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Reconnecting Pupils with Nature through *udeskole*

Subject-Specific Teaching Practices Supporting *naturdannelse* and Sustainability
Education in Primary Schools

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Abstract:

This thesis investigates how the concept of *naturdannelse*, a nature-oriented *Bildung* process can be realised through *udeskole*, curriculum-based teaching outside the classroom, in primary school Language and Science education. Through a qualitative, practice-based intervention co-developed with two teachers, the study explores how five pathways to *naturdannelse*; experiential, emotional, cognitive, philosophical, and material, were activated through different teaching activities and environments. Findings show that the pathways emerged in subject-specific ways: In the case of the Science subject teaching activities, signs of the experiential, cognitive, and material connections were visible through sensory observation, ecological reasoning, and investigative inquiry. Language teaching cultivated emotional, philosophical, and experiential connections via expressive writing, ethical discussion, and metaphorical reflection. Rather than competing with subject learning objectives, *naturdannelse* enriched them by grounding curricular goals in meaningful, place-based experiences. The study concludes that *udeskole* offers favourable pedagogical conditions for realising *naturdannelse*, and should be viewed as a legitimate method for both disciplinary learning and sustainability education. While limited by scale and context, the findings highlight the potential for schools to utilize *udeskole* to reconnect pupils with nature.

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1. Introduction

1.1 Human-Nature Connections - A Missing Aspect of Today

This thesis asks the question of how the concept of *naturdannelse*, a nature-connected *Bildung* process, can be realised through *udeskole*, a curriculum-based teaching approach outside the classroom, within Language and Natural Science education in primary schools. It further explores the pedagogical opportunities and challenges that emerge through this practice.

The core challenge we face today is not only environmental degradation or climate instability, but a broken relationship between humans and the natural world (IPBES, 2024). The Transformative Change Assessment report (2024) identifies the disconnection of people from nature as one of the three underlying causes of biodiversity loss, the others being the inequitable concentration of power and wealth, and the prioritization of short-term, individual, and material gains. The report positions human-nature connectedness as a powerful strategy for driving the systemic transformations needed to ensure a sustainable future (IPBES, 2024; Richardson, 2023).

This call for transformation is echoed across environmental psychology, human ecology, and sustainability education (Orr, 1994; Chawla, 2007; Clayton et al., 2017). Scholars increasingly argue that resolving ecological crises requires more than behavioural change; it demands cultural and relational shifts in how societies understand and engage with nature. Professor Miles Richardson, lead of the Nature Connectedness Research group, emphasises that dominant cultural norms, economic systems, and institutional structures have entrenched a psychological and cultural disconnection from the natural world. He argues that fostering nature connectedness through education, urban design, and public communication, can help shift societal values toward care, reciprocity, and sustainability (Richardson, 2020, 2023, 2024).

The interdisciplinary field of *human-nature connectedness* encompasses a wide range of academic perspectives that examine how people understand, experience, and engage with the natural world (Ives, et al. 2017). In a systematic review of this literature, Ives et al. (2018) identify five core categories of human-nature connections: 1) material, 2) experiential, 3) cognitive, 4) emotional, and 5) philosophical. These categories capture the multifaceted nature of human-nature connections, showing how our relationships with nature span physical needs, embodied experiences, knowledge and awareness, affective bonds, and ethical or ontological perspectives (Ives, et al. 2018).

Building on this understanding, several scholars argue that education itself represents a deep leverage point for transformative change (Abson et al., 2017; Ives et al., 2019; Richardson, 2023). Rather than merely delivering knowledge, education is seen as capable of shaping how people perceive and relate to nature, offering a critical space to reorient values, behaviours, and worldviews toward sustainability (Abson, et al. 2017). Ives and colleagues (2018) and Richardson (2023) highlight the potential of education not merely to inform, but to reshape the ways people relate to the natural world, making it a critical site for cultivating long term sustainability and care.

In the Scandinavian context, this potential has been articulated through the newly developed Danish concept of *naturdannelse* (Præstholt and Hartmeyer 2021) . *Naturdannelse* can be understood as a nature-oriented *Bildung* process. An approach to education that aims not just to inform but to form the individual in relation to nature (Præstholt and Hartmeyer, 2020). *Naturdannelse* is thus conceptualised as a long-term formative process rooted in the broader educational ideal of *dannelse*.

Developed by Præstholt and Hartmeyer (2021), *naturdannelse* draws directly on Ives et al.'s five categories of nature connections and reworks them as dimensions of a holistic educational goal that cultivates connection to nature through lived experience, emotional depth, and ethical reflection. The five connections; material, experiential, cognitive, emotional, and philosophical are not treated in isolation but seen as mutually reinforcing through the processes and interactions in which individuals actively engage as they build relationships with nature (Ives et al, 2018, Præstholt and Hartmeyer, 2020). *Naturdannelse* is primarily intended for childhood education, as the *Bildung* process is understood to begin early in life, when children's values, perceptions, and ways of relating are first taking shape (Præstholt and Hartmeyer, 2020). It is framed as a long term process in which active engagement must stimulate inner dimensions such as reflection, attention, emotion, and ethical reasoning, in close interaction with more external elements like embodied experience and material engagement with the natural world (Præstholt and Hartmeyer, 2020).

