



How Kindergarten Teachers Support Nascent Understanding of Sustainable Development Among Children – A New Label on an Old Practice?

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Abstract

The purpose of this study is to investigate in what ways kindergarten teachers explain their understanding and practices of education for sustainable development. The study uses the term “green sustainability” to refer to the concept of caring for nature, the environment, and the earth’s climate in ways which meet basic human needs and preserve them for future generations. The data are generated from six focus groups conducted in 2020. The sample is comprised of 23 kindergarten teachers representing six kindergartens. Analyses of the data material revealed the following theme-based categories: 1) digital, multimodal resources, 2) experiences in nature, 3) from farm to fork, 4) sorting garbage and food waste, and 5) avoiding waste. The findings indicate that existing practices are largely in accordance with longstanding traditions within the kindergartens. The study also indicates that there is a need for critical and reflective practices to meet the needs of children in developing a nascent understanding of sustainable development. Currently, 21st century skills that can be applied to sustainability challenges include critically evaluating different pieces of information, connecting knowledge, collaborating creatively, and communicating across disciplines.

Keywords: *ECEC; education for sustainable development; future skills; UN goals*

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Introduction

Background

This study aims to examine how kindergarten teachers express their understandings of sustainable development education and their pedagogical practices related to the nascent understanding of children regarding how they use, protect, and preserve nature. In the UN article, “The 17 Goals”, Goal 12 (UN, 2015, “Responsible Consumption and Production: Ensuring Sustainable Consumption and Production Patterns”) and Goal 15 (UN, 2015, “Rural Life: Protecting, Restoring and Promoting Sustainable Ecosystems, Ensuring Stable Forest Management, Combating Desertification, Stopping and Reversing Land Depression and Stopping Losses of Species Diversity”) are applied to the kindergarten context. Further, Goal 4 (UN, 2015, education) is highlighted to ensure inclusive, fair, and good education and promote opportunities for lifelong learning for all.

The research objective of this study is to investigate in what ways kindergarten teachers explain their understanding and practices of education for sustainable development. The method for data collection is focus groups, and the scientific theoretical point of view is hermeneutics, with an assumption that the Framework Plan for the Kindergarten’s direction from 2017 regarding sustainability (Norwegian Directorate for Education and Training, 2017), will make us able to find practices under development.

Based on the challenges in society regarding sustainable development education, at both the micro and macro levels, the Norwegian government issued a mandate for kindergarten teachers that includes guidelines for supporting the nascent understanding of sustainable development among Norwegian children (Norwegian Directorate for Education and Training, 2017). Children are being educated for a future that may be radically different than the present, and additional sustainability skills will be essential in a changing world (Sommer, 2015).

The Norwegian Kindergarten Act and its regulations are rooted in respect for human dignity and nature. Its aim is to empower children to unfold within themselves creative joy, wonder, and the urge to explore. In doing so, they must learn how to take care of themselves, each other, and nature. The act states that children shall develop basic sustainability knowledge and skills and engage in activities adapted to their age and condition. However, research on how kindergarten teachers educate children about sustainable development is quite limited (Heggen et al., 2019).

Teachers serve as pedagogical leaders who are responsible for the children and staff in their wards. Specifically, kindergarten teachers are responsible for planning, implementing, facilitating, and evaluating the content of kindergarten programmes (Håberg, 2016). The UN defines the concept of sustainability to include 1) economic, 2) social, 3) environmental and climate sustainability (UN, 2015). As researchers, our perspectives are connected to environmental and climate sustainability, which we, with the support of Chawla’s (2009, p. 6) description “growing up green”, are termed as green sustainability in this study.

Tradition and societal mandates

Kindergarten teachers taking a green sustainability perspective in their educational practices is not new. Contact with nature is a central part of the kindergarten pedagogy and can be traced back to Friedrich Froebel, who established the first kindergarten in Germany in 1837 (Wallström, 1992). The term “kindergarten” refers to a learning environment where children should be protected and safe, like a seed that grows in a sheltered garden (Wallström, 1992). According to Froebel, the key components of kindergarten should be various outlets for play and gardening. In the daily programme, children should be in the garden, keeping the playground free from clutter, picking up stones, and raking leaves. The most important aspect of the kindergarten programme is the children’s experience of nature rather than the work itself (Wallström, 1992). This tradition of promoting sensory experience and closeness to nature is strongly anchored in Nordic kindergarten pedagogy (Broström, 2004). The Norwegian kindergarten tradition can be understood as fulfilling aspects of the UN Sustainability Goals 12 and 15 by educating children to be responsible consumers and to protect ecosystems through sustainable use.

