Walking Among Trees: Scientific, Naturalistic and Narrative Itineraries. A Playful-Expressive Approach for Citizen Science and the Heritage Curriculum[1]

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Abstract

During the entire school year 2021–2022, two classes of the Manzoni Institute in Reggio Emilia, Italy, were taught in the town's Civic Museums as part of an experiment with new teaching and learning strategies. After returning to the school environment, the teachers involved reflected on how to support the playful methodologies that they had explored. From this perspective, the potential richness of the Palazzo Franchetti's school garden, home of Baron Raimondo Franchetti, who donated his collection of African fauna to the city's museums, emerged as a starting point for a project on outdoor education and citizen science. After the exploration of this ancient courtyard, the project extended to the city's public gardens and even into the woods in the nearby Appennine Mountains using storytelling and play to observe, collect data and samples, and catalogue findings. The project was structured around four themes linked by playful approaches and creativity: in-depth examination of citizen science aspects related to local flora, particularly tardigrades (in collaboration with the PNRR, the National Recovery and Resilience Plan of Unimore, National Biodi-

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Part of
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versity Future Center); focus on the cultural heritage of the school (the courtyard of Palazzo Franchetti) and the public city gardens; development of real or fictional stories about the historic trees in the school courtyard and public park; and the creation of musical pieces and narratives, using rhythms created with natural materials, inspired by external explorations. The common thread of the project was a dimension of creativity, which found its highest espressions in discovery-based learning and playful-expressive approaches.

1. The Context: The Manzoni Schools in Reggio Emilia

The pandemic crisis, coupled with the pervasive identity crisis affecting educators, has illuminated the challenges faced by the school system while also highlighting positive outcomes in terms of resilience and creativity. A significant adaptation to the new context has been observed, transitioning from the experience of isolation to a greater openness towards the surrounding community. The Community Educational Pacts (Cannella et al., 2021) have facilitated a broader alliance and interaction between educational institutions and their local contexts, promoting synergy among schools, local authorities, and associations. In this framework, it becomes possible to contextualize the experiences of the Manzoni Institute in Reggio Emilia, a comprehensive school institution that has undertaken a broader reflection following the "School in the Museum" experience (Landini et al., 2021). In fact, after stepping out of its school environments and decentralizing to the town's Civic Museums, the institute chose to concretize the experience and systematize it. This "provisional citizenship", caused by the health emergency, facilitated by the municipal administration of Reggio Emilia, through the "Scuola diffusa" project coordinated by Officina Educativa, gave the Manzoni school the opportunity to rotate all its classes for one week each year in the halls of the Palazzo dei Musei. In its first year 2020–2021, the Community Educational Pact therefore focused on the relocation of classes to environments outside the school and to cultural venues. The institute's choice to transform the opportunity for some classes into an opportunity for all its students and teachers, since 2020–2021, (Figure 1), has strengthened and given substance to the organizational flexibility within the autonomy of educational institutions, already promoted in

DPR 275/99. In the following school year, 2021–22, two classes from the Ada Negri primary school had the privilege to fully immerse into this museum experience during the entire school year. While this was happening in the museum, new forms of collaboration were created between the museum and the school, allowing all other classes to reflect on the entire educational offer and to experiment hybridization with experts in museum education, as well as an educational approach linked to heritage pedagogy (Landini et al., 2024).

1.1 The Curriculum of Citizenship and Heritage

The Curriculum of Heritage and Citizenship is characterized, specifically, by collaborations with formal, informal, and non-formal educational systems. The territory is viewed as the primary context for deepening the idea of an immersive and emergent curriculum and explores "the role of meaning and beauty in education" (Dallari, 2021). The necessity for students to perceive in the educational offering a horizon of meaning that, as Merleau-Ponty (1945/1962, pp. 82) notes, emerges from the undifferentiated whole, situates the collective experience of the museum and the exploration of the city, nature, and places of life within a lived experience of encounter. At the same time, children demand the opportunity to enrich their emotional and aesthetic sphere with meaningful relationships and beauty, responding to a natural need for pleasure. Immersion in the historical, artistic, scientific, and natural heritage of one's territory becomes a gift that must be intentionally prepared for the students. Finally, this curriculum is placed within the framework of «territorial intelligence» and the significant relationship established between the curriculum of heritage and the collective identity of the students (Landini et al., 2024).