Bildung has long been central to Scandinavian educational thought (Lea 2024). It refers to the holistic development of individuals as knowledgeable, ethically grounded, reflective, and socially responsible members of society (ibid) Unlike literacy, which emphasizes the ability to read and write, *Bildung* encompasses a deeper process of personal growth, critical thinking, and cultural understanding (ibid). As Elbæk et al. (2016) describe the Danish term, *dannelse* involves anchoring values and knowledge through active participation, enabling pupils to orient themselves in the world as considerate, critical, and democratic individuals. In Denmark, where education is explicitly tasked with cultivating the ideals of the future citizen through *Bildung*, *naturdannelse* is proposed as a way to position nature connection within the school's existing ethical foundation (Graf et al., 2023; Præstholt and Hartmeyer 2021). Reconnecting

pupils with nature in a school-context across the five relational dimensions is thus framed as more than an extracurricular concern, but a central and necessary aspect of the school's broader formative mandate (Præstholm and Hartmeyer, 2021).

While sustainability education has been instrumental in raising awareness about climate change, overconsumption, and ecological crises, recent research continues to highlight limitations in its common approaches (Barrable and Booth, 2019a, 2019b, 2020). Many programs rely predominantly on cognitive and normative strategies emphasizing facts, moral responsibility, and prescriptive behaviors often at the expense of emotional and experiential engagement (Liefländer and Bogner 2016; Barrable and Booth, 2019a, 2019b, 2020). Although these methods may build environmental knowledge, they can fall short in fostering the kind of affective connection to nature that research increasingly associates with long-term pro-environmental behaviour (Barrera-Hernández et al., 2020; Chawla, 2020). As Liefländer et al. (2019) point out, fostering connectedness to nature involves more than transmitting information, it requires experiential, situated encounters that resonate personally and emotionally with learners. This suggests a need for sustainability education that not only informs but also transforms, by engaging learners in meaningful, relational experiences with the natural world (Otto, et al. 2019). Rather than beginning with behavioural outcomes, *naturdannelse* starts with how pupils come to perceive, feel, and relate to the more than human world so that nature becomes something they care for intrinsically, not merely something they are told to protect (Præstholm and Hartmeyer 2021).

Although many studies show strong associations between nature connectedness and pro-environmental behaviour, it remains unclear whether this relationship is causal (Kollmuss and Agyeman, 2002; Bergman 2014; Mackay and Schmitt, 2019; Richardson et al., 2020; Zelenski and Nisbet, 2014). The research field lacks a consistent understanding of how nature connectedness operates. Ives and colleagues (2018) argue that 'connection to nature' is not a fixed concept, it is used differently across studies: sometimes as a cause, sometimes as an effect, sometimes as a consequence, and sometimes as a solution. There is growing agreement that human-nature connectedness is correlated with pro-environmental behaviour. As Richardson (2023) notes, individuals with strong nature connectedness tend to both value nature more highly, and also report greater well-being and ecological concern. However, while correlations are well documented (Mayer and Frantz, 2004; Zelenski and Nisbet, 2014) evidence that increasing human-nature connections directly causes these outcomes is still limited and context-dependent (Mackay and Schmitt, 2019; Chawla, 1998; Barrable, 2019a, 2020). This conceptual inconsistency makes it difficult to determine what role nature connectedness actually plays in driving change. To move the field forward, more intervention-based studies are needed. Particularly, there is a need for research that actively creates

opportunities for nature connection and examines whether, and how, these experiences lead to lasting behavioural change.

1.2 Udeskole - Education Outside the Classroom in Scandinavia

Amid growing concerns about children's disconnection from nature, school-based approaches where teaching takes place and integrates learning outdoors have gained increasing attention in both research and practice (Remmen 2022). A prominent example is Education Outside the Classroom (EOtC), an umbrella term referring to teaching that takes place outside the traditional classroom, yet remains embedded within the school curriculum (Remmen 2022). EOtC typically involves learning in local communities, cultural institutions, or natural environments and is defined by its curricular alignment and regularity, distinguishing it from occasional field trips or extracurricular excursions (Remmen 2022). In Scandinavia, EOtC is widespread and often associated with nature-based learning in close proximity to the school (Bentsen et al., 2009; Remmen and Iversen, 2022).