Another common traditional feature of Norwegian kindergartens is that they are governed, to a small extent, by societal directions (e.g. laws and frameworks). However, when the first formal guideline, “Targeted work in the kindergarten,” was established, nature experiences were emphasised as a central (Ministry of Family and Consumer Affairs, 1982). All framework plans for kindergarten (1996, 2006, 2011, and 2017) emphasise contact with nature. According to the first framework plan, kindergarten is responsible for “giving children a basic understanding of connections in nature” (Ministry of Children and Families, 1996, p. 84). The 2011 framework plan for kindergarten highlights the goal for children to gain a nascent understanding of the importance of sustainable development (Ministry of Education and Research, 2011).

With respect to the mandates given to kindergarten teachers, this article does not present green sustainability as something new but rather as a concept that has increased in importance and has been given more weight with the current framework plan of 2017. Working with sustainability is part of kindergarten values: “Kindergarten shall promote democracy, diversity and mutual respect, equality, sustainable development, life skills, and health” (Norwegian Directorate for Education and Training, 2017, p. 7). The concept of green sustainability is not specifically included in the framework, but knowledge of sustainable development that applies to nature and the environment is emphasised in one of the seven subject areas that the kindergarten curriculum is required to address. Kindergarten shall enable the children to “learn about nature and sustainable development, learn from and develop respect for nature, and gain an early understanding of nature conservation” (Norwegian Directorate for Education and Training, 2017, p. 52).

Education for sustainability

The national framework plan, which is the foundation for kindergarten education and the main direction for kindergarten teachers in Norway, is part of the formal formulation arena (Lindensjö & Lundgren, 2000). Formal societal directions highlight the need for a critical look at practice, or what is defined as the realisation arena, to examine the content that children encounter every day in kindergarten (Håberg, 2016). Kindergarten is the first step in the Norwegian educational system, and UNESCO (2010) points out that education is the most powerful path to sustainability. According to Sinnes (2015), it is not enough to rely solely on technological, political, or financial directions, because society needs a fundamental change in how to think and act. The UN Goal 4 highlights the teaching requirements for education for sustainable development (UN, 2015).

Working towards the development of sustainable competence in children takes place within the framework of the overriding purpose of kindergarten, which is *Bildung*. *Bildung* is not defined in either the Kindergarten Act or the framework plan (Ministry of Education and Research, 2005; Norwegian Directorate of Education and Training, 2017). *Bildung* in the Nordic kindergarten tradition builds upon the pedagogy constructed by Froebel, among others (Broström, 2004). Central to this approach is that the content of an educational programme is crucial for supporting the *Bildung* processes of children (Klafki, 2002). Educational institutions, such as schools and kindergartens, must therefore think carefully about what content young children shall encounter in education (Håberg, 2016).

Sinnes (2015) notes that education on sustainable development needs to be taught in a holistic way in which the different components are interconnected. She also highlights the need for different types of knowledge: 1) education *about* sustainable development, which is relevant factual knowledge, 2) education *for* sustainable development, such that kindergarten children are enabled to live their lives more sustainably, 3) education *in* the environment by using local areas as a learning arena, and lastly, 4) education *as* sustainable development, in which the kindergarten becomes a learning arena that contributes to everyday sustainable practices. Sharing factual knowledge is very easy; however, all four types of knowledge are necessary for education to support in-depth learning and develop a pedagogical practice that allows opportunities for change and innovation. Sinnes (2015) encourages educators to help children learn to live sustainably through the development of a range of competencies, such as action competence and faith in the future. If we take on this challenge, it will have consequences for how we educate and facilitate the professional development of teachers, which will have an impact on their further reflection on their *Bildung* perspectives and their pedagogical practice.

Research perspectives

Studies have taken both local and global perspectives to examine education for sustainable development (Heggen et al., 2019; Tejedor et al., 2019). Moreover, the research field is

changing from viewing sustainability as one-dimensional to consisting of several dimensions in terms of educating young children (Grindheim et al., 2019). In addition, didactical perspectives are being investigated, as in Sageidet (2014), for example, who examines teachers' understandings of sustainability and how these are reflected in their teaching methods. Sageidet found that teachers require more competence in this area to ensure that children have opportunities to participate in real-life experiences in inquiry-based education. Thus, kindergarten teachers need interdisciplinary approaches to provide children with experiences and a growing understanding of the earth (Sageidet, 2014, p. 48).