> What emerges from this experience is the important ability of heritage to connect with emotional and territorial intelligence, facilitating reflections on one's own identity. Regarding identities, they indeed pose a challenge to education: they allow students to evaluate themselves on the same level as the identities of others, fostering a reflection on identity from an inclusive perspective, in contrast to egocentrism and sociocentrism.
> (Landini et al., 2024, p. 81)

Figure 1 – The school in the museum, school year 2020–2021

1.2 The Ada Negri Primary School, Collaborations With the University of Modena and Reggio Emilia

The Manzoni school institution also promotes collaborative relationships with the University of Modena and Reggio Emilia, believing that engagement with the research world is an integral part of its mandate. Among the various collaborations is one with Professor Tiziana Altiero, a biologist and zoologist and member of the National Biodiversity Future Center (NBFC), which promotes the sustainable management of Italian biodiversity to improve the planet's health and return beneficial effects essential for everyone, according to the EU Biodiversity 2050 vision of „Living in harmony with nature." Part of the „Walking Among Trees" project is connected to this goal through a Citizen Science initiative focused on the flora present in the context of the Ada Negri primary school. The classes involved in the project, the fourth and the fifth grades, are an inclusive context for children with disabilities and the majority of the pupils come from migrant family backgrounds. The school is a standard time-institution organized for five mornings a week, offering a total of 27 hours of teaching. Each class is equipped with a Smartboard, which all teachers use in daily teaching, and within the school, there is a computer

room and a cart for Chromebooks, two ateliers, and a library. An additional resource is the outdoor area, which features a multipurpose track, a garden space for play, and a school garden.

The Ada Negri primary school and the Alessandro Manzoni lower secondary school are both housed, as previously mentioned, in an impressive historic residence in Emilia Romagna, Palazzo Franchetti, named after the Jewish Baron Raimondo Franchetti, who purchased it to build the largest private residence in the town. The palace itself contains 59 rooms on four floors, but its grounds extend well beyond the current walls: The Franchetti family also owned a vast park including a greenhouse, a lookout point, stables, and a riding school, which currently houses the gym of the comprehensive institute. The family's properties were transferred to the municipality of Reggio Emilia in 1929.

2. The Theoretical Framework

To better outline the main theoretical references that drive the project, it is necessary to highlight that the vertical curriculum of the institute is based on four reference methodologies: narration, socialization of learning, the school as a permanent research lab, and formative assessment for learning.

Narration is a powerful tool for interpreting the world; it helps us organize concepts and events in a coherent and meaningful way and emotionally guides us toward knowledge. Therefore, it is one of the main tools of human understanding (Bruner, 1996/1997; Egan, 1997/2012). The interaction with others is also crucial for developing thought and concepts, as well as for social and cultural mediation (Vygotsky, 1934/2000). Regarding the child as a researcher, which sees the laboratory as an essential moment for children's inquiry, references range from Dewey's active school (Dewey, 1916/2018; 1917/1963) to Malaguzzi (1993), with his vision of the competent child, endowed with potential, activated by interaction with objects, the environment, adults, and other children. This perspective is further confirmed by experientialism, thanks to the vision of Lakoff and Johnson (1980), with the theory of embodied cognition, which sees human thought as strongly structured by interaction with other people and the world, starting from sensory-motor ex-