A particularly well-established form of EOtC in the Nordic context is *udeskole* (or *uteskole* in Norwegian), a Nordic term for regular, curriculum integrated teaching that integrates and takes place outside the classroom and school buildings. *Udeskole* is a teaching approach that is typically conducted in nature and greenspace and is characterised by being led by the pupils' own teacher, providing pedagogical continuity, strong teacher student relationships, and subject specific progression (Bentsen et al., 2019). While external experts, such as museum educators or nature guides, may occasionally be involved, the teacher's leadership remains central to the approach. Although *udeskole* is often implemented to support academic goals, particularly those tied to curriculum content, several Danish scholars highlight its broader potential for children's *Bildung* (Præsthalm and Hartmeyer 2021). They emphasize how *udeskole* creates opportunities for deeper engagement with the self, others, and the natural world (Hald and Bærenholdt, 2020).

Udeskole is deeply rooted in place-based education, where learning takes place in specific, meaningful environments outside the classroom (Jordet 1998, 2007; Hald and Bærenholdt, 2020). From a *Bildung* perspective, this supports the formation of the whole person by fostering responsibility, reflection, and identity through situated, embodied experiences. Rather than focusing on abstract and decontextualized knowledge, *udeskole* emphasizes experiential, hands-on and inquiry-based learning (Hald and Bærenholdt, 2020; Barfod and Daugbjerg, 2018). This aligns with the view that *Bildung* develops through meaningful engagement with real world contexts. By grounding knowledge in concrete experiences, *udeskole*

contributes to the development of thoughtful, socially aware individuals. These characteristics make it particularly well suited to support long-term educational aims.

While *udeskole* is practiced across a range of school subjects, often cross-disciplinary, it has been most commonly applied in science education, where natural environments provide immediate relevance for curriculum topics such as ecosystems, biodiversity, and environmental processes (Barfod and Daugbjerg, 2018). By contrast, its potential within language subjects remains underexplored (Eggersen, 2024).

1.3 *Naturdannelse* through *udeskole*

While *udeskole* has gained recognition for its pedagogical and academic benefits (Bentsen et al., 2009; Jordet, 2007), its broader potential to support sustainability education and foster human-nature connections, remains underexplored. As discussed earlier, sustainability education is increasingly understood as needing more than cognitive knowledge or behaviour-focused interventions (Jickling and Wals, 2008). Instead, it must cultivate a long-term, multifaceted relationship between children and the natural world. This is the essence of *naturdannelse*: not simply learning about nature, but developing a personal, ethical, and emotional connection with it (Lysgaard, 2022). Such a process involves ongoing sensory experience, emotional engagement, ethical reflection, and the creation of personal meaning (Chawla, 2020; Barrable and Booth, 2020).

Udeskole's regular, place-based format offers particularly fertile ground for this kind of development. Unlike occasional field trips or isolated lessons, *udeskole* embeds nature within the everyday fabric of schooling (Jordet, 1998; Hald and Bærenholdt, 2020). Its emphasis on learning through direct experience in real, familiar environments aligns closely with the conditions that researchers have identified as supportive of human-nature connections and *Bildung* (Louv, 2005; Bang et al., 2015; Beery et al., 2021). Yet, despite this alignment, there is limited empirical research exploring how *udeskole* might actively foster *naturdannelse* in practice.

This thesis seeks to address this gap by investigating how *udeskole* can serve as a teaching approach to facilitate *naturdannelse*. To explore this, the study is structured as a comparative case study across two school subject disciplines: an obvious subject discipline, exemplified by Natural Science (hereafter, Science), where nature is already central to the curriculum, and a less obvious subject discipline, exemplified by language subjects - in this study, specifically the mother tongue (i.e. Danish), due to the

empirical context of the thesis. The aim is to identify which kinds of teaching situations within *udeskole* support nature-connection in practice, and how they unfold in practice.

The study adopts a qualitative, practice-based research approach, grounded in pragmatic and human ecological perspectives. The empirical foundation is a four-week, co-created teaching intervention developed in collaboration with two *udeskole* teachers and a 5th-grade class. Through field observations and interviews, the study examines how different activities and environments afford different pathways for connecting to nature. The five pathways of *naturdannelse*; experiential, emotional, cognitive, philosophical, and material, serve as the central analytical framework. To guide this investigation, the following research questions are explored:

1.4 Research questions:

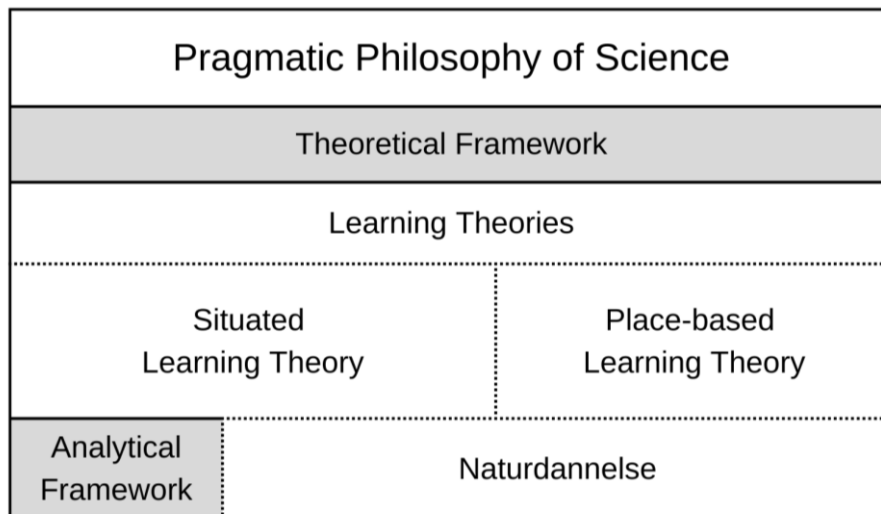
1. How does the integration of *naturdannelse* align with the learning objectives of Science and Danish Language education?
2. If, and so, how are the five pathways to *naturdannelse* activated differently in Science and Danish Language *udeskole* teaching?
3. What forms of pupil engagement and experience arise when *naturdannelse* is enacted through *udeskole* in natural settings?

1.5 Structure of the thesis:

Chapter 2 presents the theoretical framework, outlining the core concepts and learning theories that guide the study. Chapter 3 details the methodology, describing the qualitative, practice-based research design. It includes sections on research ethics, data collection, co-creation of the teaching intervention, and the comparative case study structure. Chapter 4 presents the empirical analysis by identifying cross-cutting patterns and reflect on teacher development, pedagogical tensions, and the practical integration of *naturdannelse* into school subjects. Chapter 5 deepens the analysis by connecting findings to broader discussions in educational theory and sustainability education and concludes the thesis with a synthesis of key insights, reflections on limitations, and recommendations for educational practice and future research.

2. Theoretical Framework

This study draws on two complementary learning theories: situated learning and place-based learning. *Naturdannelse* is positioned within these as both a pedagogical goal and an analytical lens for interpreting practice. The analysis is further supported by Hald and Bærenholdt’s (2021) practice-oriented perspective on *udeskole*, which emphasizes how learning unfolds through embodied, sensory, and contextual engagement with local environments.



Tabel 1: Theoretical Structure. Produced by the author.

2.1 Situated Learning

The theory of situated learning was developed by Jean Lave (a social anthropologist) and Etienne Wenger (a learning theorist). They conceptualise learning as a fundamentally social and context-dependent process (Lave and Wenger, 1991). In their foundational work, they argue that knowledge is constructed through participation in meaningful, real-world practices within a community of learners (Lave and Wenger, 1991).

Applied to this study, the theory of situated learning provides a lens for analysing how *naturdannelse* is fostered through *udeskole* activities. *Udeskole* is not simply a change of setting, but a context where pupils can learn from doing, observing, and reflecting in shared, authentic situations. Knowledge here is shaped by both what is taught but also by how pupils engage with one another, with their surroundings, and with the curriculum in context (Waite, 2011; Rickinson et al., 2004; Bærenholdt and Hald, 2021).

2.2 Place-based Learning

The theory of place-based learning emphasizes that learning becomes most powerful when it is rooted in local environments, cultures, and communities. This perspective is central to the work of David Sobel (2004) and further developed by Gregory Smith and David Greenwood (2017), who connect education to ecological, ethical, and cultural dimensions of place. Rather than starting with abstract knowledge, place-based learning focuses on pupils' own geographical, ecological, and social contexts. It values local relevance, relational engagement, and a sense of belonging. In this study, the theory of place-based learning supports analysis of how teachers use the natural and cultural features of local environments as pedagogical resources and how pupils form connections through direct, contextual experiences (Smith 2017; Barfod and Daugbjerg, 2018).

The study also draws on the concept of meaningful learning, which refers to learning that is personally engaging, situated in real-world contexts, and grounded in pupils' own lived experience. Informed by experiential and place-based education (Sobel, 2004), as well as theories of embodied cognition (Schilhab 2015), meaningful learning is seen to arise when pupils engage directly with their surroundings emotionally, sensorially, and reflectively. In this context, *naturdannelse* is approached as one expression of meaningful learning: a process through which pupils learn about nature, while forming lasting, situated relationships with it (Sobel, 2004; Rickinson et al., 2004).

2.3 Naturdannelse

This thesis applies the concept of *naturdannelse* as its central analytical framework. Developed by Præstholm and Hartmeyer (2021), *naturdannelse* builds on the broader Danish tradition of *dannelse* and refers to a long-term, formative process in which individuals gradually develop meaningful, situated relationships with nature. It is both an educational goal and a theoretical tool, grounded in the idea that connection to nature develops through lived experience, reflection, and ethical engagement.

Præstholm and Hartmeyer (2021) draws on Ives et al.'s (2018) five dimensions of human-nature connectedness; the experiential, emotional, cognitive, philosophical, and material connection to nature, and reinterpret them as educationally grounded relational pathways. The pathways represent different but interacting aspects of connections to nature, which may be more or less active at different stages in life and in different contexts (Præstholm and Hartmeyer, 2021).