Hedefalk et al.'s (2015) meta-study concludes that only a few studies investigate how teachers implement sustainability education in kindergarten and primary school, teachers' didactic practices, or how learning about sustainability develops in children. The results from this meta-study indicate that education for sustainable development often is taught in a traditional, production-based educational system that focuses on normative knowledge. The authors (Hedefalk et al., 2015) also find that the educational focus may easily fail to engage young children in critical thinking, become more aware of their values, solve challenges in creative ways, discuss complex problems, and become innovative, with an optimistic view of the future. They point out that there is a particular need for studies with didactic approaches investigating how teachers' sustainability competence in kindergartens and schools can help them develop a more powerful, research-based practice (Hedefalk et al., 2015). Against this background, it is desirable to have more research based on teachers' experiences and reflections in working towards green sustainability.

However, some studies in the Norwegian context have been less concerned with teachers' experiences and practices and have placed greater emphasis on children's benefit from learning about green sustainability. Melis et al. (2020) interviewed 56 children from eight kindergartens and concluded that at the end of kindergarten, the five-year-olds had gained an early understanding of environmental sustainability. Activities and measures towards this, as highlighted by the staff through a short survey, included picking up rubbish in nature, re-cycling material, re-using items, and saving water or energy, in addition to spending several hours each week in nature. In contrast, Bergan et al. (2021) used focus groups with kindergarten staff to investigate how they perceive the children's reactions to various measures and activities aimed at promoting green sustainability. The five focus groups varied in size from two to six informants. These activities included taking part in the whole gardening process, from sowing seeds to growing a plant that you can prepare and eat, as well as learning to gut fish. The study builds on the work with green sustainability as project work and highlights that when staff have the chance to work together, it is inspiring and educational. What Melis et al. (2020) and Bergan et al. (2021) have in common, is that the main emphasis is on concrete activities and measures when working with green sustainability. In some international studies, such as the meta-study of Ardoin and Bowers (2020) and Chawla (2020), considerable emphasis is placed on children's opportunities to connect with

nature and learn to appreciate it. A significant correlation is shown between contact with nature as a child and commitment to working for the conservation of nature as an adult.

With this background in place, it is relevant to investigate in more detail how kindergarten teachers facilitate children's contact with nature and other activities geared towards their development of competence in green sustainability. Based on this knowledge background and earlier research in the field, our research questions are:

- **In what ways do kindergarten teachers express their understanding of education for sustainable development, and how do they explain their practice**

Method

Design

This qualitative study investigates in what ways kindergarten teachers explain their understanding and practices of education for sustainable development. Its design uses focus groups to generate the data. Since the knowledge regarding how kindergarten teachers understand, plan, and conduct education for sustainable development in a kindergarten context is minimal, this study has an explorative design, with the researchers taking a hermeneutic position (Befring, 2015). Our prediction was that the implementation of new sustainability education mandates in the Framework Plan for Kindergartens would face challenges, as it takes time to implement educational practices in response to a top-down directive from the national framework plan. We aimed to investigate the kindergarten teachers' understanding and practice of education for sustainable development in an open-minded way.

The objective was to use focus groups to investigate the understanding among kindergarten teachers of education for sustainable development and how they address the challenges of instilling the values, attitudes, and actions related to sustainability in their students. The core idea in the focus groups was that two heads think better than one, and that a comprehensive group dynamic can arise in this discussion forum. In this way, interesting information and experiences could be obtained through the discussion of collective opinions among the teachers (Tjora, 2019; Wilkinson, 1998). As Puchta and Potter (2004) describe, the aim of this study required the focus groups to have two main elements: first, a moderator who poses thematic questions, and second, an aim to bring out the attitudes, perceptions, and feelings related to education for sustainable development.

Sample

Six kindergartens were randomly selected and contacted by telephone. The recruitment was conducted in a manner that allowed the research team to construct homogeneous groups at approximately the same level of education. Participation was voluntary, and all

the teachers signed consent forms. To determine both individual and institutional levels, all teachers across the six kindergartens were invited to participate in the focus groups. Halkier (2015) notes that there can be social control in focus groups that can cause the participants to feel insecure and unfree. Therefore, we did not select the groups based on the entire staff, but rather chose teachers with bachelor's degrees who were working as pedagogical leaders, since it is recommended to form homogeneous focus groups in order to more easily facilitate discussions (Halkier, 2015; Tjora, 2019).

