# Designing a Digital Platform to Promote Experiences of Nature (EoN) in Early Childhood: A Methodological Model Derived from Action Research

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**ABSTRACT**

This paper presents the development of a participatory digital platform designed to promote nature-based experiences for children aged 0 to 3 years. The project responds to the growing reduction of young children's opportunities to engage with nature in their daily lives, despite the critical role such experiences play in early development. Grounded in an action research framework, this initiative integrates both operational and scientific objectives. The platform was co-created through interdisciplinary collaboration and informed by a needs assessment involving early childhood professionals and caregivers. This article details the methodological model, participatory design process, and broader implications for supporting caregivers, fostering nature engagement from infancy, and contributing to interdisciplinary research in conservation and early childhood education.

*Keywords*: early childhood, experiences of nature, digital platform, action research

As the IPBES[1] (2019) asserts, none of the Sustainable Development Goals can be achieved without transformative changes in our societal models, which require redefining our social paradigms and relationships with nature. But how can such a shift occur in societies where direct contact with nature has become increasingly rare?

In modern Western societies, an increasing body of research highlights a growing disconnect from the natural world. Ecologist Robert Pyle (1993) coined the term "extinction of experience" to describe the gradual erosion of direct, daily interactions with nature. In this work, we choose to adopt a broad understanding of both "nature" and "experiences of nature" (see below). According to Susan Clayton and colleagues (Clayton et al., 2017), experiences of nature (EoN) involve interactions with one or more elements of the natural world, which engage cognitive,

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1 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

sensory, emotional, and social processes. The effects of these encounters vary based on individual characteristics, the specific type of nature involved, and the surrounding cultural context.

Yet across contexts, the extinction of such experiences has far-reaching consequences for mental and emotional health (e.g., Kellert, 2002), but also for the development of environmental concern and pro-environmental behaviors. Louise Chawla (1998, 1999) has further demonstrated that early and meaningful experiences of nature are strong predictors of later ecological engagement and conservation-oriented values.

In the French context, several indicators suggest that this disconnect particularly affects children. A 2023 report by the French High Council for Family, Childhood and Age (HCFEA)[2] underscores that French children spend an average of less than 10 minutes outdoors daily, with 65% of children aged 6–12 not engaging in regular outdoor physical activities, and fewer than 20% having easy access to nearby natural spaces. Plus, consequences of this disconnection are particularly pronounced during the first three years of life, a foundational period for physical, emotional, and cognitive development (e.g., Cyrulnik, 2020).

The progressive extinction of EoN results from environmental factors, such as increasing urbanization, which reduces access to green spaces, as well as social and cultural barriers (e.g., Soga & Gaston, 2016). Outdoor time is often overlooked in institutional care for young children, where priorities may focus more on hygiene and structured indoor activities (Giampino, 2016). This cultural perception, reinforced by safety concerns and time constraints, limits opportunities for free exploration in natural settings. Additionally, people may dislike being outdoors (Soga & Gaston, 2016).

Contrary to older children and adults, very young children (up to 3 years old) are most often very enthusiastic in experiencing their natural environments (Wilson & Villeneuve, 2012): they try to watch, smell, catch, taste, listen to all the stimuli that are available in their surroundings (Giampino, 2016). We posit here that experiences of nature in early childhood are spontaneous. Yet, in several societies and cultures (for instance in France), very young children are rarely left in outdoor environments (Giampino, 2016). Therefore, in order to reintegrate EoN into young children's daily lives, one key issue is to inspire and equip adult caregivers—parents and early childhood professionals.

**Designing the digital Fourmis & Cie platform to encourage experiences of nature in early childhood**

In this context, we built an innovative participatory and free digital platform dedicated to consulting and sharing EoN practices tailored for children aged 0 to 3. This platform, named Fourmis & Cie, has been deployed with two complementary objectives: (i) an operational objective of providing a tool to encourage professionals and parents to take young children out; (ii) a scientific goal of investigating the diversity of early childhood nature experiences (EoN), the difficulties and opportunities associated with them, and their potential consequences for children, adults, and nature.  To reach the scientific objective, we transparently encouraged participants to this platform to provide specific data for scientific research, as part of an interdisciplinary PhD thesis in conservation psychology, environmental sociology, and scientific ecology.

