. In the initial phase, a discourse was initiated with the children and teachers, exploring their perspectives and ideas on the learning environment. The second phase examined the children's relationship with plants. How does changing the organization of the learning environment affect the attitudes and activities of children and teachers in educational settings? How does the presence of plants in the learning environment encourage and cultivate ecological thinking among students?

Greening the learning environment: The vital role of plants in schools

School is a space where emotions and experiences intertwine, forming a crucial context that contributes to individual and collective growth. It also fosters awareness of our interconnectedness with the global environment. In the 19th century, Von Uexküll[1] introduced the concept of ″Umwelt″ (environment) and explored the interaction between organisms and their environment. This dynamic interaction is a continuous process of adaptation and transformation of different species. In the field of biology, all organisms actively shape and modify their environment.[2] Organisms not only act on their environment but are also influenced by it, space plays an active role in the processes of evolution, growth and learning. Thanks to the ongoing coexistence and the symbiotic relationship between living beings and the environment, human beings become an integral part of this intricate ″network″.[3] This connection extends not only to members of the same species, but also to more distant living beings and other elements of the biosphere. Together, they create a complex system that forms the intricate web of life.[4] All artefacts have a significant impact on the human transformation of physical spaces, and the environment plays a crucial role in shaping emotions, biology and culture.[5] The relationship between humans and the environment is often imperceptible because we are an inherent part of it and live within it. Unfortunately, schoolteachers often overlook this vital connection in their daily activities, treating the environment as an anonymous witness. In the field of education, various pedagogues have emphasised the importance of the environment in the learning process, from luminaries such as Don

Milani and Montessori to Dewey, Freinet and Malaguzzi. They emphasised the key role of rich and culturally vibrant contexts in supporting children's knowledge development.

They not only give value to their experiences, but also increase creativity and stimulate cognitive engagement when interacting with other members of the community.[6] The Reggio Emilia Approach (REA), devised by pedagogue and teacher Malaguzzi, has its roots in the philosophical foundations of John Dewey's theory of active learning for children (1902). In the REA philosophy, food, objects, materials and living entities are not conceived as passive entities but are ascribed substantial significance in enhancing children's lives.[7] Established in the aftermath of World War II, Reggio schools were founded by a group of women driven by the aspiration to provide their children with a superior educational experience. Central to the REA is the active involvement of children, parents and community members in the educational environment, which represents a paradigm shift aimed at raising the overall quality of education.

Malaguzzi, who was also a teacher in Reggio Emilia, defined the learning environment as the «third educator».[8] He emphasised its significant role in the knowledge acquisition process. Furthermore, he argued that educators should meticulously plan all elements during the school year and provide guidance to children in exploring the whole system through sensory and cognitive experiences. A dynamic and adaptable environment, in which constant movement, deep thinking, exploration of theories, storytelling, collaboration and life experiences are the defining characteristics of both children and teachers, play a key role in enhancing the quality of the educational project.[9] Consequently, it encourages children to perceive the possibilities and connections between human beings and the natural world in an ecological way. Our personal and social narratives are intricately intertwined with our environment, as they evolve through interactions with the plant kingdom. The story of the Earth is shown through the experiences of each individual, allowing each person to take on the role of ecological storyteller.[10] However, in Italian public schools, physical spaces and plants are often considered primarily for their ornamental value, thus neglecting their potential to provide valuable insights into the plant kingdom and its intricate connections with us and other living organisms.

Scientific literature from industrialised countries has found that children often experience few direct interactions with nature, resulting in gaps in their understanding of living entities, their biological characteristics and the significance of ecosystems. Furthermore, lack of knowledge about plants is a prevalent concern among children in both rural and urban environments, and this trend appears to be increasing.[11]

Prior research in Italy has supported the free exploration of nature, guided by the innate curiosity of children, as exemplified by Guerra, Mortari and Weyland.[12] This approach takes a new perspective on the relationship between individuals and the natural world. For instance, the EDEN (Educational Environment with Nature) research project originated during the pandemic in Italy, at the initiative of the pedagogist Weyland. The pedagogist introduced plants into the classroom, initiating a novel dialogue between pedagogy and educational institutions. This effort aimed to re-evaluate the curriculum with a focus on the integration of ecology as a substantial component of the learning process.

The aim of this study is to create a new paradigm, building on the foundations of the previous framework and guided by the 17 Sustainable Development Goals (SDGs)[13] established in 2015, as well as the UNESCO reports of 2003 and 2021.[14] These reports support the idea that different educational settings should adopt a multifaceted approach to ecological education, recognising cultural diversity as a guarantor of sustainable development.

Moreover, within the traditional learning environment that incorporates plants, lies the potential for sustainable support in expanding the class group's understanding of ecology, offering new perspectives on life, society, culture and the future. Education is increasingly aimed to cultivating sustainability

skills,[15] seeing it not as a static concept but as an ongoing process in which individuals and disciplines collaborate within a new ecosystem framework.
This study in a primary school focused on sensory experiences, diversity and plant life. In this way, the children had a platform for discussion about their learning environment and their knowledge of plant care.

