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# The teacher's role for engagement in foraging and gardening activities in kindergarten

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## ABSTRACT

Early childhood education provides an important arena for fostering valuable habits and practices for sustainability. This paper contributes to understanding the educator's role within early childhood environmental education in foraging and gardening practices. What pedagogical approaches does the teacher provide to foster the children's participation, engagement, and learning in such activities? To investigate this question, we used a qualitative approach, including video and on-site interviews with kindergarten teachers during foraging or gardening activities. We also analyzed semi-structural interviews and collected field notes for in-depth views and reflections from the teachers. The qualitative data were analyzed using reflective thematic analysis. The data analysis suggests three themes that exemplify hallmarks of the teacher's role: (1) facilitating adventurous experience, (2) child-centered communication, and (3) building collective knowledge and skills. The implications for the future are discussed with respect to the kindergarten teacher's pivotal function in supporting children as eco-citizens for sustainability. The data show that the kindergarten teachers' over-arching role is to take leadership of fostering engagement and learning for everyone involved.

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## KEYWORDS

Early childhood education; eco-citizens; foraging; gardening; kindergarten teacher; sustainability

## 1. Introduction

Early childhood environmental education (ECEE) aims to connect children to nature (Ardoin and Bowers 2020) and its food resources through foraging (Nugent and Beames 2015) and gardening activities (Petrou and Korfiatis 2022; Rymanowicz, Heatherington, and Larm 2020). How to hunt or gather food from nature, also termed foraging practices, is pivotal for survival and has been taught to younger generations. The practice of agriculture dates back at least 21,000 years and has developed through hands-on experiences in close interaction with the environment, landscape, climate conditions, weather, and biodiversity at the location (Bowles, 2011). Knowledge of how to harvest or grow food locally is actualized in a modern world where many children live in urban settings threatened by social and political instability, climate change, population migration, and even war. Everybody needs daily meals, and knowledge and skills on how to grow or harvest food from nature should be included in education for the youngest children. Moreover, the roles of educators and practitioners in early childhood education (ECE) in

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supporting children's learning in gardening and foraging practices must be pursued. This has relevance to both ecological, social, and cultural aspects of education for sustainability (EfS) (Bergan et al. 2021), as well as supporting young children's development of being and becoming active eco-citizens that value nature (Heggen et al. 2019). We define children's eco-citizenship as a child-sized citizenship where the more-than-human parts of the world's eco-system is included (Heggen et al. 2019). Children's eco-citizenship is in line with recent research that suggest that children's connection to nature impacts sustainable behavior and happiness in children (Barrera-Hernández et al. 2020).

For the last decade, research on early childhood education for sustainability (ECEfS) has increased, and we find an emphasis on outdoor, nature-based, or project-based programs that support children's agency and participation for sustainability (Ardoin and Bowers 2020; Bascopé, Perasso, and Reiss 2019; Elliot, Årlemalm-Hagsér, and Davis 2020; Rymanowicz, Heatherington, and Larm 2020). Nature-based learning in ECE impacts children's environmental literacy, cognitive development, and social and emotional skills (Ardoin and Bowers 2020; Rymanowicz, Heatherington, and Larm 2020). However, the role of the *kindergarten teacher or practitioner* in supporting and facilitating such learning in nature has been less investigated.

### **1.1. Foraging and gardening practices in ECE**

The Swiss pedagogue J. H. Pestalozzi (1746–1827), who was preoccupied with the practical work of agriculture, inspired the modern education of children with the motto 'Learning by head, hand and heart' (Brühlmeier 2010). Pestalozzi's ideas were later developed by the German educator F. Fröbel (1782–1852), who created the concept of the 'kindergarten' as an educational institution for the youngest children. In Fröbel's kindergartens, the teacher supports the children's learning and development using the garden and nature as key components (Herrington 1998; Marín Murcia and Martínez Ruiz-Funes 2020).

Harvesting food from nature and gardening activities provide young children with close interactions with nature as a resource for food (Miller 2007). The benefits for children may be healthy eating habits (Pecaski McLennan 2010) and knowledge of the origin of food through the connection to the local cultural heritage (Chipeniuk 1998; Nugent and Beames 2015). Foraging and gardening also contribute to authentic work with real tools, with direct insights into the interconnection of species. The explorative and participatory aspects of these practices in collaboration with peers, kindergarten staff, family, and the community have impacts on the children's engagement in the task at hand (Bergan et al. 2021; Keith 2005; Koloszuki Maciel et al. 2022). Children's active engagement in and for the natural environment by harvesting or cultivating food may be a starting point toward a sustainable future (Bergan 2019; Bergan et al. 2021).

### **1.2. The educator's role in ECEE**

We find few empirical studies on the educator's role with children in ECEE, and even fewer studies referring to foraging and gardening practices. Most studies and theoretical literature emphasize the benefit of the outdoor environment for young children's holistic learning and development (Ardoin and Bowers 2020; Meier and Sisk-Hilton 2017), but not as much focus on how the educator fosters these benefits. Research shows that the challenge for kindergarten teachers to facilitate adequate learning in the natural environment may be grounded in educators' lack of scientific knowledge or experience (Davies and Hamilton 2018; Torquati et al. 2013).