We chose to develop a digital platform as a tool to encourage EoN because we considered it was the only medium capable of responding to these dual objectives. It enables broad participation across diverse geographic and social contexts, fosters accessibility and allows dynamic exchange of practices between caregivers and professionals. Further, the platform represents a unique opportunity to gather large-scale and structured information in this field, providing a tool that simultaneously supports daily practice and generates a longitudinal research corpus. To date, the lack of such data prevents the mapping of early childhood experiences of nature (EoN) at the national scale in France.

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2 Haut Conseil de l'enfance, de la famille et de l'âge

Though, we were concerned by the apparent paradox of using a digital device to share and document EoN; this raises questions about how such experiences can be represented, structured, and circulated through a technological medium.

The platform was launched in April 2025. This paper therefore does not present results about EoN in early childhood but rather detail the methodological framework and participatory design process to invent and design this digital platform. This methodological model seeks to capture the tensions and opportunities inherent in designing a digital platform as both support for EoN practices and a scientific research tool.

**A project led by an interdisciplinary academic and operational team**

The development of the platform has been part of a multidisciplinary project Sciences with Society program. The project team consisted of different partners:

- The **CESCO** (Centre d'Écologie et des Sciences de la Conservation, UMR 7204) is an interdisciplinary research laboratory affiliated with the Muséum national d'Histoire naturelle in Paris, the CNRS, and Sorbonne University. It specializes in conservation sciences to support ecological and social transitions.
- The **CERLIS** (Centre de Recherche sur les Liens Sociaux) is a research laboratory in the humanities and social sciences, affiliated with Université Paris Cité, Université Sorbonne Nouvelle, and the CNRS in Paris (France). It conducts research on various themes such as media, work, culture, and education.
- **Label Vie** is an associative group working towards ecological transition through an innovative approach to change management. A pioneer and leader in early childhood, Label Vie created the first sustainable development label dedicated to this field in 2009 with the Ecolo Crèche® label.
- **Mosaic** is a service unit affiliated with Muséum national d'Histoire naturelle in Paris and Sorbonne University, specializing in the development of digital tools for citizen sciences.

Two research engineers (LB and JLB) have been recruited for the project with operational partners. They helped the project team to enable the continuous documentation of the trade-offs between scientific objectives, technical constraints, and user expectations. Particular attention was drawn to grappling with the paradox of using a digital tool to promote activities in direct contact with nature. Indeed, EoN, in all their previously discussed dimensions - sensory, collective, emotional, etc. - could be defined as experiences that resist standardization. Yet, they are structured here through a digital activity form. This raised a critical question: how is it possible to structure content using a digital writing format so that it remains accessible to all, while preserving diversity and richness of EoN?

To do this, we conducted a needs assessment phase, which included:

- five individual interviews (see *Appendix A for the interview guidelines*)
- two focus groups
- two committee meetings with early childhood experts

These sources were crucial in identifying user expectations regarding their relationship with nature, pedagogical content needs, and digital practices. All this phase along, we also organized regular meetings with the project team, including plenary meetings with all four stakeholders (CESCO, CERLIS, Label Vie, Mosaic).

**Discussion**

**ENCOURAGING EON IN EARLY CHILDHOOD (0-3)**

The platform aims to encourage EoN in early childhood primarily through peer-to-peer exchange. To achieve this, we adopted the *activity sheet format (see figure 2)*, a widely used template in early childhood education; and for the majority of participants interviewed. As a familiar and structured tool, it provides clear guidance for sharing practices

online. On the platform itself the wording "activity" *(figure 1; figure 2)* was retained in the user interface (e.g., button "share an activity"), as it was the most immediately understandable wording for users.

At the same time, we are aware of the limitations associated with this choice. The activity sheet model can appear overly formal or prescriptive and may not easily capture the multiple dimensions of EoN (as cognitive, sensory, emotional, and social processes; Clayton et al., 2017). Several professionals interviewed during the needs assessment phase preferred the term *"exploration"* emphasizing open-ended encounters without predefined objectives.