periences. Formative assessment for learning (Black & Wiliam, 1998) and as learning (Earl, 2003) ultimately allow students to be engaged as critical thinkers, making sense of information, relating it to prior knowledge, and using it to construct new learning. Starting from this methodological foundation, which teachers have come to better understand after their immersion experiences in cultural settings, is the significant value of a playful and expressive approach that is based on the need to give space to children's creativity. In *Thought and Language*, Vygotsky emphasizes the importance of language and symbolic thought in the development of imagination and creativity. As language is a symbolic system through which individuals represent abstract ideas and concepts, it allows for the combination and manipulation of symbols in ever-new ways, thus proving essential for the development of imagination and creativity (Vygotsky, 1934/2000). In addition, Guilford (1950) defines divergent thinking as typical of when one moves away from known and expected products and explores unusual paths. Following the criteria developed by Guilford, another American scholar, Frederic Bartlett (1958, as cited in Dentici, 2001), shows that individuals considered creative exhibit an active exploration of situations, an analysis of structures and relationships that often lead to sudden restructurings of thought and the breaking of closed systems. According to the author, innovative experimentation seeks points of overlap or analogy between phenomena normally observed in different fields: it applies techniques typical of one field to another, such as statistical methods, mathematical, biological and genetic models. For this reason, it is essential to create a playful, flexible, and motivating environment to foster dialogue among the various competences and expressive languages that children possess. Bondioli (2002, p. 349) argues that the playful quality of the activities is influenced not by game structures or rule basis, but rather by a playful attitude of the learners. Another important support for this playfulness is the presence of ateliers in schools: a rich and stimulating space where visual language interacts and intertwines with other languages (Vecchi, 1995, as cited in Cardarello & Gariboldi, 2012). The atelier encourages creative thinking, not because it is the place where children create artistic objects in the strict sense, but because it is the place where hands reconnect with the mind to explore and construct knowledge (Malaguzzi as cited in Cardarello & Gariboldi, 2012). This suggests that, along with knowledge, experience, and storytelling, you can

create a complete involvement in the activity, through playfulness, freedom of expression and an overall emotional tone that helps sustain concentration and interest.

3. Walking Among the Trees

The park of the Franchetti family extends from the palace, which is now the site of the school, to what are now the Public Gardens, namely Parco del Popolo in the town of Reggio Emilia. In this area once stood the Gonzaga citadel, the birthplace of Ludovico Ariosto. It was demolished in 1850 to allow the establishment of the Gardens in 1871, with the aim, as stated in a municipal resolution of the time, of offering citizens a pleasant and convenient walk within and near the city, the most genial meeting place for the community.

Here, the Franchetti family owned the racetrack for horse races, and today that ring constitutes the main pedestrian walkway within the garden. It is among these trees that the Ada Negri classes began their walks. The location is intrinsically linked to the environments they frequent daily and offers a unique variety of specimens, at the botanical level, in the city.

The trees present in the gardens are largely from the original planting, making them certainly over a hundred years old. The ring of the horse racing track was lined with rows of plane trees that are still present today; the original Japanese sophoras are also located between the Municipal Theater and Ariosto, and some photos from the early 1900s already testify to their presence. The majestic oak near the Mercure Hotel and the American ash at the beginning of Viale Allegri were also certainly present by the end of the 19th century.

However, the botanical emblem of the gardens is the large, centuries-old cedar of Lebanon, located almost at the center of the star-shaped layout. An inventory from 1889 describes all the species among the 1,302 trees present; among the trees, deciduous specimens (662) predominated over evergreens (248). Now, the situation has changed, and evergreens make up the majority of the thirty species present: Caucasian fir, red fir, mountain maple, holly, Judas tree, hackberry, Atlantic cedar, Deodar cedar, Cedar of Lebanon, flowering cherry, beech, oak, ash, ginkgo, white wisteria, horse chestnut, cher-

ry laurel, liquidambar, magnolia, black walnut, paulownia, Himalayan pine, black pine, eastern white pine, white poplar, cypress poplar, plane tree, Japanese sophora, red-leaf plum, yew, and lime (Pellini, 2006).

Additionally, the park houses several artistic pieces that are part of the local history, which have allowed, in other school projects, the development of historical research and narrative reinterpretation. Among these, the students particularly studied some of them, such as the Fountain with the little elephant, the Capitoline Wolf, and the Bust of Chierici. The research conducted was, ultimately, shared with the community.