The experiential and material dimensions are primarily externally oriented, focusing on sensory experience and physical interaction with natural materials, places, and systems. The emotional, cognitive, and philosophical dimensions are more internally expressed, involving reflection, affect, attention, and ethical or existential thought (Præstholt and Hartmeyer, 2021). These dimensions are not isolated but mutually reinforcing, shaped by the interactions and learning situations children participate in.

Naturdannelse is described as a long-term and ongoing process, particularly relevant in childhood, when foundational values and ways of relating to the world are being formed (Præstholt and Hartmeyer, 2021). For a situation to be considered nature-formative, it must engage internal processes such as attention, perception, thought, or emotion in close interplay with material and experiential engagement. A single activity may stimulate several pathways at once, for example, bodily presence in nature may evoke emotional response and ethical reflection. The five pathways are presented below:

- **The experiential pathway** concerns direct, bodily and sensory interaction with nature. It emphasises physical presence and perceptual attentiveness as foundational to deeper connection.
- **The emotional pathway** involves affective responses such as wonder, care, or joy. Emotional resonance is considered essential to developing a lasting attachment to the natural world.
- **The cognitive pathway** relates to understanding ecological systems and processes. It includes observation, interpretation, and integration of nature-related knowledge.
- **The philosophical pathway** entails ethical reflection and existential questioning. It foregrounds values, responsibility, and perspective-taking in relation to the more-than-human world.
- **The material pathway** highlights human–nature interdependence through resource use, landscape interaction, and awareness of environmental constraints.

(Appendix I)

This framework is used in the analysis to identify how and when nature connection is fostered in educational practice, and how subject-integrated *udeskole* may support these dimensions through concrete teaching strategies.

When I refer to nature in this thesis, I use a broad definition that includes accessible outdoor environments where pupils can encounter the more-than-human world. This includes places such as forests, meadows, coastal areas, and school grounds, where natural elements like trees, birds, and plants can be found. Nature is not framed as pristine wilderness, but as something that can be found and experienced in everyday spaces. This understanding aligns with the types of environments commonly used in *udeskole*, where pupils engage directly with nature through sensory experience and reflection (Sobel, 2004; Ives et al., 2017; Præstholt and Hartmeyer, 2021).

3. Methodology

This chapter outlines the methodological design of the study, which investigates how the concept of *naturdannelse* can be enacted within Language and Science subjects through the outdoor teaching approach of *udeskole*. The research adopts an exploratory, practice-based approach rooted in human ecological and pragmatic epistemologies. Informed by my background in anthropology, the study applies methods aimed at understanding how experiences and meanings are shaped in context, drawing on data from observations, pupil focus groups, and teacher interviews. The chapter outlines the study's research philosophy and explains the sampling strategy, intervention design, and ethical considerations, before detailing the processes of data collection and analysis.

3.1 Philosophical Position

This study is grounded in a pragmatic research perspective, which emphasises the value of knowledge as it emerges through experience, action, and reflection. Pragmatism adopts a dynamic view of reality shaped by human practices, and a fallibilist epistemology where knowledge is partial, situated, and judged by its usefulness (Dewey, 1938). Pragmatism values knowledge that is context sensitive, and developed through doing (King, 2022). Based on this epistemic position, rather than seeking universal truths, this study focuses on what works in practice, examining how *naturdannelse* can be meaningfully incorporated into existing Language and Science education through *udeskole*, not as a separate subject or full curriculum revision, but as a contribution to the Folkeskole's broader task of fostering *Bildung* in education. Its emphasis on meaningful outcomes and contextual sensitivity makes it especially well-suited for exploring how educational ideas like *naturdannelse* can take shape through lived practice, not just theory.

Aligned with the field of Human Ecology, this study treats knowledge as emerging from relationships between people, place, and the more-than-human world (McManus, 2009). This perspective shaped the choice to design the research as a collaborative intervention, and to treat both pupils and teachers as active participants in the learning process.

3.2 Research Design and Approach

The research aims to explore how *naturdannelse* can be enacted through *udeskole* while still being grounded in curricular subject goals. The research design is anchored in a qualitative, practice-based approach that enables theory-informed teaching activities to be developed and explored in a specific school setting.

A central methodological decision was to design and conduct an intervention; a structured, time-bound teaching programme developed in collaboration with teachers, to serve as the empirical site for generating data. Choosing an intervention allowed the study an arena to try to operationalise the five *naturdannelse* pathways and examine how they might manifest across different teaching situations. It provided a way to translate theory into pedagogical practice and to observe how pupils and teachers responded to specific activities, environments, and reflections. The intervention also created a consistent framework for comparing the Science and Language sessions, supporting a cross-disciplinary exploration of *naturdannelse*.

This intervention-based design is underpinned by a pragmatic and human ecological orientation, which values situated, relational knowledge that emerges through shared experience and experimentation. The logic of inquiry is primarily exploratory and abductive, moving iteratively between theoretical framing and field observations to identify patterns and refine understanding.