The selected kindergartens were to have wards for both young children (0–3 years) and older children (3–5 years). This resulted in a selection of fewer participants than the often-recommended 6–12 persons group. However, Krueger (1994) notes that smaller focus groups, with 3–4 participants, may also be successfully used among topic specialists. The sample was defined as a cluster. First, kindergartens with three or more wards were selected, and all the leaders of these wards were then recruited. In total, the sample consists of six kindergartens, each with a group of 3–5 teachers that work together. The data were collected during January 2020, and six focus group interviews were conducted with a total of 23 participants. The focus groups were divided as follows:

Groups	Kindergarten	Participants
1 st Focus Group	Kindergarten A	4 teachers
2 nd Focus Group	Kindergarten B	3 teachers
3 rd Focus Group	Kindergarten C	4 teachers
4 th Focus Group	Kindergarten D	4 teachers
5 th Focus Group	Kindergarten E	4 teachers
6 th Focus Group	Kindergarten F	4 teachers
In total: 6 Focus groups	6 kindergartens	23 teachers

Figure 1. The participants

Planning and conducting

First, the participants were informed about the study, and a comfortable and safe atmosphere was created; yet this phase had to be short. The participants were notified that their personal information would be secure, when the audio files would be deleted, that all information would be anonymised, and they were informed that participation was voluntary.

Two research team members conducted the focus group interviews, one serving as a moderator and another taking notes and serving as a technical assistant. After a short introduction that the 2017 framework plan highlighted green sustainability and how we must live today in ways that will ensure that those who come after us will be as well off as we are. The first theme in the study was about their didactic practices, and the second theme was about their reflections according to their practices. Follow-up questions from the moderator were aimed at expanding the answers or making them more concrete.

The moderator ensured that the social interactions in the groups were positive and constructive, which Befring (2015) points out is very important. The moderator served as a leader to move the discussions forward but did not engage in them. This person was responsible for the schedule, maintaining the discussion flow, and ensuring that the discussions were relevant to the topic.

Analysis

Before the analysis, the discussions of the six focus groups were transcribed. There was some initial concern regarding who said what, but quickly it became clear that the opinions, views, experiences, and group opinions were the most important aspects. Content analysis was chosen because the questions were analysed in the context of meetings with different people and their discussion patterns in order to gain an overview of the material, the overall discussions, which topics created the most interest, and how the opinions were formed (Befring, 2015).

The team started with a deductive data-driven analysis by reading and re-reading, categorising, and re-categorising. This iterative process (Thagaard, 2018) resulted in the following five categories: 1) theme work and digital, multimodal resources, 2) experiences in nature, 3) from farm to fork, 4) sorting garbage and food waste, and 5) avoiding waste.

Inspired by Richards (2009), the research team sought to ensure reliability by having thorough procedures in all parts of the research and being transparent and accurate in our procedures to ensure that the data had strong validity. According to Maxwell (1992), qualitative studies gain validity by describing exactly what the participants express, defining theoretical concepts precisely, and interpreting meanings from the participants' perspectives. To achieve this, the moderator repeated the participants' answers and asked if they were correctly perceived, in a process of "member checking." Furthermore, factors that could affect the validity were avoided, e.g. a situation where the researchers sat in the focus group room. The team clarified that the participants could state their opinions freely and that the objective of this explorative approach was to listen and learn from each other. It was important to convey to the participants that a supposed correct answer was not the goal of the conversation. However, in all the groups, the participants shared "how we usually do it in our kindergarten" and came up with short stories from their daily practices.

Empirical findings

The moderator asked about the participants' didactic practices and their reflections on these in relation to education for sustainable development. None of the participants were questioned about what green sustainability indicates or whether sustainable development belongs in the kindergarten's social mandate. In every group, the participants immediately began to talk about what they do in their everyday kindergarten practice and what specific

activities and measures they plan and conduct together with the children. We interpret this as tacit knowledge and a weakly expressed sense of understanding of sustainability. We see this in statements such as, “this theme [green sustainability] we work with is purely practical with the kids” (Kindergarten A).

The participants’ understanding of the concept of green sustainability was first expressed in the examples they presented of concrete measures, activities, and reflections, stating “we work actively with it” (Kindergarten D). Only one of the 23 participants had completed continuing education with a focus on green sustainability. She and several other participants point to the lack of time and sufficient staff as obstacles to working even more with education for sustainable development. Their stories were often about tight schedules.