3.1 Project Areas Emerging in the Contexts of Experience

The project aimed to create a motivating and playful combination between the historical-artistic experience related to the Franchetti site and the experience of Citizen Science, which, with the collaboration of the university, would enable the children to become true researchers in the service of the research community (Bonney et al., 2009; 2014). There are four areas that have emerged from the experiences and informal exploration of the classes, within which it is possible to briefly synthesize the experiences that have arisen from co-design with the children:

Naturalistic area:

1. Exploration of the schoolyard
2. Exploration of the city's public gardens
3. Exploration of woods next to the city
4. Collection and observation of tardigrades in various environments (citizen science)

Historical-cultural area:

1. Research on the monuments of the city's public gardens
2. Creation of narratives about the history of the monuments in the public gardens

Narrative area:

1. Invention of fantasy narratives about the trees in the city's public gardens
2. Role-playing and dramatization of the narratives
3. Digital experiences: the blog
4. Digital experiences: the news program

Musical area:

1. Creation of melodies with environmental themes
2. Use of natural elements as musical instruments

Children, directly immersed in the observation environment, develop authentic scientific learning: experiencing the natural contexts trains students to pay attention to the phenomena they witness and educates them to be respectful of the environment. Moreover, it encourages them to discover what is important to know about objects and facts, fostering an authentic interest in the natural world. In this way, students begin to tackle the small problems they encounter using hypothetical-deductive reasoning and refine their ability to make predictions about the consequences of the observed phenomena.

The project began with the idea of exploration, aiming to utilize open spaces, both inside and outside the school, as generative sites for questions. The initial phase focused on plural operational methods, consistent with the methodologies of the three-year educational offer plan, which identifies the socialization of learning as a cornerstone of its practice. The first exploration took place in the ancient park of the school, a natural yet anthropized and historicized space, one that has been "colonized" by a garden school space for vegetables.

Subsequent steps led the children to open the large ancient gate of Palazzo Franchetti and proceed with active and participatory observation in the public gardens, perhaps seeing with new eyes the large green trees that had gone unnoticed at a hurried glance. The image in figure 2 shows the map of the park, which, after the initial informal exploration, would allow for orientation along a targeted path to find specific plants.

Figure 2 – Map of Parco del Popolo: Seeking ancient trees

This in-environment learning, where groups of students learn to use tools from their own culture and documentation, within dialogues and the social construction of knowledge, takes on an intentionality that adds value to the experience.

The children not only sought the plants but also negotiated and shared their hypotheses during the structured exploration phase. Divided into four groups, they had to compile a booklet by observing five different trees in the Parco del Popolo: a cedar of Lebanon, an oak, a plane tree, a hackberry called "bagolaro schiacciasassi", and a Japanese sophora.

Initially, they were to stay near each tree and pay attention to its characteristics in order to produce a live graphic interpretation, such as a direct observation drawing or frottage of the leaves. Then, they were to describe in writing the observable characteristics and, as a final divergent and creative act, imagine that the tree could speak and transcribe what the tree would say to introduce itself based on its name and what they could observe.

The naturalistic part, which would later culminate in the citizen science project and the research of samples led by professor Altiero, was preceded

by a narrative phase in which the collective exercise of constructing a story and developing a script would introduce the creation of a class short film as an authentic task. The children worked on the sets, costumes, staging, and technical aspects of recording and editing the video, with the five observed trees from the park and their profiles, as the main characters, mediated by the first encounter with the children. In Figure 3, some phases of this creative part are shown.

Figure 3 – Some phases of the short film production

All the children's productions such as plays, narratives, graphics, and conversations, were reviewed with qualitative analysis. Seeking out themes highlighted by Guilford (1950), teachers redefined them as criteria for pursuing greater creative "intensity." The author, in his article "Creativity," identifies four key components:

- Fluency, understood as the ability to generate a large number of ideas or solutions in a short period;
- Flexibility, defined as the ability to adapt and shift between different categories of thought or perspectives;
- Originality, which refers to the ability to produce original ideas or solutions uncommon or different from norms;
- Elaboration, as ability to extend and enrich the generated ideas or solutions in new contexts (Guilford, 1950).