Ardoin and Heimlich (2021) advocated for an 'environmental learningscape framing' that incorporates what individuals retain cognitively, affectively, and skill-wise from across many encounters with nature accumulated over time. This perspective is in line with Lave and Wenger

(1991) situated learning theory of real-life activities through participation in a community of practice. The role of the educator in these nature meetings is to initiate and maintain a dialogue with the child about everyday events situated in local and cultural practices (MacQuarrie, Nugent, and Warden 2015; Rogoff, Matusov, and White 1996). Rogoff (2014) proposed calling this type of cultural learning in a family and community setting 'learning by observing and pitching in' (LOPI). LOPI is defined by seven features that are significant for the teacher's role to the learner (Rogoff 2014): 1) the learner is included to contribute, 2) the learner is guided or supported, 3) the endeavors are collaborative, 4) the goal of learning is to contribute, 5) the learning attracts attention (current or anticipated), 6) communication is based on shared reference, and 7) feedback supports the learner's mastery. Elements of LOPI are widely used for learning in indigenous communities (Rogoff 2014; Rogoff et al. 2007). Generational knowledge about the environment may also be taught through 'education of attention' (Ingold 2000), in which the child is instructed to feel this, taste that, or watch out for different natural elements (p. 22). The educator's role is to point out significant information or clues that the child is instructed to attend to.

Another role for the educator in the natural environment is to create and maintain children's curiosity and wonder about what is found or perceived outdoors (Heggen and Lynngård 2021; Skalstad and Munkebye 2021). The teacher follows the children's interests, aiming to create rich experiences for children by building on their interests and signals either through dialogue or providing tools to explore (Heggen and Lynngård 2021; Ramanathan, Carter, and Wenner 2021). If the teacher is attentive and interested, the children tend to prolong their interest, delving even deeper to understand (Heggen and Lynngård 2021). The teacher's ability to follow up on the children's questions (Skalstad and Munkebye 2021) and ask open-ended questions is important to increase the children's curiosity and involvement (Ramanathan, Carter, and Wenner 2021). The natural environment also invites children to explore authentic life matters with a backdrop of uncertainty, novelty, and challenge that may be called 'adventurous learning' (Beames and Brown 2016; Jickling et al. 2018). Not knowing what to expect may motivate us all, especially children, to explore and learn more (Solly 2014).

In summary, the teacher plays a pivotal role in fostering children's engagement, curiosity, experience, and learning outdoors in nature. We have previously shown that participatory learning in kindergarten of foraging and gardening over time resembles communities of practice (Bergan et al. 2021), and that these endeavors build collective knowledge in both staff and children. In the following, we aim to look more closely at the role of the educator in foraging and gardening practices and investigate what contributes to children's growing eco-citizenship (Heggen et al. 2019).

### **1.3. Background and purpose of study**

Norwegian kindergartens are educational and care institutions for children from birth to six years of age, and 93.4 percent of all children in Norway are enrolled (Statistics Norway 2022). The framework plan for kindergartens in Norway is grounded on a socio-cultural view of learning, and core values are based on a child-centered view with emphasis on democracy, diversity, equality, sustainability, and wellbeing (Norwegian Directorate for Education and Training 2017). In Nordic culture, nature encounters are highly valued. Accordingly, outdoor play and learning in the natural environment are equally important in kindergartens (Grindheim 2021; Sandseter and Lysklett 2018). Another element in Norwegian culture is the 'Outdoor Activities Act,' which ensures everyone access to natural areas for activities such as hiking and recreation, as well as the opportunity to harvest wild plant resources, fruit, berries, and mushrooms for their own use (Ministry of Climate and Environment, 1957). The framework plan for kindergartens specifies that 'Kindergartens shall help the children to [...] gain an insight into food sources, food production and the path from ingredient to meal' (Norwegian Directorate for Education and Training

2017, p. 50). This means that foraging and gardening activities are natural practices to include in the ECE curriculum to ensure cultural, social, and environmental sustainability (Bergan 2019; Bergan et al. 2021; Utsi, Bøe, and Krempeg 2019).

The purpose of this study was to investigate the kindergarten teacher's (hereafter called 'teacher') role in foraging and gardening activities in a kindergarten context in the Arctic region of Norway. To delve more deeply into what key elements foster engagement in these activities, we posed the following research questions:

1. What contributes to kindergarten children's (and staff's) engagement, experience, and learning?
2. How does the kindergarten teacher inspire and attract children's attention?

These questions are further discussed with respect to how the teacher fosters children to be and become eco-citizens.

## 2. Research design and methodology

To obtain in-depth insights into the teacher's role, we chose a qualitative methodology (Silverman 2020). The study was approached as participatory action research with the aim to include the persons being studied in the design, execution and dissemination (MacDonald 2012). More specifically, this is a case-based learning study (Runesson Kempe 2019), in which the 'field researcher' (first author – hereafter called researcher) and the main kindergarten teacher (fourth author) collaborated on documenting the activities and supporting the children in performing foraging and garden activities (see Tables 1 and 2).

### 2.1. Research setting and participants

The study was undertaken in a medium-sized kindergarten (60 children aged 0–6 years) organized in four units in the northern part of Norway. The staff consisted of 9 teachers and 11 assistants, where 7 teachers took part in the activities (Table 1). The main teacher (fourth author) had a leading role in data collection and activities with the children. Initially, the main teacher situated himself as a contributor to the research project by engaging, planning, and execution the agreed upon activities and collecting video data along the way. During the process with the crowberries (see below) he began to view his role as a co-researcher. The research was a part of the 'KINDknow – Kindergarten Knowledge Centre for Systemic Research on Diversity and Sustainable Futures' founded by the Norwegian Research Council (grant no. 275575) and was approved for following ethical standards by the Norwegian Centre of Research Data (reference no. 920483). The staff and the children's parents gave their written consent to participate. In addition to the parents' consent, the children were asked to approve the filming during the activities, to which they all agreed. All data were anonymized.

Table 1. Demographics of the participating kindergarten teachers.

Gender	Years of teacher experience	Years of experience with gardening in kindergarten
Female	9	5 and adult life
Male*	10	3 and childhood
Female	17	5 and childhood
Female	27	5 and whole life
Male	31	5
Female	37	5 and childhood
Female	39	5 and childhood

\*Main teacher.