Theme work and digital, multimodal resources

The study finds examples of learning about sustainable development mainly through thematic work and the use of media. With regards to theme work, the participants pointed out the ways they work with sustainable development. One teacher expressed, “we do not have much of it, I just have to say, very little focus on [such thematic work]. It ... has been set aside a bit” (Kindergarten D). Some participants said that they “may have good intentions,” but every day “disappears into nothingness” (Kindergarten D).

The participants also expressed that in the thematic work, kindergarten or preschool television programmes are seen as useful and relevant to sustainable development. The participants emphasised that they have, for many years, benefited from various environmental programmes about “caring for nature” (Kindergarten E). These programmes have been useful because “it actually starts there, because we had to sort plastic, paper, residual waste” (Kindergarten B). As an example, the participants discussed a television programme called *Svanhild*: “*Svanhild*, it is an environmental programme adapted to preschool children” (Kindergarten E).

Some of the kindergarten teachers expressed that it is not feasible to use such an environmental programme, as sometimes, “it is a bit difficult for the children” (Kindergarten E). Some of the teachers also mentioned that using these programmes means they must spend time getting to know the content, which can be challenging to fit into their busy schedules. When it comes to using the media to learn about green sustainability, the participants pointed to various films from *Miljøplaneten* found on TV for children, stating, “we have watched different films” (Kindergarten E). In particular, the channel NRK Super was highlighted as relevant in their teaching of sustainable development.

Experiences in nature

The participants gave several examples of how they promote education for sustainable development through walks in the local environment around the kindergartens. Three of the kindergartens are located close to a beach, and the teachers facilitate trips to these

beaches to allow the children to track the seasons and experience the wildlife on land and in the sea. In this way, children also become familiar with maritime fishing, and being close to the sea is common for some of the kindergartens in the sample. In addition, the teachers facilitate regular hiking days with walks in the local area, along the road, or in nature. The participants also mentioned that for the five-year-olds, the oldest age group, the trips become longer and more demanding so that they get to experience various landscapes. Furthermore, the participants noted that talking to the children about what they are experiencing and linking this directly to sustainable development can take place on such trips. Kindergarten C participants emphasised that they often talk about “what is broken down and what is left lying around” when they go for walks with the children, and further that “the children are good if we only make them aware that it is not okay [to throw something in nature].” This is interpreted as a continuation of the kindergarten culture, with the kindergarten teachers at the forefront, as the sustainability goals of the UN state (UN, 2015).

“From farm to fork”

Participants in the study stated that in all the kindergartens, there is some form of growing vegetables and picking fruit and berries in season. In the kindergartens, they use pallet frames and large black buckets for the easy cultivation of potatoes and carrots. Most kindergartens make vegetable soup in the autumn. Furthermore, the kindergartens use nearby resources in the local community, such as forests and local private gardens, to pick blueberries, apples, plums, and currants. For example, Kindergarten D has an autumn tradition of using self-picked blueberries in jams and pancakes. Kindergarten B has implemented the theme of wild growth, and in that context, they make dandelion biscuits with the children. The teachers stated, “it was great, you know, going out and picking dandelions, they [the kids] were so excited!” (Kindergarten B).

The participants also noted the utilisation of other local resources to show the children where food comes from. In Kindergarten D, they made sausages with the children. Three of the kindergartens collaborated with local fishermen so that the children could take part in the process from fish in the sea to food on the table. “Every year we go onboard a fishing boat, for example, because usually, someone has a father or grandfather [who is a fisherman], so then we ... see how things are done” (Kindergarten B). The participants mentioned that the children take part in gutting the fish and making fish cakes in the kindergarten afterward. They emphasised that they try to convey to the children “where the food comes from and that it does not grow in the stores.” They point out that “the milk does not come from the shop and the meat does not come from the grocery store” (Kindergarten B).

The participants emphasised that they want to convey to both children and employees that it is possible to go out into nature and pick and harvest, but the challenge is finding time to implement this, stating, “it’s almost like getting a bad conscience” (Kindergarten B).

At the same time, the desire was there to do much more. There was also a desire for more time to cook from scratch. One of the kindergartens tried to make compost, “but it was too much work to keep on with” (Kindergarten F). Instead, the participants expressed a desire to try out bokashi, but this was only at the “thinking stage” (Kindergarten F) because it is challenging to find time to implement this and other measures.