The Historical-cultural area of the project was developed during the whole project, but was emphasized through the research on the monuments of the city's public gardens. After studying the meaning of the statues and their authors, the students continued the storytelling on the public park sculptures, writing narratives about the history of the monuments and giving them a space in their imagination, as Rodari argues "If we want to teach people to

think, we must first teach them to invent" (Rodari, 1973). For him, creativity is synonymous with divergent thinking, meaning the ability to continuously break the patterns of experience:

> A creative mind is one that is always at work, always asking questions, discovering problems where others find satisfactory answers, capable of autonomous and independent judgments, rejecting the conventional, and re-manipulating objects and concepts without being inhibited by conformism. (Rodari, 1973)

It is interesting to remember that the word *play* means both *to play a game* and *to play a role*. In both cases, children feel pleasure and affection toward learning. As Rodari suggested, inventing stories is a game in itself. From this the idea of a playfull approach that has its roots in the *tempting* and fantastic pairing of narration and role playing.

3.2 We, Scientists and Researchers of Beauty

The scientific-natural phase has accompanied and intersected with the narrative phase, where exploration has evolved from spontaneous scientific observation. Subsequently, the discovery of the richness of the flora in public green spaces sparked reflections and questions about the fauna inhabiting those trees. The spontaneous investigation was then enriched by the contributions of Professor Altiero, who guided the students in discovering new microscopic animals: tardigrades. In this case as well, during the science teaching activities, narration generates an intentional and natural use of language that facilitates understanding and in-depth knowledge of reality. Narration thus emerges as the most suitable tool to stimulate learning in general and science learning in particular. Scientific education cannot be fragmented, as often happens in schools, as this would lead to a loss of understanding of reality and limit students' inferential and representational skills (Landini & Corni, 2023).

In this didactic phase, Ada Negri pupils studied tardigrades (Figure 4). These animals are aquatic interstitial micro-invertebrates, also known as water bears, their length is less than 1 mm.

They are cosmopolitan and capable of tolerating extreme conditions: desiccation, freezing, high temperatures, various types of radiation, vacuum, and outer space environments.

Although tardigrades are mostly unseen by the public, they have become very popular among child-researchers.

They really are an excellent model for science education, due to their cryptobiotic abilities, unique appearance, and global distribution. In addition, they maintain a quality of mystery and originality that significantly and naturally fuels curiosity and the desire to explore.

Figure 4 – A tardigrade

During this project, school pupils collected mosses in the school garden to look for tardigrades. They extracted tardigrades from the moss substrates with everyday materials, following a video tutorial and they observed them under microscopes. Then, the children drew the tardigrades they had collected, after observing them under the microscope, as well as the laboratory procedures phases. After these experiences, children seeking and looking for tardigrades, collected other mosses during a school trip to a woodland in the natural park in Northern Apennines called Marola Wood (Figure 5). They compiled a datasheet provided by researchers, and sent the moss with the samples to tardigradologists, for biodiversity assessment, at the Laboratory of Evolutionary Zoology, Department of Life Sciences, University of Modena and Reggio Emilia.

Figure 5 – Children collected moss samples in the park and in the wood to look for and extract tardigrades.

The researchers analysed these samples of tardigrades through an integrative taxonomy approach involving morphological (light microscopy) and molecular (cox1 mitochondrial gene for DNA barcoding) studies. Feedback was sent to the Ada Negri pupils: the researchers communicated to them the biodiversity highlighted in the mosses through written reports and meetings.

Finally, the students realized that they had discovered a new species and, thanks to the coordinates sent to the researchers, they understood that they had contributed in mapping the area, from a biological and zoological perspective.

This scientific work put the children *in the shoes of scientists*, enriching their knowledge and fostering their idea of science and biodiversity. Above all, children had the opportunity to see the beauty in science, to understand the unseen, making knowledge of biodiversity and to recognize the importance of its conservation as a commitment of all citizens.