**Table 2.** Overview of video sequences for the different activities or tasks (total 8 h and 20 min).

Activity – task	Length of video	Data collector
Harvesting and rinsing flowers to make cordials outdoors	92' 42"	Field researcher
Harvesting and rinsing flowers to make cordials outdoors	93' 25"	Main teacher
Separating flowers, adding sugar, and tasting indoors	38' 35"	Main teacher
Separating flowers, adding sugar, and tasting indoors	39' 9"	Assistant teacher
Picking crowberries outdoors in the woods	38' 40"	Main teacher
Rinsing crowberries and crushing the berries indoors	29' 39"	Main teacher
Separating crowberries and adding sugar indoors	72' 1"	Main teacher
Tasting crowberry drink and preparing for storage indoors	53' 3"	Main teacher
Harvesting potatoes outdoors	43' 13"	Field researcher

## 2.2. Foraging and gardening activities

The study investigated the teacher's role in the process of retrieving and utilizing resources from nature during the 2021 harvesting season with children in kindergarten. The main teacher documented the process of planning, executing, and working progress to the product of collecting Rosebay willowherb flowers (*Chamaenerion angustifolium*) and crowberries (*Empetrum nigrum*) to extract juices and flavors to make cordials. The area for collecting flowers and berries was a 5–10 minutes' walk from the kindergarten (see [Figure 1](#)). In addition, the process of planting potatoes to grow crops for harvesting was done within the fence of the kindergarten and was filmed by the researcher. The researcher supported and collaborated with the teachers to build experience, skills, and knowledge in foraging and gardening on terms with the children.

## 2.3. Video sequences

The researcher and/or the teachers wore GoPro cameras during the activities. Apart from the researcher, the main teacher wore the GoPro Camera most of the time. Video sequences were collected, as summarized in [Table 2](#).

The videos were cut to extract only essential material for the research and were further transcribed.

## 2.4. Field notes

The researcher visited or communicated with the teachers at several stages of planning or executing the different activities. Communication, either by e-mail, phone, or physically during collaboration meetings or observation of activities in the kindergarten, was thus recorded as field notes.

## 2.5. Group interviews

Two group interviews (approximately 30 min each) were conducted with the teachers responsible for leading and organizing the different endeavors with the children and the staff. The interviews were performed and recorded on zoom and then transcribed. Member checking (Creswell & Miller, 2000) was undertaken by doing a follow-up in depth focus group interview while showing the video material to the informants. Moreover, one of the informants was given authorship (fourth author) and was thereby included in the process from collecting data to writing the article.

## 2.6. Analysis

The qualitative data material was analyzed based on reflexive thematic analysis (RTA) (Braun and Clarke 2021) with a collaborative approach (Eggebo 2020). RTA is described as a six-phase process for data engagement that leads to overall themes based on our research questions (Braun and Clarke 2021). The analysis process was partly done collectively with either two or



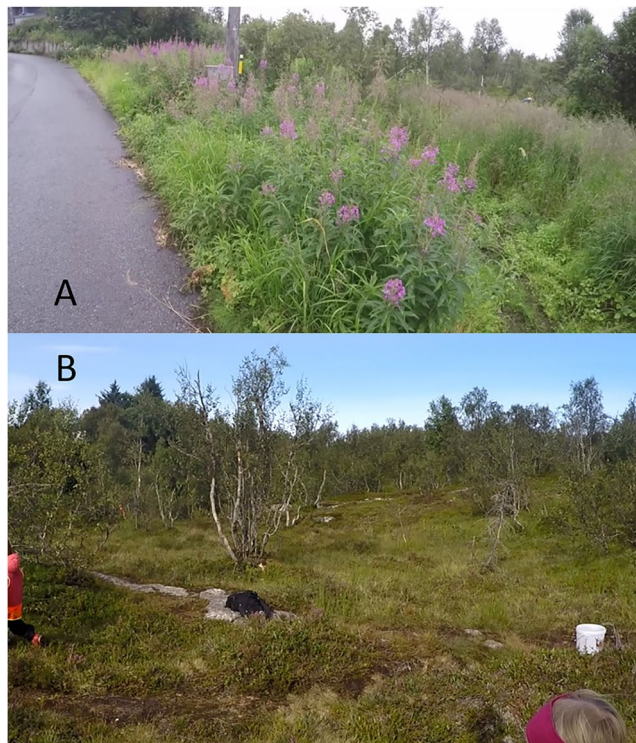


Figure 1. Pictures of the area where Rosebay Willowherb (A) and Crowberry (B) were harvested.

three authors (Eggebo 2020). This was important to pursue a professional distance from the findings, since the first and fourth authors also participated in data collection.

Initially, the first three authors read all transcribed data material and wrote familiarization notes (1) before meeting to systemically code the data (2). During the first meeting, Authors 1 and 2 watched the video sequences together to ensure that our coding was aligned. The coding was data-driven (inductively) and frequently revealed codes such as ‘recalling,’ ‘explaining,’ ‘repeating notions,’ and ‘asking questions.’ The codes were then collectively categorized by all authors into initial categories such as (3) ‘verbal communication,’ ‘contributions to engagement,’ ‘competence building,’ ‘leadership,’ and ‘treasure hunting.’ Developing, reviewing (4), and refining (5) themes included collectively interpreting the data based on our research questions, which resulted in writing a report (6). The themes from the analysis were named ‘facilitating adventurous experiences,’ ‘child-centered communication,’ and ‘building collective knowledge and skills.’

### 3. Results

The aim of this study was to explore the teacher’s role in foraging and gardening activities. Three activities were included in this study: 1) collecting ‘Rosebay willowherb’ flowers (*Chamaenerion angustifolium*) in early August; 2) picking ‘crowberries’ (*Empetrum nigrum*) in late August, both activities resulted in making cordials; and 3) harvesting ‘potatoes’ to make potato chips, which was an annual endeavor in late September. The different tasks in each activity are summarized in Table 3.