A "PLANT-BASED" APPROACH TO THE DEVELOPMENT OF SUSTAINABILITY

The context was predominantly receptive or transmissive,[16] in which knowledge and skills are assimilated by children through the transmission of information by the teacher. This approach is closely linked to the current educational system, characterised by established structural elements such as the classroom, teaching disciplines, lesson organisation, the school environment and the use of textbooks.[17] Such an environment proves to be ecologically unresponsive to the needs of children and adults, as illustrated in Figure 1. For these reasons, the children found it difficult to engage in open discussions, so conversations were facilitated within a circle format.

Figure 1. Transmissive context

The learning environment saw significant changes after the conversations and interviews with the children and teachers. An ethnobotanical approach to promoting sustainability was initiated through co-design with school stakeholders. This ethnobotanical space aimed to create a plant-rich environment by documenting the use of nature and how people perceive it. It introduced an innovative ″systemic alphabet″, encouraging the development of a new ecological and intercultural image, as illustrated in Figure 2. The presence of plants in the school environment offered the freedom to explore the intricate web of life and to recognise the space in which learning takes place as a fundamental place for expanding one's knowledge and practices of care.[18]

Figure 2. New setting with plants

Interaction with plants played a significant role in re-establishing the relationship between individuals and the living world, enabling a distinct form of learning that included cognitive, emotional and experiential aspects. In this environment the children had the flexibility to move, adapt and engage

with their surroundings in a holistic manner. In the classroom, the teachers played an active role in facilitating the children's learning process by creating flexible spaces that support their identity and well-being. During this investigation, nature was not just a symbol, but an integral part of life. This immersive experience not only deepened their connection with nature, but also fostered an emotional connection with plants. It increased their awareness of the intricate relationships and complexities inherent in the dynamic between humans and the natural world.[19] Consequently, this exposure broadened their perspectives and enabled them to see the world in a more holistic way.

METHODOLOGY

The co-research methodology offered children, teachers and researchers the opportunity to collaborate and follow the work process together. It allowed progress notes, observations and interpretations to be added. It also facilitated teamwork and the development of new approaches to sharing work.

Adhering to ethical standards and legal parameters that protect the rights of children and adults, this study adheres rigorously to ethical guidelines set by the university, ensuring compliance with legal provisions, including Article 10 of the Civil Code and Articles 96 and 97 of Legislative Decree no. 633/1941.

Research setting

This study involved fourth-grade students in a northern Italian city. This study used pedagogical documentation as a tool to follow the learning process of children and teachers. In this approach, teachers actively engaged in exploring, listening, recording, annotating and interacting with the context, while establishing connections with the children. This practice was instrumental in amplifying ideas and meanings. It also contributed to enhancing the children's exploration of the learning environment with plants and making them visible within it.[20] Through the method of conversations with the children and interviews with the teachers, data was collected on their perceptions of the environment where they carried out their daily activities. After approximately six months, both children and teachers were asked to reflect on the changes to the classroom environment, again using the same conversational and interview approach. The aim was to investigate how these changes had affected the teaching-learning process, fostering greater fluency and a more academic approach.

Results and discussion

The children expressed their creative ideas of an ideal learning space during the initial interviews where the researcher asked the children what changes they would like to see in their classroom. Their ideas included the presence of plants, soothing colours, a relaxation area and more. These are described in the comments below:

″I would put a foosball″

″More happiness is needed″

″I would like it to be more curious, so that the first time you enter you look around and it is as if you never saw it before″

″I would like it to be bigger″

″I don't like the way we are arranged. I would like to be close to my friends″.

After this conversation, the researcher, the children and the teacher worked together to transform the classroom layout. They decided to arrange the desks in islands for groups of five children. This new arrangement prompted the children to discuss the meaning and value of the group and the space itself (Table. 1).

Questions by the researcher	Examples of children's answers	Themes	
Since I joined this class, we have made many changes in the physical space, but in your opinion have these only occurred in the physical space or has anything else changed as well?	The arrangement has changed, perhaps you talk more with the others, whereas before you could not talk to everyone _S. I like it better so there's more space and we're in a group, if you don't know something you can ask someone else _L. I like being like this because we help each other with friends_ D. I like it this way because you can work in a group _N.	Collaboration	
	In my opinion it's nicer now, there's more space in the middle even during games we can do better _A. Something has improved, here we have friends who play cards and we play games. We have the space in between to do more _N. Teachers can move more around us _T.	Movement	

Table 1. Final conversation with the children

At the same time the researcher interviewed teachers to find out if there were any cross-cutting elements between children and teachers (Tabel. 2).