The study uses a comparative case approach between two school subjects and draws on multiple qualitative methods such as observation and semi-structured focus group interviews with pupils and individual interviews with teachers. These methods were selected to access both verbal and non-verbal forms of expression and to support triangulation across data sources.

3.3 Sampling Strategy

A purposive sampling strategy was used to identify participants with relevant background, experience and interest. Inclusion criteria required:

- Teaching Danish Language and/or Natural Science at middle school level
- Prior or current engagement with *udeskole*
- Willingness to participate in a four-week outdoor teaching intervention focused on exploring how *naturdannelse* could be integrated into their subject teaching

Recruitment was conducted through sharing a flyer, (Appendix II) outlining project's purpose and the inclusion criteria, via the *UdeskoleNet* Facebook group for educators engaged in EOtC in Denmark, and professional networks through the external supervisor, Mads Bølling, a researcher in *udeskole* from the Centre for Clinical Research and Prevention at Frederiksberg Hospital. Several teachers expressed interest, and two were selected to participate. The selection was based on their geographical closeness to the researcher and their fulfilment of the inclusion criteria.

3.4 Participants, Study site and Context

The study was conducted at a public primary school in suburban Denmark and involved two primary school subject teachers and their shared 5th-grade class of 25 pupils aged 10–12. This age group was chosen because middle childhood is considered a formative period for developing nature connectedness (Chawla, 2015). Research shows that meaningful experiences in nature before the age of 12 are strongly associated with long-term pro-environmental attitudes and behaviours (Wells and Lekies, 2006; Otto and Pensini, 2017). This stage also precedes a typical decline in environmental interest during early adolescence, often referred to as a “teenage gap”, making it a critical window for fostering lasting connections to nature (Chawla, 2015; Otto and Pensini, 2017). Developmentally, children at this age are able to engage in abstract and reflective thinking while remaining playful and open to sensory, embodied, and imaginative experiences (Sobel, 2004; Schilhab, 2015).

The participating school is part of the Danish *Folkeskole* system, which promotes democratic participation and inclusive teaching. It is also a certified participant in the Grønt Flag programme, which is a national sustainability initiative in which schools commit to integrating sustainability efforts across subjects and involving pupils in continuous environmental action.

At this school, *udeskole* was already part of the weekly schedule. Both participating teachers were formally assigned as *udeskole* coordinators and had dedicated hours to teach in outdoor settings with their own classes, while also being assigned as mentors for colleagues in expanding their use of *udeskole* across the subjects. Both participating teacher have 20 years of experience in teaching, while the Science teacher has approximately 8 years of experience with practicing *udeskole*, while the Danish Language teacher has 3-4 years of *udeskole* experience. The school is located near a diverse set of natural environments, including forests, ponds, and artificially grazed meadows. These settings served as active learning spaces during the intervention and supported the sensory and embodied learning that *naturdannelse* requires.

3.5 Teaching Intervention and Logic Model

The intervention was deliberately designed using a co-creation approach, which functions here as a distinct methodological choice aimed at developing new perspectives through shared inquiry. Co-creation was chosen because it allows both researcher and practitioners to actively shape the teaching design in a way that responds to the local context, integrates professional knowledge, and explores new educational possibilities (Greenwood 2013).

Co-creation is not a singular method, but a methodological orientation that encompasses various levels and forms of participation (Lystbæk 2017). In this study, it involved collaboration between the researcher and the two participating teachers, who contributed actively to the design and refinement of the teaching intervention (Lystbæk 2017). Their subject knowledge, classroom experience, and reflections were treated as integral to the research process not simply as implementation feedback, but as co-generative input.

This choice aligns with the study's human ecological and pragmatic underpinnings, which emphasise relational knowledge, practice-based inquiry, and responsiveness to lived conditions. By involving teachers as partners, co-creation supported the development of educational strategies that were both theoretically informed and practically relevant. It also enabled the research to be embedded in the complexities of everyday school life, making it more sensitive to real-world constraints and opportunities.

The four-week intervention was designed as a curriculum-aligned, co-created teaching programme that explored *naturdannelse* through structured *udeskole* sessions in two school subjects: Science and Language. Each weekly session was themed around one or more of the five *naturdannelse* pathways: material, experiential, cognitive, emotional, and philosophical (Præstholt and Hartmeyer, 2021).