The idea for the first activity was inspired by a conversation between three teachers and the researcher, in which they elaborated on what nature had to offer for produce at this time of year (early August). The researcher suggested making cordials and becoming an external

Table 3. Overview of different steps in the three activities.

Activity	Preparation	Step 1	Step 2	Step 3	Step 4
1. Roseberry willowherb flowers ( <i>Chamaenerion augustifolium</i> )	Preparing the children by asking about what they know about juices and cordials. e.g. how they are made and what kind of drinks they like. – indoors	Mapping the nearby area with the children for where to find the flowers and drawing a 'treasure-map'. Determining different plant species by using an app <sup>1</sup> on site. – outdoors	Following the map to harvest flowers and separating them from leaves and insects. Adding hot water and citric acid onto the flowers to extract the flavours. – outdoors	Sifting the flowers from the extract and adding sugar. Tasting the drink. – indoors	Serving the colourful floral cordial with foods. Store the cordial in flasks in the freezer for later use. – indoors
2. Crowberries ( <i>Empetrum nigrum</i> )	Observing where to find crowberries in the woods. Buying children size berry picker tools and containers for picking. – outdoors	Taking a trip to the woods with the children and picking berries with berry picker tool in containers. – outdoors	Separating berries from leaves, insects and other detritus. – indoors	Crushing berries with preboiled water in a blender to extract aromas. – indoors	Sifting the berry debris from the extract and adding sugar and citric acid for taste <sup>2</sup> . – indoors
3. Potatoes	Preparing the soil by weeding, adding chicken manure, and using different tools with the children. – outdoors	Planting parent potatoes with tools and explaining the role of earthworms in the soil. – outdoors	Attending the growth by weeding and watering the plants. – outdoors	Harvesting potatoes by using different tools with the children. – outdoors	Counting the harvest and making potato chips in the kitchen. – indoors

<sup>1</sup>Artsorakel (artsdatabanken.no)

<sup>2</sup>Step 5: Freezing the finished cordial into ice pops sticks. Some cordial was also served as a drink at special occasions or stored in the freezer.



expert to inspire and support the teachers in trying something new. The activities were further planned and led by the teachers.

Based on our data analysis, we observed extensive collective engagement in the process of hunting for treasures in nature. The teachers functioned as the 'expedition leader' who 1) *facilitated adventurous experiences* or learning, who executed a high degree of 2) *child-centered communication*, and who was conscious about 3) *building collective knowledge and skills* for everyone that was involved. In the following section, we examine each of these three themes and provide examples.

### 3.1. Facilitating adventurous experiences

The process of picking flowers or berries to make cordials lasted a whole week with different tasks each day (Table 3), and the teachers had to capture the children's attention along the way. Since neither the staff nor the children had experience of what to do or expect, this became an adventurous and open-ended process led by the teachers with an enthusiastic and curious tone. This curiosity may be exemplified in this conversation between a teacher (T) and a child (C):

T: If we make a cordial out of these [flowers], how do you think it will be? What color do you think it [the cordial] gets?

C: Purple! (enthusiastic)

T: Yes, it will be exciting to see. I have not made this kind of cordial before.

New discoveries, curiosity, following the children's own interests, and open exploration were facilitated and ventured by the teachers in many ways (Table 4).

We were stroked by the bodily expressed eagerness we observed in the children in the video sequences; the noise level of their excitement was high, especially in the potato field. Bodily eagerness was supported by the teachers and was expressed in the children as interest in tasting, smelling, participating, etc. The teachers' role was to build anticipation and engagement for the different endeavors and to explore, execute, and wonder with the children without knowing the result. They led the expedition, kept the overview from start to end, and were conscious of letting the children explore with their senses and use tools to ease and aid the 'work' and the discoveries.

In this study, the teachers seemed to function as the 'expedition leaders' for the activities that led to new discoveries, both connected to hunting treasures from local places in nature, but also from leading the process of gaining experiential knowledge from harvest to product. The novelty of the activity of transforming flowers or berries into colorful and tasteful cordials created curiosity for the process in an adventurous way for all participants.

### 3.2. Child-centered communication

Throughout the harvesting activities, we met teachers who were attentive to the children's questions, initiatives, and interests. The child-centered communication (CCC) was mostly inquiry- and dialogue-based, with a respectful and engaging style. The children led the way, and the teachers were open to adjustments. This is exemplified in a dialogue between a teacher (T) and two children (C) while picking crowberries.

C: We found a mushroom. Follow us! Mushroom!

T: Did you find a mushroom?

C: Do you want to look at it?

T: Yes, I will very much look at it. [...] Where is it?

The CCC also involved creating excitement to find a treasure (flowers) by creating and following a 'treasure map' or by counting to ten before starting a noisy blender to crush berries.

Table 4. How 'facilitating adventurous experiences' is articulated with the children.

Rosebay willowherb	Crowberries	Potatoes
Searching for where the flower species is located by mapping the nearby area with an app with the children. – <i>field notes</i>	Reading, printing out, and exploring the process on how to make crowberry cordial on a blog. – <i>field notes</i>	Building anticipation and eagerness in the children in advance by talking about the task ahead. – <i>interviews</i>
Creating a 'treasure map' for where the flower is located with the children. – <i>videos</i>	Letting the children explore nature on their own. Treasure hunting for berries and mushrooms. – <i>videos</i>	Encouraging the children to explore what is hidden in the soil (different kind of potatoes and earthworms). – <i>videos</i>
Asking curious questions on what the children think or expect in the process. – <i>videos</i>	Following up the children's interest for what they find in nature (e.g. mushrooms and litter). – <i>videos</i>	Expressing "I wonder how many can be found?" The children are then eager to find more. – <i>videos</i>
Having personal and contagious engagement and curiosity for the different tasks. – <i>interviews</i>	Trying out new tools for harvest, separation and crushing berries (e.g. berry picker tool). – <i>videos</i>	Introducing new tools (pitchfork) to be able to dig deeper gives increased interest. – <i>videos</i>
Following up the children's interest for what they see in nature (e.g. insects). – <i>videos</i>	Following up the children's suggestions for what to make (ice pop juice on a stick). – <i>interviews</i>	Supporting the excitement around the different forms and sizes of the potatoes. – <i>interviews</i>
Inviting the children to explore with their senses (touch, smell, taste, colour). – <i>videos</i>	Exploring the novelty of the taste and shifting colour (e.g. from adding sugar and citric acid). – <i>videos</i>	Responding to children's sayings: "look, I found another one" "look, I found an earthworm" – <i>videos</i>