3.3 Between Digital Storytelling and Musical Compositions: Reimagining While Having Fun

The didactic path has integrated all the areas mentioned above. In the final part of the project, the narrative area was explored thanks to digital experiences: the Blog and the News program.

The use of blogs and news broadcasts in education is a simplified digital version of the "Giornalino" by Mario Lodi and that of Don Lorenzo Milani. Making the necessary distinctions, even today, for students, it serves as a way to tell stories, rework experiences, and participate by communicating within the social contexts they are part of. The students of Ada Negri experienced it as an easy and fun tool, playful, in fact, to engage strongly, through new technologies, in the realm of storytelling directed towards communication. From an educational standpoint, this has allowed them to:

- research and experiment with new forms of learning in virtual environments;
- create learning and practice communities.

The children organized into groups, built a social and cultural context through the Blog and the News, allowing them to reinterpret their experiences while reflecting on conceptual connections and the necessity of producing short yet engaging texts with visual elements. In the digital realm, this meant sharing materials, reworking digital content, creating links to online articles, searching for short musical compositions, providing information supported by captions, and commenting on real or fictional events. The discussions or related readings, as well as the selection of objects such as images, videos, and music, provided opportunities to exercise problem-solving and divergent thinking.

The musical area, instead, facilitated the creation of melodies with environmental themes, using of natural elements as musical instruments. This highlighted the significant value of invention, imagination, and musical experimentation for the development of creative skills starting from experience. In the creation of their compositions, it was indeed of fundamental importance that children engaged in motor and sound exploration activities. Sound-musical improvisation is a practice that does not require particular technical or theoretical skills, and for this reason, it becomes an important and motivating creative tool in basic musical learning. During the project, children listened extensively: they listened to the trees, their sounds, and the noises of the forest. They collected natural materials from the courtyard, the park, and the woods, then categorized these natural elements as a "sound collection." Playing with natural elements, building harmonies and rhythms from materials related to nature, facilitates and educates active listening skills and sound creativity. In the forms of musical improvisation and elementary composition experienced in the project, artistic creation occurred spontaneously and holistically through the integration of movement with voice and natural instruments. This action guided children towards a series of exploratory attitudes that contribute to the development of imagination and fantasy while simultaneously fostering the process of invention. Then, it was necessary to relate a possible score to ensemble music, in order to use music as a language and to expand its descriptive potential.

4. Conclusions

The project "Walking Among Trees" underlines the importance of creativity and playfulness, as interrelated dimensions that found their highest espressions in discovery-based learning and playful-expressive approaches. The latter are firmly rooted in the theoretical frameworks of experientialism, in addition to narrative, simulative and collaborative didactic architectures. Consequently, the children have integrated linguistic-expressive and logical-inferential skills throughout the various phases of the activities, while focusing on themes related to scientific education and active research experiences. The documentation has briefly shown how narrating and representing situations, invented characters, emotional plots in a multimodal way, can stimulate the pleasure of learning in children.

In conclusion, the school, thanks to creative and playful activities and fostering divergent thinking, can and must move away from a strictly traditional approach and open itself to integrated and innovative experiences. The stimulus is to open one's eyes to the territory, to cross boundaries and to embrace it. This vision evokes, in addition to a less ordinary and more creative and constructive teaching approach, a kind of existential planning (Bertin, 1983). As Berti and Contini suggested:

> Children and students can thus build action objectives in their daily lives. They will have the power to project themselves into their future as citizens, that is, aimed at configuring themselves not simply in terms of adapting to the present reality, but also (and indeed predominantly) in terms of a "possible" that can be imagined, achievable through intelligence, and realizable in a continuous process of constructing. (Landini, 2023, p. 260)

A *possible* world, the one designed by the children in the school park and their territory, which has woven together emotions, knowledge, narrative and scientific thought, supported by the pleasure of that playfulness that Bondioli evokes as possibility, offered or earned (2002, p. 352) to share affectively meaningful encounters and playful vivid memories.

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