To clarify the intervention's structure and expected outcomes, a logic model was developed:

Input	Activities	Output (Short term)	Outcomes (Long term)	Impacts
<ul style="list-style-type: none"> ● Co-created teaching plan ● <i>Naturdannelse</i> framework ● Classroom, schoolyard and local natural environment. ● Teaching time: 4 weeks, 1 day/week, 4x45 min./day 	<p>Weekly <i>udeskole</i> modules designed to support one or more of the five pathways to <i>naturdannelse</i> while remaining academically grounded in curricular goals of Language and Science subjects.</p> <ul style="list-style-type: none"> ● Topics concerning human consumption of nature (<i>Material</i>). ● Sensory and bodily experiences outdoors and in nature (<i>Experiential</i>). ● Knowledge of local species, ecosystems and ecological processes (<i>Cognitive</i>). ● Scenarios inviting emotional engagement with nature (<i>Emotional</i>). ● Reflective discussions about nature's value and humans' role in it (<i>Philosophical</i>). 	<p>Early signs of <i>naturdannelse</i> observed as:</p> <ul style="list-style-type: none"> ● Sensory awareness and attentiveness in nature ● Emotional and reflective expressions about nature (e.g. joy, wonder, sadness) ● Expressions of curiosity, respect and care for living beings. 	<p>Strengthened <i>naturdannelse</i> across all five pathways expressed through:</p> <ul style="list-style-type: none"> ● Pro nature values (e.g. care, respect, empathy for living beings). ● Pro nature behaviours (Choosing a sustainable lifestyle through e.g. consumption, career choice, civic engagement or politics). 	<ul style="list-style-type: none"> ● Integration of <i>naturdannelse</i> across subjects in the national curriculum. ● Policy support for <i>udeskole</i> in Danish primary schools. ● Contribution to a generation of environmentally engaged and reflective citizens. ● Increased national focus on human-nature connections and <i>udeskole</i>.

This logic model acted as both a planning tool and a framework for analysis.

3.5.1 Designing Teaching Materials and Meetings

To initiate the intervention, I developed a draft teaching programme and an accompanying activity booklet. These materials were created to provide a shared starting point and to translate abstract theoretical concepts into concrete classroom practices. The design also drew inspiration from practice-oriented resources, including the Nature Connection Handbook (University of Derby Nature Connectedness Research Group) and the Danish *udeskole* platform Skoven i Skolen, to ensure pedagogical feasibility within a primary school context.

The intervention aimed to provide students with repeated, meaningful encounters with nature across five thematic modules. Each session combined structured subject-based activities in Language and Science subjects with opportunities for sensory, emotional, and reflective engagement. The intention was to foster a sense of attentiveness, presence, and relational awareness in nature through multiple entry points aligned with the five pathways of *naturdannelse*.

To support co-creation, I first shared a short introduction to *naturdannelse* and a preliminary draft of the teaching plan. During the first planning meeting, we discussed *naturdannelse* briefly and agreed on the duration of the intervention. Between the two meetings, I conducted semi structured interviews with each teacher to explore their experiences with *udeskole*, their expectations for the intervention, and their subject specific learning goals. The language teacher highlighted nature's creative potential as a theme in writing and discussion, while the Science teacher saw opportunities to spark curiosity and expand pupils' vocabulary. These insights informed a revision of the teaching materials. Both teachers also received a folder with background readings on *naturdannelse* ahead of the second meeting.

Prior to the second planning session, I shared an updated version of the activity booklet, a proposed teaching plan, and a draft schedule for each day. During the meeting, we discussed the overall structure of the intervention and identified which activities or themes the teachers felt most comfortable leading. I brought printed timetables to support this process and to help estimate rough timeframes for each session. (See Appendix VII for an overview of the activities included in the final booklet).

3.6 Data Collection Methods

3.6.1 Intervention as Method and Empirical Foundation

The teaching intervention served both as a pedagogical initiative, and as the methodological core of this study. Through its design, implementation, and classroom enactment, it created the empirical conditions necessary to explore how *naturdannelse* can be integrated into teaching. While the logic model outlined the intended structure and goals of the intervention, this section explains how the intervention functioned as a research tool and how data was generated in practice. To examine how *naturdannelse* unfolded, a range of qualitative data was collected:

Data source	Purpose
Semi-structured focus group interviews with pupils (four groups of 5-6)	To gain insight into pupils' own interpretations, reflections, and experiences of <i>naturdannelse</i> , including how they describe emotional, sensory, and philosophical engagement with nature.
Field notes observations of the teaching	To capture how <i>naturdannelse</i> plays out in real-time teaching, identifying situations where pupils show signs of <i>naturdannelse</i> using specific observational indicators.
Semi-structured interviews with teachers (pre- and post-intervention).	To understand how teachers experienced integrating <i>naturdannelse</i> into their subjects, and to identify perceived potentials and challenges in doing so

Tabel 2: Overview of empirical data collected. Produced by the author.

These varied sources provide a triangulated data set that sought to capture the intervention from multiple perspectives. This triangulated approach is supposed to support the study's analytical depth and foster a nuanced understanding of how *naturdannelse* may unfold in school settings.

3.6.2 Observation

Observations were used to gain insight into how *naturdannelse* manifested in real-time classroom and outdoor teaching settings. This method allowed me to remain open to how various elements of nature connection might be expressed by pupils in unpredictable or subtle ways, whether through body language, spontaneous remarks, sensory engagement, or emotional reactions. Observation is particularly valuable in capturing the embodied, situated, and social dimensions of learning that may not surface in interviews. This aligns with anthropological approaches that view observation not simply as watching, but as a form of immersion in practice paying attention to how meaning is enacted through everyday actions and sensory experience.