To reduce these tensions, we made specific design choices to adapt the activity sheet format so that it both meets user's habits and allows to share a wide diversity of nature experiences. It influenced key pedagogical approaches in the platform's design, as follows:

- **Providing no definition of EoN, nor educational or developmental objectives**: the platform does not impose any definition of EoN Instead, each user is invited to develop their own interpretation of EoN, fostering a wide range of personal testimonials. The platform does not include fields for developmental objectives either, as is often the case in traditional activity sheets. Similarly, the platform does not provide top-down educational content created by the project team. Instead, we advocate for a more expansive vision of nature-based learning, where knowledge arises organically through experiences and interactions. Learning about biodiversity, and, by extension, its protection, does not necessarily require formal scientific knowledge. It can rather be cultivated through emotional and collective experiences, enriched by peer-to-peer exchanges (Chawla, 1999).
- **Being open to a wide diversity of EoN**: any sensory interaction of young children with natural elements. Reported activities ranged from general ideas (e.g., "vegetable painting with spices") to more specific ones (e.g., "hiking with a baby carrier in Calanques Park"). In order to accommodate this diversity, we kept mandatory fields on the activity forms to a minimum (see figure 1), selecting them in consultation with an expert committee. This decision was made to move away conventional early childhood activity templates, allowing the platform to evolve based on user interactions after its launch. As a result, users can enrich their submissions by filling out optional fields (e.g., budget, materials, season, weather, child's age, etc.). These optional fields help users search for content more precisely, enabling better filtering through the platform's activity catalog.
- **Being open to informal EoN:** By limiting the number of mandatory fields and providing ample space for free-text fields (see figure 1), we created room for contributions that do not conform to traditional educational formats. For instance, activities such as "jumping in puddles" as mentioned by one participant during the needs assessment. This choice enables the recognition and eventually the legitimization of forms of nature's interaction that are frequently practiced informally yet rarely documented.
- **Being playful**: By valuing the diversity of practices and offering flexibility, the platform creates a "ludo-narrative space" (Ryan, 2007), where individuals can freely experiment with nature experiences that are not necessarily goal-oriented or didactic. In this context, simply being in nature becomes an immersive, playful experience, one that can be shared and explored through an activity sheet that unfolds as a personal narrative. In line with the playful dimensions of nature activities, we designed the digital platform to be playful. While the primary users are adults, the design, platform name ("*Fourmis[3] & Cie*"), and user journey all adopt a playful tone that aligns with early childhood themes. A gamified user journey was incorporated, especially through thematic challenges displayed on the homepage (e.g., "Submit your autumn-themed idea of activity"). Additionally, users can upload photographs to accompany each activity form. This design choice highlights the aesthetic dimension of the EoN which plays a crucial role in valuing nature-based experiences (Brady, 2016).
- **Building a community to share practices:** we prioritize the community aspect of the platform. To foster this sense of sharing, the platform introduces an innovative feature: "experience feedback" on

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3 « Ants » in French

activities submitted by other users. These feedback sections mainly consist of free-text fields, but to promote deeper engagement, we also have included prompts that encourage users to provide more thoughtful responses (e.g., What did you enjoy? What were the strengths and challenges of the activity?). The activities posted on the platform are not subject to external validation or moderation, except in cases of non-compliance with the platform's terms of use. Further, we excluded a "like" function from the platform when sharing activities on the platform. The goal was to maintain a supportive environment and avoid certain pitfalls associated with social media such as competition or judgment. To further enhance inclusiveness on the platform, we will also be carefully considering the communication channels that will be used to promote it, ensuring that we reach individuals who might otherwise feel illegitimate in sharing nature-based activities.

## CONTRIBUTING TO RESEARCH

Beyond its function as an educational resource, the platform also addresses a scientific objective: to generate new empirical knowledge on early childhood EoN. With this platform, we aim to document, at a national level: (i) the types of EoN reported, (ii) the conditions that enable or hinder them (cultural, institutional, material, social, etc), and (iii) the perceived outcomes for both children and caregiver's adults. To address these research questions, we designed the platform, its architecture, data fields, and user journey to support caregivers in their daily practices while simultaneously generating a structured and analyzable corpus for research.

### Designing the platform as a scientific data source

To do so, we first paid particular attention to choice of terms designing nature in the platform, in order to ensure scientific accuracy and everyday language. For example, we chose not to use the term "wild", whose contradictory representations could blur communication. This decision aligns with a study by Tian, Potter, and Phelps (2023), which explored the implications of the term "wild" in public policies related to conservation. The authors highlight significant inconsistencies in how wildlife is perceived across different national contexts, which directly affect legislation on biodiversity protection and management.

As a second example, we prioritized terms that are frequently used by future users, drawing on the work of Colleony et al. (2017), who analyzed the categories and names people naturally use to describe nature in a survey conducted in Paris region, France. Their findings enabled us to balance scientific rigor with the everyday language and perceptions of users, ensuring our terminology remains both accessible and scientifically grounded.