Sorting garbage and food waste

The teachers stated that there is daily collection and sorting of rubbish and food waste in all the kindergartens. In every focus group, there was a lot of talk about food waste because they experience that quantities of food must be thrown away daily. Kindergarten D claimed that the food waste in the kindergarten is so large that “we could feed a whole farm!” (Kindergarten D). The participants explained that there are many bread crusts and other leftover food that goes into the trash during the day. They said that they work continuously to prevent food waste and remind the children not to put more food on their plates than they can eat. The participants from Kindergarten B expressed, “we almost forget to mention it [which concerns food waste], it is so incorporated” (Kindergarten B).

The participants pointed out that not all municipalities deliver food waste from institutions. The kindergarten teachers in the areas where this service does not exist stated that they sort daily “plastic, cardboard, paper, but not food waste” (Kindergarten A). In addition, they commented that it is usually the oldest children who pick up rubbish outdoors. Kindergarten A emphasised that children “pick up debris, take it back [to the kindergarten], collect bottles, glasses and such things” (Kindergarten A). Furthermore, they stated that “they [the children] have been so hooked on it, they have really got it under their skin, and they understand that this item should not lie in the ditch” (Kindergarten A). The teachers said that they give the oldest children the task “to be an environmental pioneer! We went to the local community and looked for rubbish and found out what people were throwing in nature” (Kindergarten E). During this activity, they wonder aloud with the children about why these objects were thrown into nature.

Avoiding waste

The participants emphasised that another important practice in creating sustainable habits is caring for toys and books. The staff and children repair damaged items together. The participants pointed out that teaching children how to care for things can counteract opposing social trends. Kindergarten B claimed that “society is such that we can only buy new, there is no problem. It teaches children from day one about, zero problem, if a toy is broken, we get a new one” (Kindergarten B). The ways to teach the children to take care of toys and books they mentioned involve telling them that they must “take care of the toys and the books, do not pull on them, but sit on the sofa when we read” (Kindergarten B).

Kindergarten B claimed that dealing with waste is also a learning point, and children are instructed “not to take more food on the plate than you actually manage to eat. We interpret that this is something that they almost forgot to mention because it is so incorporated” (Kindergarten B).

The main impression from these reports is that in all the focus groups, the participants created a common narrative about the kindergarten’s practice. Their comments were interrelated, and they gave concrete examples of the actions they took to educate children around sustainability. The personal stories they offered during the focus groups also highlighted what was special in this regard for each kindergarten.

Discussion

Existing practice

The main impression from the study is that the participants emphasised that what they teach is learning *for* green sustainability, while learning *about* green sustainability is taught to a much lesser extent. The participants hardly define green sustainability, and no one questioned the meaning of this concept. This understanding, however, is expressed in the actions and activities they discussed. Such an action-oriented understanding of green sustainability can be interpreted as indicating that this concept could be further defined and discussed. It may also indicate a tacit knowledge of the concept but an inability to articulate this knowledge because it is learned implicitly or second-hand, taken for granted, and often forgotten (Chakravarthy et al., 2011).

Tacit knowledge is typical in institutions with tradition as a supporting element (Bøe & Thoresen, 2017). Kindergarten has a rich history of tradition, especially before the introduction of the first framework plan for kindergarten in 1996 (Ministry of Children and Family, 1996). A relevant question therefore may be whether kindergarten traditions function as a hidden curriculum (Berg, 1995). The hidden curriculum is a collective term for how pedagogical heritage functions as a “frozen ideology” in the form of a dominant value base that constitutes a significant and governing source for the content of a business or organisation. This topic has been investigated to a small degree in the kindergarten field (Håberg, 2016). It is thus relevant to explore the room for action as experienced by pedagogical leaders.

The study finds that kindergarten teachers use several approaches in their work towards sustainable development, including 1) theme work and digital, multimodal resources, 2) experiences in nature, 3) from farm to fork, 4) sorting garbage and food waste, and 5) avoiding waste. Approaches 2–5 offer various ways to use, protect, and preserve nature (UN, 2015). The kindergarten teachers make it possible for the children to experience nature by sowing and harvesting their own food and making trips to different biotopes in various seasons. They also teach children to protect nature by picking up rubbish and learning

to take care of material things. These approaches may be interpreted as implementing UN Goals 12 and 15. The kindergarten teachers try to educate the children on responsible consumption according to the UN's goals (UN, 2015), which contributes to the strengthening of sustainable consumption and production practices (UN, 2015, Goal 12). They also work to promote the sustainable use of ecosystems (UN, 2015, Goal 15) by bringing children in contact with nature. Together, these ways of experiencing and protecting nature contribute to building a foundation for green sustainability.