Questions by the researcher	Examples of teachers' answers	

What value should be placed on the learning environment?	I think the learning environment is important, but I admit I haven't paid much attention to it so far. Perhaps it's my own shortcoming, perhaps because I'm prone to clutter and I've never fully recognised its importance _C.	
	I do well in fairly tidy environments _L.	
	For me it's important that it is well-organised, but the concept of order is relative, what may be orderly for a child may be messy for an adult. The learning environment has to be somehow structured according to the characteristics of a given context, in this case of a given class, based on what emerges from their needs _La.	
	I quite agree with what my colleague (L) said because I think that a learning environment can also be built after observing the ways of living and being of the children at school _M.	

Table 2. Teacher interviews

From the interviews conducted, the teachers expressed a common perspective on the learning environment. Despite the collective recognition of its fundamental importance, a recurring sentiment among educators indicated a perceived lack of emphasis and consideration of the learning environment in their pedagogical practice. However, this recognition does not stem from a lack of understanding of the importance of the learning environment; rather, it reveals a prevailing perception among teachers that they do not pay sufficient attention to this crucial aspect of teaching. In addition, the teachers expressed a noticeable lack of tools that are specifically designed to facilitate the strategic planning and optimisation of the learning environment.

In the final interviews (Table. 3), the teachers acknowledged that the change in the classroom environment and the materials in the learning environment provided some elements for a different way of working.

Final interviews	Examples of teachers' answers	Themes	
	Being able to move easily around the classroom is important _L.	Movement	

	In this new setting we can sit next to them, previously we couldn't _M. Sometimes I go and speak from the back of the class and see it from a different perspective you realise some things that you don't see from the desk _L.		
	It favoured group work, collaborating more and although this collaboration is noisier, they chat more, it's more convivial _C. The good thing is that not everyone starts working in a group, especially the selective ones who want to be the first _M. A positive aspect that for some children in difficulty can find help in this arrangement, support from the other children when the teacher is busy _Lu. In terms of collaboration and sharing, the results were positive _Li.	Collaboration	

Table 3. Teacher final interviews

In the discussions that follow (Table. 4), the children not only recognised the importance of plants in shaping their environment, but also gained an understanding of the different levels of care given to these essential elements. Ultimately, the children realised that plants were an integral part of the planet's ecosystem. In their discussions, children effortlessly grasped the visible thread of the interrelationship that runs through the connection between plants and humans. Through ecological consciousness, they easily identified themselves as integral nodes in an interrelated network. In addition, they were astutely

aware of the intricate connections that exist between human beings, plants and other living things,[21] inviting us to rethink our relationship with living beings.

Questions by the researcher	Examples of children's answers	Themes	
What possibilities did the plants offer?	In my opinion, it went a bit wrong because some children water plants too much, watering for no reason. I had a cactus and it died; the soil moves _Am.	Connection	
	It made me realise the importance of plants and made me realise that they are very important to our lives, so you have to look after them _T.	Essential	
	It left us the importance of plants, their world, how they reproduce, how much water they need _Am.	Essential	
	In the environment there are living beings this means an environment is made up of living beings, a typical environment can be a forest made up of trees animals and mushrooms _Gia.	Connection	

Table 4. A conversation about plants

CONCLUSION

Through an exploratory journey, the class underwent a significant transformation that positively impacted both individual students and teachers, as well as the collective group as a whole. Out of this metamorphosis emerged a dynamic learning community that embraced the group's diverse cultural identities. The children observed that the new environment opened the door to different opportunities. It encouraged mutual cooperation and allowed freedom of movement.

Educators recognised the positive impact of this learning environment on group dynamics. It supports innovative teaching methods. It encourages students to work together. It is a constructive dynamic in which those who have difficulties can ask their peers for help when the teacher is busy. This arrangement offers an alternative perspective. It allows teachers to move fluidly within the classroom to provide timely support to children. Research has extensively shown that the alteration in classroom settings has significantly contributed to children's and teachers' physical, cognitive, and social well-being. This contribution intends to prompt additional contemplation on the configuration and characteristics of an environment that has been observed to influence the learning and social experiences of both children and adults.

Children's conversations were geared towards recognising their relationship with plants and the natural environment through the inclusion of plants in the learning environment. Plant inclusion in education is fundamental to building knowledge and providing an opportunity to discuss their cultural significance in a formal context. It is also fundamental to imagining a new ecological paradigm.

The primary objective was to acknowledge plants' utilitarian functions and potential to promote well-being and foster positive interactions with living organisms. This reconnection with the botanical realm engendered a heightened awareness regarding the significance of ecology and sustainability. The aim was to steer the children towards adopting a systemic perspective and comprehending the intricacies of ecosystems. Through this botanical engagement and collaborative endeavours within a novel milieu, both children and adults discerned that sustainability is not an inherent concept but rather the outcome of an educational journey wherein individuals redefine their rapport with the natural world, society, and themselves. Values of reverence, solidarity, active involvement, accountability, and democratic principles underpin this transformative process. Furthermore, it has been recognized that the foundation of sustainability lies in collaborative efforts aimed at advancing the common well-being of all.

NOTES

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