**Table 5.** How 'child-centered communication' is expressed in the video sequences.

Recalling	Motivating	Asking questions	Instructing	Explaining
Reminding the children about the goal of making a cordial or juice (food product)	Verbally acknowledging the children's work: "when you spread the flowers, then I could find more green leaves"	Asking open-ended questions to invite the children to elaborate on what they see and think during the activities	Giving instruction on what part of the flower should be picked and not to pick leaves and knots	Describing why we need to separate flowers and berries from leaves, insects and other detritus to make a good drink
Recalling previous events: "Do you remember previously [...] planted potatoes?"	Encouraging and inviting the children to use their senses (taste, smell, tactile/softness, visual/colour)	Asking leading questions such as: "do you know what this is?" "do you want to..?"	Giving instruction on what kind of potatoes should be harvested (not parental potatoes)	Explaining why the potato plant has become yellow and withered and is ready for harvesting
Repeating difficult words (geitrams <sup>3</sup> , krøkebær <sup>4</sup> , greip <sup>5</sup> )	Encouraging the children to participate and helping with the task at hand	Making inquiries about the role of specific things in nature (insects, earthworms etc.)	Showing how to use tools for harvest (berry picker, pichfork, etc.) and processing (blender)	Demonstrating why the sugar is more easily dissolved in the floral drink by adding heat

<sup>3</sup>English: Rosebay willowherb

<sup>4</sup>English: Crowberries

<sup>5</sup>English: Pichfork

The children's attention seemed to be more easily captivated outdoors than indoors. The children wanted to participate when the teachers called out for action. The CCC also seemed intended for learning that can be described as *recalling, motivating, asking questions, instructing, and explaining* (Table 5).

We found many examples of CCC in all the video material. 'Recalling' was exhibited by recalling previous events, offering reminders about where they were headed, and repeating difficult words (see also Section 3.3). 'Motivation' was related to encouraging the children to participate or use their senses to explore, or verbal acknowledgement of their work. The teachers asked many open-ended 'questions' that either led toward specific or inquiry-based aspects about the role of different elements in nature, or different steps toward making the cordials. 'Instructions' were given both verbally and by showing how things were done (practical skills). The instructions had elements of 'do this – not that' and were mostly followed by 'explanations' of why things were done in certain ways. The teachers were conscious of informing the children of why things were done with the aim of a product in sight, and they demonstrated physical laws (e.g. sugar is more easily dissolved in hot liquid than cold) when the opportunity emerged. This leads us to the last theme, which addresses the role of the teacher in 'building collective knowledge and skills,' both on behalf of the children and the staff.

### 3.3. Building collective knowledge and skills

The teachers were responsible for taking the lead in building collective knowledge and skills in the activities from harvest to product, both on behalf of the children and the staff. The main teacher collected knowledge about the process by reading and printing the recipe in advance and reached out to the expert with hands-on knowledge (the researcher) when the written knowledge was unclear. The teachers also invited the researcher to participate in a field trip to the meadow to harvest flowers. A 'treasure map' was drawn together with the children to make sure they knew in advance where to find the right species at the field site close to the kindergarten.

The teachers were especially attentive to sharing knowledge with the children by repeating new concepts and words to ensure they stuck. This is exemplified in the following conversation:

T: Do we remember what this [flower] is called?

C: No.

T: It has the same name as an animal (waits for the child's answer).

T: Geit-rams<sup>1</sup> [English: Rosebay willowherb]

C: Yes, geitrams!

The teachers also consciously told the children which part of the flower should be harvested to make the cordial: 'Look, we can pick this flower part. We should not pick the leaves or the flower knots [pointing at different plant parts]'. Thus, the knowledge and skills that were the teacher's main concern were transmitted to the children (see also [Table 5](#)).

The interviews confirmed that the teachers were eager to build new competences for all the children involved. The enthusiasm and interest for learning and participating in these activities was surprisingly high, as was the inherent force in the activities themselves. The video sequences showed that learning from an online source had limitations, and the staff had to learn through trial and error. They experienced that a food processor was insufficient to crush crowberries, so they had to use a blender instead. They also had to adjust to make the sugar dissolve more quickly by heating the floral cordial and cooling it again before tasting with the children. They discovered that each step took time.

The ownership of the activities was distributed among the entire staff, but the teachers were responsible for the pedagogical work with the children and leaned on each other in the different tasks. The endeavor of harvesting flowers and berries to make cordials was new to the staff. The teachers had more experience with picking berries than flowers (picking berries is a cultural tradition), and thus, the external expert was a significant factor in making the floral cordial. This was particularly important, as the flowering time for the rosebay willowherb was limited to approximately 15 days in early August. The initial intent was to pick meadowsweet (*Filipendula ulmaria*) to make a cordial, but it had produced seeds at the time of the field trip and was thus overdue for harvesting. Fortunately, meadowsweet and rosebay willowherb grew at the same location ([Figure 1A](#)), and the plans were easily changed on the day of harvest because the researcher came along.