Most of the activities and initiatives the pedagogical leaders stated they carry out appeared in all the participating kindergartens. The participants were in no way prompted to refer to these approaches, as our question of green sustainability was very open-ended and explorative (Befring, 2015). A large degree of consensus between disconnected kindergartens in several municipalities, with no or little contact between them, can be interpreted as indicating that the activities and initiatives that the participants discussed are an integral part of the kindergarten tradition (Bergan et al., 2021; Melis et al., 2020). The tradition from Froebel and the later Nordic kindergarten tradition highlights children's contact with nature as a valuable part of the kindergarten curriculum (Wallström, 1992).

The teachers' formulation arena (Lindensjö & Lundgren, 2000) that applies to green sustainability has been strengthened and made clearer since 2017, but there is little research on the extent to which practice, or the realisation arena, has changed in kindergartens and primary schools (Munkeby et al., 2020). It is possible that existing practices can both inhibit and promote work with green sustainability. On the one hand, traditions can be inhibiting when they are continued without reflecting on why they exist. Thus, patterns and habits can present obstacles for pedagogical leaders (Berg, 1995) because they unnecessarily exclude alternative approaches in their work with green sustainability. On the other hand, when traditions become the starting point for reflection and critical thinking, they can promote work with green sustainability (Bøe & Thoresen, 2017).

According to Argyris (2000), correcting a course without questioning its underlying values is equivalent to individual circuit learning in an organisation. Double-loop learning means correcting by first examining and changing what governs a behaviour, such as the actual interpretations and values of a person. Both single-loop and double-loop learning are necessary, according to Argyris (2000), because single-loop learning can be used for routines and repetitions, while double-loop learning is appropriate for dealing with complex challenges. Working with green sustainability is a complex challenge, especially considering the current environmental and climate issues, which the UN also emphasises (UNESCO, 2010). Traditionally, approaches to work with a green sustainability practice can be characterised by a lack of words and terms to describe the concept, as presented in the current study. However, by reflecting on why the practice is the way it is, kindergarten teachers can use a double-loop learning approach, which can raise awareness of how to educate children and prepare them for an uncertain future.

Educating for teaching green sustainability

The findings in this study point to several challenges for kindergarten teachers in educating about sustainable development. Including sustainability in their teaching is, as highlighted in UN (2015) Goal 4, good education. Good education is defined by the UN as inclusive and fair, promoting opportunities for lifelong learning. The participants in the focus groups talked about the sources of their impulses and which factors inspire them to develop their practices. It appears that their practice is strengthened as they are encouraged to continuously engage with professional development relevant to sustainability. It seems that in a stronger way than ever before, they are influenced to continue their professional development from a sustainability perspective. In their work around sustainability, they use knowledge from digital and multimodal resources and develop new didactic practices from these platforms as well as from television programmes for children, which they transform into their work approaches. Moreover, an international focus the teachers echoed was UN (2015) sub-goal 4.7, which emphasises the importance of ensuring that all learners acquire the knowledge and skills needed to promote sustainable development. This includes education around sustainable development and lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship, and an appreciation of cultural diversity and culture's contribution to sustainable development (UN, 2015, Goal 4.7). However, the focus group participants pointed to a lack of time and sufficient staff as obstacles to performing focused, quality work relevant to this goal. Norwegian kindergartens are part of the formal educational system, and these learning processes are seen as part of lifelong learning. The Norwegian Directorate for Education and Learning (2017) imposed a mandate on kindergarten teachers to implement and manage work related to education for sustainable development. The mission of the teachers is to educate children to promote the values, attitudes, and practices towards more sustainable societies (Norwegian Directorate for Education and Training, 2017). Nevertheless, a lack of time and sufficient teachers are factors that inhibit good education for sustainable development. Another factor that teachers expressed as a limitation, was the lack of self-competence. They find themselves in a new paradigm where their traditions are being challenged. The earlier ways of pursuing professional development centred on completing an educational programme. In our sample of 23 kindergarten teachers, only one had completed an actual programme aimed at education for sustainable development. In this work, elements from the education of each kindergarten teacher can have an impact.

New curricula around sustainability have also been developed in teacher education because it takes time to change programmes and their content. Teacher educators thus train kindergarten student teachers to handle and master education for sustainable development. Moreover, teacher educators in universities must also work with their attitudes and values in relation to sustainability; this group of teachers are often defined as hidden professionals (Høydalsvik, 2019).