Achieving these research objectives needs to collect metadata during platform registration. To combine these needs with the need to ensure smooth navigation, we restricted collected data to the following ones:

- Basic demographic data (age, gender, profession, etc.) to characterize the study population
- An environmental sensitivity index of the professional. Among the diversity of existing scales (Tam, 2013), we chose to use Schultz et al. (2004)'s Inclusion of Nature in Self (INS) scale, which is widely used in conservation psychology to measure the degree of an individual's identification with nature

### Interrogating the platform as a medium for EoN

Addressing the research questions outlined above requires interrogating the specificity of the platform as a medium of communication and how digital technologies interact with EoN and may reshape them. More precisely, several questions will be studied: how digital technology facilitates access and interaction; its potential to expand data collection and content dissemination, but also its possible tendency to standardize information. How, from a semiotic perspective (Pédauque, 2006), are digital documents shaped, used and put into circulation to convey specific aspects of the nature experience? How is the "documentality" (Frohmann, 2012) of the platform influencing these experiences? To answer these questions, we will combine both quantitative data (e.g., user activity on the platform, number of created and shared activities) and qualitative data (e.g., analysis of free-text descriptions

provided by users). Once extracted, these data will be analyzed through a comprehensive approach that integrates the cognitive, social, and emotional dimensions of nature experiences (Clayton et al., 2017).

A comparative approach with other research methodologies used in the PhD project (i.e., field observations and semi-structured interviews with adults) will help us to understand the role of digital technologies as an "environment" (Bachimont, 2007).

**Interrogating the specific role of the researcher within an action-research project**

Embedded within this scientific objective is a reflexive approach, whereby the researchers also examine their own role in the platform's design and implementation. Indeed, researchers associated with this project were also, and originally, the designers of the digital tool. This dual role aligns with an innovative action-research methodology, where the creation of the platform itself becomes an integral component of the research. Action research encourages a reflexive approach, prompting researchers to critically examine their own practices while striving to transform the field of study (Faury, 2023).

By actively participating in the design process, researchers position themselves not as external observers but as engaged contributors, simultaneously transforming both the object and the subject of their research. This dual role offers significant advantages, as it enables a reflexive examination of the decisions that shape the platform's design, including pedagogical principles, writing practices, documents circulation, and editing choices; yet it also raises important questions about objectivity in research (Bedessem, 2020). While acknowledging these challenges, we propose a reflexive and context-aware analysis of these conditions by thoroughly documenting the platform's design process (see above).

The reflexivity embedded in this project extends to the evaluation of the platform's impact—on both individual and collective nature experiences, the communication strategies used, and the broader societal effects. We deliberately move away from two opposing views of digital technology: seeing it either as a barrier to authentic nature experiences or as a neutral facilitator. Instead, the platform is understood as a space of mediation, where intimate and sensory interactions with nature, and "more-than-human worlds" (Searle et al., 2024), are translated into shared digital content. This process reflects the notion of "triviality" as defined by Jeanneret (2014), that is, the transformation of experiences and knowledge into forms that are communicable, reusable, and culturally appropriated. Triviality refers to the fact that cultural artifacts (such as online content for instance) do not simply circulate between social actors but are also transformed, reshaped and reinterpreted in the process, through ordinary uses and media. By analyzing how users describe and share these experiences, we gain insight into how ecological knowledge is constructed and transmitted through everyday digital practices.

Following the platform's launch, research-driven adaptations may be implemented to refine its content based on these findings. Thus, the project operates as a dynamic living laboratory, an iterative process in which research and practice continually inform and shape one another through an ongoing cycle of innovation. While this approach may challenge the traditional notion of researcher objectivity (Bedessem, 2020), it also aligns with the principles of action research, aiming to foster a distinct ethos, understand as a behavior. By encouraging specific behaviors, we hope to inspire transformative changes (IPBES, 2019) and contribute to cultivating deeper individual commitments to biodiversity conservation.

## Conclusion

The Fourmis & Cie project illustrates how a participatory digital tool can simultaneously serve operational and scientific purposes. By combining the sharing of EoN through activity sheet with collection of research data, it proposes an innovative model to support caregivers by generating new empirical knowledge about early childhood experiences.

Positioning the design of digital tools at the core of scientific production, *Fourmis & Cie* opens up new perspectives for analyzing the dynamic interactions between digital platforms, users, and data. This approach raises several

compelling research questions that merit further exploration: How can the complexity of nature be effectively represented through digital activity forms? What effect can a digital platform have on users' daily behaviors? How should researchers define their role in an action-research project that seeks to inspire transformative change?