The teachers' competence in growing potatoes developed over time and was based on experiences from several years. The transmission of knowledge and skills was easily spotted in the video sequences, as the teacher explained and showed the children how one potato was 'parent' for many 'baby' potatoes. The children quickly learned the difference between the brown parent potato and the new red potatoes. An on-site interview with one of the teachers at the end of the potato harvest revealed that the intent for this activity was for the children to participate—to acknowledge the children's efforts in harvesting potatoes so that they knew how it was done, and that it was possible to grow potatoes where they lived. The teachers specifically allowed the children to do the work, and did not do it for them, thus teaching them the skill of harvesting potatoes.

Together, these findings reveal the crucial role of the kindergarten teacher in venturing into explorations, such as foraging and gardening, by taking responsibility for and leadership both on behalf of the children and the staff. In this study, adventurous leadership took the form of the teachers' personal engagement in CCC and through building knowledge and skills for everyone involved. The drive for the children's great enthusiasm and the teachers' curiosity may partly be explained by their personal interests in learning something new as well as the value in transmitting culture to the children through learning real concepts by harvesting treasures from nature.

#### 4. Discussion

This study asked *what contributes to kindergarten children's (and staff's) engagement, experience, and learning in foraging and gardening activities?* We found that the teacher's own engagement

and leadership in ‘facilitating adventurous experiences’ is a key element that contributes to the children’s experience and engagement (Table 4). Engagement is contagious, and excitement for exploring new things, not knowing what to expect, enacts curiosity that has inherent motivation. We observed that the teacher met the children’s questions, interests, and curiosity in the activities, which are hallmarks of inquiry-based learning in preschool (Ramanathan, Carter, and Wenner 2021). Supporting curiosity is fundamental to motivating children’s learning and is easily recognized as bodily curiosity, as children explore with all their senses (Heggen and Lynngård 2021). In our data, this bodily eagerness to find and touch earthworms, smell flowers, and taste the flavors of the cordials was encouraged by the teachers. The teachers facilitated an opportunity for first-hand experience with real growing things that nurture and are easy to like (sweet cordials and potato chips), which we believe have a different status for the children than playing with toys or ‘just’ explore nature freely. The teachers’ choice of activity, taking the lead in these activities, drawing a treasure map, and creating excitement for a treasure hunt (where can it be found, how many, how big, what taste, etc.) were significant. This is in line with the literature on ‘adventures learning’ (Beames and Brown 2016) and ‘wild pedagogy’ (Jickling et al. 2018), which challenges the regime of control in teaching and relies more on spontaneity and risk in meeting the unknown. The teachers did not know what to expect, yet they went into an adventure that had a risk of failure. The qualities of a self-reliant teacher who dares to take this risk seem to lie in the support from fellow kindergarten teachers, the staff, and external experts—that is, the ‘community of practice’ (Bergan et al. 2021). The kindergarten in our study has established a tradition of gardening and harvesting for several years, which may have influenced the teachers’ courage to expand their repertoire of activities.

The second research question we posed was: *How does the kindergarten teacher inspire and catch the children’s attention?* The teachers executed highly developed skills on CCC and attracted the children’s attention mostly by recalling previous events, asking open or leading questions, and inviting the children to participate (Table 5). It seems that the teachers were continuously aware of the children’s limited sense of time, and thus tried to connect events forward and back in time. Planning a goal of, for example, making the floral cordial with the children involved several steps (Table 3), and the teachers communicated this to the children by recalling, repeating, and reminding them of previous experiences, what to do now, and the aim ahead. By holding the thread through CCC, the teachers helped the children contribute willingly, especially when the activities were held outdoors (Table 3). This is interesting but may reflect how the outdoors is perceived as a more interesting arena for the children to be engaged in by their teachers. Hence, the outdoor activity itself seems to be perceived as engaging for the children, since it involves a mission, the use of different harvesting tools, and free exploration with the support of the teacher.

Another function the teachers provided that fostered engagement was leadership for ‘building collective knowledge and skills’ for everyone involved, both children and staff. This was expected from previous research (Bergan et al. 2021), but the recent data are more robust on how this was articulated by the teachers through CCC (Table 5) and staff leadership. We observed several elements of LOPI in the videos, which involved the teacher guiding or supporting the learner in a socially organized endeavor with the goal of contribution (Rogoff 2014). The teachers specifically guided the children’s attention by pointing out what to harvest and what to leave, which is also described as a feature of LOPI (Rogoff 2014) and as an ‘education of attention’ (Ingold 2000). The building of knowledge and skills was happening along the way of experiencing for all learners – but the teachers took the responsibility for adding on to the collective competence on behalf of the staff and children. This is an example of what Ardoin and Heimlich (2021) calls an environment learningscape framework, where meaningful learning activities in rich environments happens along a line of everyday life. The teachers are agents for what kind of activities, especially outdoor environmental educational activities, are scheduled and executed throughout the year.

## 5. Conclusion and implications for children's eco-citizenship

Foraging and gardening will not happen in kindergarten without teachers who have the knowledge and skills for these kinds of eco-friendly practices. Having competence is not enough; teachers need to have personal engagement, self-reliance, and agency to set these activities into practice. In addition, they must be conscious of how they communicate with the children during the activities to support the children's curiosity, engagement, and learning in the process. Harvesting activities in the natural environment that have the purpose of producing a tasty product teach children the origin of food and the interconnectedness of nature. Children who experience such adventurous and purposeful activities led by competent teachers on a regular basis are more likely to value these eco-friendly habits throughout their lives, and they may also appreciate their local environment and advocate to protect it from exploitation. We believe that foraging and gardening early in life connects the children to the more-than-human world and foster children's development in becoming eco-citizens who care for the natural environment (Heggen et al. 2019). The children's ongoing and repeated connection to nature in these activities, are likely to impact their sustainable actions and even happiness (Barrera-Hernández et al. 2020). In this respect, the teacher is pivotal as a role model for implementing authentic practices that have relevance for environmental, social, and cultural sustainability (Bergan 2019; Bergan et al. 2021). The teachers' decisions on what kinds of activities are pursued outdoors in kindergarten affect the children's opportunity to build habits and agency as eco-citizens. Local knowledge on how to produce and harvest food is relevant in a future threatened by climate crises and restricted global trade. In this sense, the kindergarten teacher can make a huge difference for the youngest generation in terms of sustainability. Further studies are needed to address how children pursue and exert their eco-citizenship later in life after attending gardening and foraging activities in kindergarten.