Our study shows that kindergarten teachers may need support both to articulate and critically assess their own practice. This means that teachers, through their basic education, start to establish their own sustainability competence. The framework plan for kindergarten teacher education (Ministry of Education and Research, 2012) places little emphasis on education for sustainable development. However, a related concept, “nature,” is discussed in the knowledge area of “nature, health and movement,” such that student teachers should learn to facilitate children to take part in nature experiences. Kindergarten teacher education thus gives future pedagogical teachers little support in acquiring knowledge and competence about working with green sustainability. Thus, experience-based knowledge and traditions in the kindergarten field may be prevalent as a knowledge base in this area.

Skills of the 21st century

Teachers educate children who have complex experiences and input from different areas of their lives, including family, kindergarten, and multimodal mass media. Towards the education of sustainable development, there is the question of what skills children and teachers alike need in order to respond to the challenges of and develop skills for the 21st century. The experiences of children and their need to know and understand themselves as participating actors and citizens must be acknowledged. This, in turn, strengthens their fundamental understanding of sustainable development. In a technological society brimming with complex information, critical reflection will be a key competency in this century (Gamlem & Rogne, 2016). Likewise, creativity, such as finding new solutions to challenges related to nature, the environment, and the climate, will also be highly important in the future. The kindergarten teacher is in part responsible for supporting, motivating, and inspiring hope in children and young people. Therefore, preventing and calming climate anxiety and climate shame are other relevant skills for professional kindergarten teachers.

Kindergarten teachers are responsible for educating children for an uncertain future; therefore, it is necessary to ask questions about which knowledge and skills will be most relevant in the future (Sommer, 2015). An approach from the Organisation for Economic Co-operation and Development (OECD, 2018) may be key, as it points to the development of action competence. Action competence work can start with kindergarten teachers critically reflecting on their own practices through development work with double-loop learning (Argyris, 2000). Double-loop learning can also be a tool that reveals the values and attitudes that lie behind the often subconscious traditions and routines of a kindergarten practice. For education for sustainable development to contribute to broader change, the kindergarten must facilitate systemic criticism of the role of kindergartens in society, analyse the social mission, and challenge teacher education to implement its mandate and mission. Kindergarten teachers must educate children for future school and adult life characterised by a sustainable lifestyle placed in local, national, and global contexts

(United Nations, 2015), and *Bildung* must be part of this. The potential for education for sustainable development to become coherent and less dependent upon the individual insight and competence of the teacher is an exciting new development.

Final remarks

The study has investigated in what ways kindergarten teachers explain their understanding and practices of education for sustainable development. The study notes that education for sustainable development is not new in the kindergarten field but is part of the longstanding kindergarten tradition. Yet, through the introduction of the concept of sustainability in the current framework, it has become part of the kindergarten curricula (Lindensjö & Lundgren, 2000). This study questions whether teachers' practices are sufficient for children to develop the necessary skills for the 21st century.

To answer the first part of the study's research question: "In what ways do kindergarten teachers express their understanding of education for sustainable development," this article highlights that sustainable development is quite practical, and only to a small degree do the teachers express the concept verbally. However, the idea of sustainability seems to be expressed as more tacit knowledge. To answer the second part of the study's research question: "How do kindergarten teachers explain their practices," the article points out that teachers continue to implement activities and initiatives which are largely based on tradition and less on the challenges facing society, white paper recommendations, and what the laws demand. As hermeneutical researchers, our prediction have changed, as we now see a larger shift towards practice, which previously only occurred to a small extent (Befring, 2015). The attitudes and values around sustainability are taking hold, but everyday practice has not yet undergone major change in this respect. Therefore, we question whether the tradition has just been given a new label. The implementation processes around sustainability are understood to be complex, yet we found traces of good sustainability didactic practice, and some of the teachers are engaged in professional development processes. Nevertheless, the practice still hangs on the "old labels."

Traditions can be an obstacle to reorientation towards sustainability as opposed to developing a critical reflection on how to work in this area. A reflective approach can be a more critical pedagogy as it dives into the uncomfortable and demanding aspects of this pursuit. Unfortunately, today's kindergarten teacher education does not provide much support for such an approach. More research in the kindergarten field is thus necessary, as it can point to the teachers' dual societal mandate: to work on their own professional development and, at the same time, support children's nascent understandings of sustainable development. To achieve this, it is necessary to know more about what motivates teachers to perform qualitatively well in relation to sustainability education both now and the future.

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