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**Supplementary Materials**
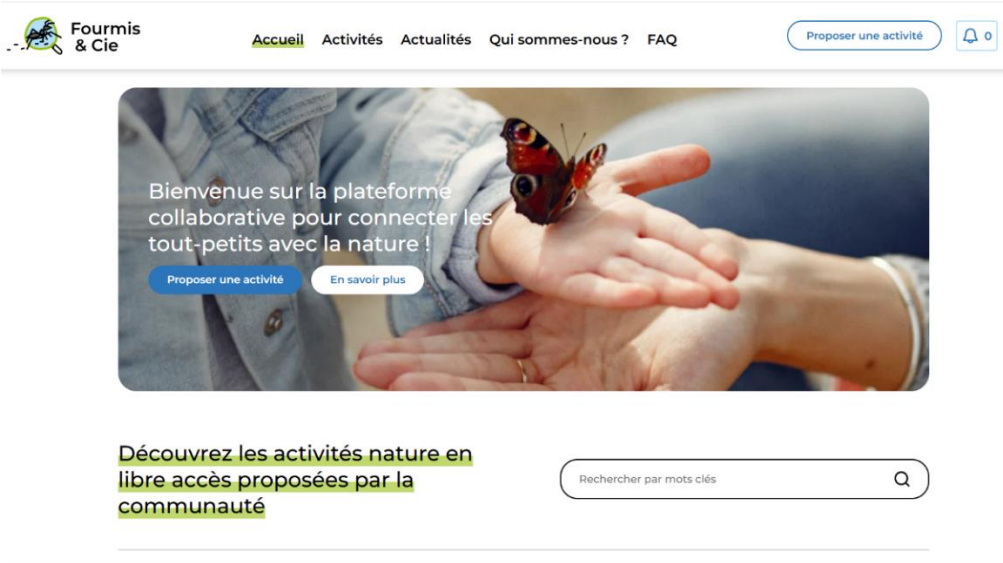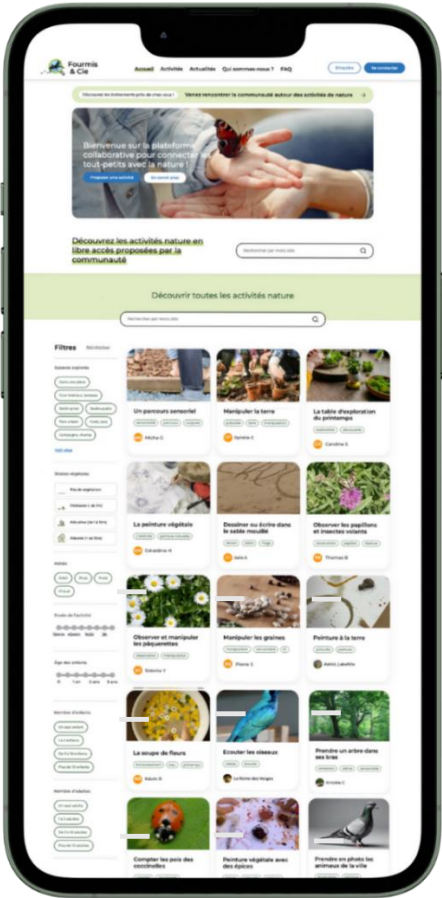
**Figure 1.** Homepage



**Figure 2.** View of the activity's catalog (search function)



*View of the activity catalog interface, illustrating the search function for exploring activities shared by caregivers and professionals.*

**Figure 3. Fields of the activity sheet form (Ages 0–3)**

| Fields | Type | Mandatory |
|---|---|---|
| Title, Short description, Associated keywords | Free text | Yes |
| Season (summer, winter, autumn, spring) | Multiple choice | No |
| Weather (sunny, rainy, cold, warm) | Multiple choice | No |
| Vegetation strata | Multiple choice | No |
| Activity location (indoor, garden, forest, beach, etc.) | Multiple choice | Yes |
| Age range (all ranges between 0 and 3 years) | Multiple choice | No |
| Limit on number of children (e.g., 1–3, >10 children) | Dropdown menu | No |
| Number of supervising adults necessary | Free text | No |
| Preparation time | Multiple choice | No |
| Activity duration | Multiple choice | No |
| List of necessary materials | Free text | **Yes** |
| List of necessary natural elements | Free text | **Yes** |
| Activity steps | Free text | **Yes** |
| Photos | Free text | No |