### Note

1. Geitrams is Norwegian for Rosebay willowherb and starts with the word "geit," which is "goat" in English.

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### References

- Ardoin, N. M., and A. W. Bowers. 2020. "Early Childhood Environmental Education: A Systematic Review of the Research Literature." *Educational Research Review* 31: 100353. doi:10.1016/j.edurev.2020.100353.
- Ardoin, N. M., and J. E. Heimlich. 2021. "Environmental Learning in Everyday Life: Foundations of Meaning and a Context for Change." *Environmental Education Research* 27 (12): 1681–1699. doi:10.1080/13504622.2021.1992354.
- Barrera-Hernández, L. F., M. A. Sotelo-Castillo, S. B. Echeverría-Castro, and C. O. Tapia-Fonllem. 2020. "Connectedness to Nature: Its Impact on Sustainable Behaviors and Happiness in Children [Original Research]." *Frontiers in Psychology* 11: 276. doi:10.3389/fpsyg.2020.00276.
- Bascopé, M., P. Perasso, and K. Reiss. 2019. "Systematic Review of Education for Sustainable Development at an Early Stage: Cornerstones and Pedagogical Approaches for Teacher Professional Development." *Sustainability* 11 (3): 719. doi:10.3390/su11030719.



- Beames, S., and M. Brown. 2016. *Adventurous Learning: A Pedagogy for a Changing World*. New York and London: Routledge.
- Bergan, V. 2019. "Hvordan Kan Økologisk Dyrking Bidra Til Bevissthet for Bærekraft?" In V. Bergan & K. E. W. Bjørndal (Eds.), *Bærekraft i Praksis i Barnehagen* (pp. 99–114). Oslo: Universitetsforlaget.
- Bergan, V., I. W. Krempig, T. A. Utsi, and K. W. Bøe. 2021. "I Want to Participate—Communities of Practice in Foraging and Gardening Projects as a Contribution to Social and Cultural Sustainability in Early Childhood Education." *Sustainability* 13 (8): 4368. <https://www.mdpi.com/2071-1050/13/8/4368>. doi:10.3390/su13084368.
- Braun, V., and V. Clarke. 2021. "One Size Fits All? What Counts as Quality Practice in (Reflexive) Thematic Analysis?" *Qualitative Research in Psychology* 18 (3): 328–352. doi:10.1080/14780887.2020.1769238.
- Brühlmeier, A. 2010. *Head, Heart and Hand: Education in the Spirit of Pestalozzi*. Cambridge: Open Book Publishers.
- Chipeniuk, R. 1998. "Childhood Foraging as Regional Culture: Some Implications for Conservation Policy." *Environmental Conservation* 25 (3): 198–207. doi:10.1017/S0376892998000253.
- Creswell, and Guetterman, T. C. 2021. *Educational Research: planning, Conducting, and Evaluating Quantitative and Qualitative Research* (Sixth edition Global edition.). Harlow: Pearson Education Limited.
- Davies, R., and P. Hamilton. 2018. "Assessing Learning in the Early Years' Outdoor Classroom: Examining Challenges in Practice." *Education 3-13* 46 (1): 117–129. doi:10.1080/03004279.2016.1194448.
- Eggebo, H. 2020. "Kollektiv Kvalitativ Analyse." *Norsk Sosiologisk Tidsskrift* 4 (2): 106–122. doi:10.18261/issn.2535-2512-2020-02-03.
- Elliot, S., Årlemalm-Hagsér, E., & Davis, J. (Eds.). 2020. *Researching Early Childhood Education for Sustainability: Challenging Assumptions and Orthodoxies*. London: Routledge.
- Grindheim, L. T. 2021. "Exploring the Taken-for-Granted Advantage of Outdoor Play in Norwegian Early Childhood Education." In L. T. Grindheim H. (Eds.), *Outdoor Learning and Play: Pedagogical Practices and Children's Cultural Formation* (pp. 129–144). Springer International Publishing. doi:10.1007/978-3-030-72595-2\_8.
- Heggen, M. P., and A. M. Lynngård. 2021. "Curious Curiosity—Reflections on How Early Childhood Lecturers Perceive Children's Curiosity." *Outdoor Learning and Play* 183: 183–201. doi:10.1007/978-3-030-72595-2\_11.
- Heggen, M. P., B. M. Sageidet, N. Goga, L. T. Grindheim, V. Bergan, I. W. Krempig, T. A. Utsi, and A. M. Lynngård. 2019. "Children as Eco-Citizens?" *Nordic Studies in Science Education* 15 (4): 387–402. doi:10.5617/nordina.6186.
- Herrington, S. 1998. "The Garden in Fröbel's Kindergarten: Beyond the Metaphor." *Studies in the History of Gardens & Designed Landscapes* 18 (4): 326–338. doi:10.1080/14601176.1998.10435556.
- Ingold, T. 2000. *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*. London and New York: Routledge.
- Jickling, B., S. Blenkinsop, M. Morse, and A. Jensen. 2018. "Wild Pedagogies: Six Initial Touchstones for Early Childhood Environmental Educators." *Australian Journal of Environmental Education* 34 (2): 159–171. doi:10.1017/aee.2018.19.
- Keith, K. 2005. "Childhood Learning and the Distribution of Knowledge in Foraging Societies." *Archeological Papers of the American Anthropological Association* 15 (1): 27–40. doi:10.1525/ap3a.2005.15.27.
- Koloszuki Maciel, K. F., M. D. Fuentes-Guevara, C. da Silva Gonçalves, P. M. Mendes, E. Gomes de Souza, and L. B. Corrêa. 2022. "Mobile Mandala Garden as a Tool of Environmental Education in an Early Childhood School in Southern Brazil." *Journal of Cleaner Production* 331: 129913. doi:10.1016/j.jclepro.2021.129913.
- Lave, J., and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.
- MacDonald, C. 2012. "Understanding Participatory Action Research: A Qualitative Research Methodology Option." *The Canadian Journal of Action Research* 13 (2): 34–50. doi:10.33524/cjar.v13i2.37.
- MacQuarrie, S., C. Nugent, and C. Warden. 2015. "Learning with Nature and Learning from Others: Nature as Setting and Resource for Early Childhood Education." *Journal of Adventure Education and Outdoor Learning*, 15 (1): 1–23. doi:10.1080/14729679.2013.841095.
- Marín Murcia, J. P., and M. J. Martínez Ruiz-Funes. 2020. "Froebel and the Teaching of Botany: The Garden in the Kindergarten Model School of Madrid." *Paedagogica Historica* 56 (1-2): 200–216. doi:10.1080/00309230.2019.1622578.
- Meier, D., and S. Sisk-Hilton. 2017. "Nature and Environmental Education in Early Childhood." *The New Educator* 13 (3): 191–194. doi:10.1080/1547688X.2017.1354646.
- Miller, D. L. 2007. "The Seeds of Learning: Young Children Develop Important Skills through Their Gardening Activities at a Midwestern Early Education Program." *Applied Environmental Education & Communication* 6 (1): 49–66. doi:10.1080/15330150701318828.
- Ministry of Climate and Environment [MCE] 1957. Outdoor recreation act. <https://www.regjeringen.no/en/dokumenter/outdoor-recreation-act/id172932/>
- Norwegian Directorate for Education and Training 2017. *Framework plan for kindergartens*. <https://www.udir.no/globalassets/filer/barnehage/rammeplan/framework-plan-for-kindergartens2-2017.pdf>
- Nugent, C., and S. Beames. 2015. "Cultural Transmission at Nature Kindergartens: Foraging as a Key Ingredient." *Canadian Journal of Environmental Education* 20: 78–91.
- Pecaski McLennan, D. M. 2010. "Ready, Set, Grow!" Nurturing Young Children through Gardening." *Early Childhood Education Journal* 37 (5): 329–333. doi:10.1007/s10643-009-0366-4.