*Overview of the different fields available in the digital activity submission form on the Fourmis & Cie platform.*

**Appendix A** - **Semi-Structured Interview Guide**

*This guide was used during the needs assessment phase of the Fourmis & Cie project.*

**Target groups**: Early childhood professionals and parents / caregivers

**Interviewers**: Louise Bouché ans Jérémy Lucas-Boursier

**Method:** The following questions were not presented to participants in this exact form—except for the definition of nature - but instead served as thematic guidelines that structured discussions.

1.  **Introduction, presentation and consent**

    After a brief introduction of the researchers and the purpose of the interview, participants are asked for their explicit consent for the conversation to be recorded and for their responses to be used in two ways:

    -   to inform the design and development of the Fourmis & Cie platform, ensuring it aligns with users' needs and practices.
    -   to contribute to the associated research project, led by Label Vie, Mosaic, CERLIS (Université Paris-Cité), and CESCO (Muséum National d'Histoire Naturelle).

    Participants are informed that all data will be anonymized and may be used in internal project documentation or scientific publications. Once consent is obtained, we propose to frame the conversation with a broad definition of nature-based activities: any sensory interaction with natural elements experienced alongside young children.

2.  **Participant background**

    -   Could you introduce yourself briefly?
    -   What is your current role/profession? How long have you been working in this field? What type of structure do you work in (type, size, location, public/private, engaged in Label Vie's network)?
    -   How many children are you usually responsible for? Do you care for mixed-age groups?
    -   How many colleagues do you usually work with?
    -   Could you describe a typical day (morning, lunch, afternoon)?
    -   Are specific moments of the day/week dedicated to structured activities (e.g., outdoor play, music, motor skills sessions)?

3.  **Relationship to nature**

    -   In your current practice, do you organize or take part in nature-related activities with children? If so, what types of activities?
    -   How often do they take place? In what settings (indoor garden, public park, forest, etc.)?
    -   What is the average duration of these activities?
    -   How many children usually participate? Does the number affect how the activity unfolds?
    -   How many adults are usually involved?
    -   In your view, what makes a nature-based activity "successful"?
    -   What are the necessary conditions (equipment, organization, time, space, documentation) to implement it?
    -   If we define activities in nature as interactions with the living world in a broad sense—that is, with all organisms that have biological functioning, interacting both with one another and with non-living elements such as air, water, or soil—does this evoke anything in particular for you?
    -   Can you recall any activity that, in your opinion, significantly changed the children's (or your own) relationship with nature?

4. **Digital Practices**
   - Do you have access to digital tools at your workplace? If so, which ones, and under what conditions?
   - Do you use digital tools at home to prepare for your work or for children's activities?
   - Do you use any digital tools during outdoor activities with children?
   - Do you use digital or printed resources to plan activities (websites, apps, books, guides, etc.)?

5. **Expectations for the Platform**
   - What would you expect from a platform designed to support nature-based activities for children aged 0–3?
   - What would be the necessary conditions for you to use such a digital tool in your work (time, equipment, training, etc.)?
   - What themes or formats of activities would seem most relevant and useful for you and the children you care for?
   - How often do you think you would consult nature activity ideas?
   - How frequently do you think you could implement them with children?

6. **Participation and contribution**
   - Would you agree to share your own nature-based activities on the platform for others to use? If yes, would it be important for you to be acknowledged as the author of the activity?
   - Would you feel comfortable commenting on other users' activity sheets? What kind of feedback would you like to receive or give?
   - What criteria would be most important in choosing an activity (content, clarity, comments, rating system, etc.)?

7. **Suggested features and tools**
   - Are there any particular features or tools you think would support or encourage your use of the platform? (e.g., filters, bookmarks, personalized suggestions, activity journals, etc.). Would you be motivated, for example by monthly/weekly thematic challenges or a participation tracker?
   - Can you think of other ways to encourage users to participate and interact?

8. **Views on scientific research**
   - Would you agree to the usage data you generate on the platform being used for scientific research?
   - What comes to mind when you hear the term "scientific research"? Do you think of specific types of studies, researchers, or institutions?
   - Would you be interested in participating in a larger research project (e.g., user panels, feedback loops)?
   - Would this evoke any specific emotions, curiosity, pride, hesitation?

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