- Petrou, S., and K. Korfiatis. 2022. "Transformations of Children's Environmental Conceptions through Their Participation in a School Kitchen-Garden Project." *Environmental Education Research* 28 (4): 524–544. doi:10.1080/13504622.2022.2051440.
- Ramanathan, G., D. Carter, and J. Wenner. 2021. "A Framework for Scientific Inquiry in Preschool." *Early Childhood Education Journal* 50 (7): 1263–1277. doi:10.1007/s10643-021-01259-1.
- Rogoff, B. 2014. "Learning by Observing and Pitching in to Family and Community Endeavors – An Orientation." *Human Development* 57 (2-3): 69–81. <https://www.jstor.org/stable/26764709>. doi:10.1159/000356757.
- Rogoff, B., E. Matusov, and C. White. 1996. "Models of Teaching and Learning: Participation in a Community of Learners." In *Handbook of Education and Human Development* (pp. 388–414). Oxford: Blackwell.
- Rogoff, B., L. Moore, B. Najafi, A. Dexter, M. Correa-Chávez, and J. Solís. 2007. "Children's Development of Cultural Repertoires through Participation in Everyday Routines and Practices." In *Handbook of Socialization: Theory and Research*. (pp. 490–515). New York: The Guilford Press.
- Runesson Kempe, U. 2019. "Teachers and Researchers in Collaboration. A Possibility to Overcome the Research-Practice Gap?" *European Journal of Education* 54 (2): 250–260. doi:10.1111/ejed.12336.
- Rymanowicz, K., C. Heatherington, and B. Larm. 2020. "Planting the Seeds for Nature-Based Learning: Impacts of a Farm-and Nature-Based Early Childhood Education Program." *International Journal of Early Childhood Environmental Education* 8 (1): 44–63.
- Sandseter, E. B. H., and O. B. Lysklett. 2018. "Outdoor Education in the Nordic Region." In C. Ringsmose & G. Kragh-Müller (Eds.), *Nordic Social Pedagogical Approach to Early Years. International Perspectives on Early Childhood Education and Development* (pp. 889–906). Cham: Springer.
- Silverman, D. E. 2020. *Qualitative Research*. London: Sage.
- Skalstad, I., and E. Munkebye. 2021. "Young Children's Questions about Science Topics When Situated in a Natural Outdoor Environment: A Qualitative Study from Kindergarten and Primary School." *International Journal of Science Education* 43 (7): 1017–1035. doi:10.1080/09500693.2021.1895451.
- Solly, K. 2014. *Risk, Challenge and Adventure in the Early Years: A Practical Guide to Exploring and Extending Learning Outdoors*. London: Routledge.
- Statistics Norway 2022. *Barnehager [kindergartens]*. <https://www.ssb.no/utdanning/barnehager/statistikk/barnehager>
- Torquati, J., K. Cutler, D. Gilkerson, and S. Sarver. 2013. "Early Childhood Educators' Perceptions of Nature, Science, and Environmental Education." *Early Education & Development* 24 (5): 721–743. doi:10.1080/10409289.2012.725383.
- Utsi, T. A., K. W. Bøe, and I. W. Krempig. 2019. "Vill Mat i Barnehagen - Kompetanseutvikling i Fellesskap." In V. Bergan & K. E. W. Bjørndal (Eds.), *Bærekraft i Praksis i Barnehagen* (pp. 115–136). Oslo: Universitetsforlaget.