Observation is well suited to practice-based educational research, where the aim is to understand how learning unfolds in real-life settings (Cohen et al., 2017). Although I co-designed the intervention, I took a non-intrusive role during sessions, stepping back to minimise my influence.

To support a systematic and theory informed observation process, I developed a set of guiding questions and indicators aligned with the five relational pathways to *naturdannelse* (Præstholt and Hartmeyer, 2021). These helped me stay attuned to both expected and emergent expressions of *naturdannelse* during each session, as I observed how pupils responded to the teaching activities and the outdoor environment.

For each pathway: material, experiential, cognitive, emotional, and philosophical, I asked myself variations of the following questions:

- Does [e.g. emotional engagement, sensory awareness, reflection, etc.] occur as intended?
- If so, how is it expressed by the pupils?
- What kind of situation initiates it?
- What does it set in motion for the pupil, for their peers, or for the learning environment?

In addition, I used more specific indicators to guide my attention toward concrete expressions of each relation in practice:

- Philosophical:** Do pupils reflect on ethical questions or human-nature relations? Are they encouraged to pause and think deeply?
- Emotional:** Do pupils express empathy, wonder, care, or discomfort? How do they react bodily, e.g. through smiles, laughter, or hesitation?
- Cognitive:** Do pupils connect new knowledge to prior experiences or broader ecological systems? Do they ask curious or explanatory questions?
- Experiential:** Are pupils actively using their senses, e.g. watching, listening, touching? Do they physically engage with the environment?
- Material:** Do pupils discuss human use of nature? Are they aware of environmental impact and its connection to human consumption?

These reflective prompts and indicators helped me remain attentive to both verbal and non-verbal expressions of engagement, including body language, tone of voice, interpersonal dynamics, and unspoken

responses. Together, they formed an analytical lens through which I could trace how *naturdannelse* unfolded in practice. Observations were captured as handwritten field notes, with each session analysed in relation to the indicators from the observation guide (Appendix III). In addition to capturing pupil responses, I also took note of moments where activities fell short either due to low engagement or confusion.

3.6.3 Interviews with Pupils

To complement my classroom observations and gain a deeper understanding of the pupils' experiences, I carried out four focus-group interviews. One with each group of 5-6 pupils. These took place at the school the day after the final *udeskole* session, each lasting around 45 minutes. I used an offline voice recorder, allowing me to revisit and transcribe the interviews later for analysis.

Interviewing the pupils was essential to this study. Many signs of *naturdannelse* such as curiosity, wonder, or reflection are internal and best expressed in the pupils' own words at their own pace. While observations captured how pupils behaved, they could not reveal what pupils felt, valued, or reflected on. Since the intervention was designed for them, it was important to understand how they experienced it, what they found meaningful, and how they made sense of the activities. Their perspectives are not only analytically valuable, but also ethically necessary when evaluating a teaching approach meant to support their development (Lundy, 2007). This view is supported by research that recognises children as competent informants who can meaningfully contribute to understanding educational practice (Christensen and James, 2008). Including pupil voices are also a matter of ethical responsibility, as argued by Lundy (2007), who links it to children's right to be heard in matters that affect them.

The interview guide (Appendix IV) was shaped by the five *naturdannelse* pathways (Præstholt and Hartmeyer, 2021) and adapted to the pupils' age and language. Questions invited open reflection, avoiding any search for 'right answers'. Prompts included:

- What stood out to them from the programme
- Whether anything in nature made an emotional impression
- How they understood the activities
- What new thoughts or questions the experiences sparked
- How they think of nature
- And how they felt about doing Language and Science subjects in nature

To help spark their memory, I included prompts like asking about their biggest 'wow moment' and used sensory recall exercises, encouraging them to think about what they had seen, heard, touched, or felt. These questions helped bring the experiences back to life, often surfacing rich descriptions of how they had connected to nature.

While *naturdannelse* is understood as a long term and ongoing process, this study aims to capture early signs of its emergence. In particular, I focus on the moments where pupils show signs of reflective thinking, emotional engagement, or new understandings related to nature. These aspects are important because, as Præstholt and Hartmeyer (2021) argue, nature-based activities only contribute to lasting *naturdannelse* when they are internalised. So, when they plant seeds that grow into cognitive, emotional, or philosophical connections. Otherwise, they risk remaining surface level experiences without long-term meaning. By inviting pupils to share what they felt, noticed, or thought during the intervention, the interviews help reveal whether and how such deeper connections may have started to take shape.

In addition to providing insight into pupils' retrospective meaning making, the interviews also served a practical and supplementary function in the data collection process. Because much of the teaching took place outdoors in group-based, dynamic settings, it was not always possible to document every pupil comment or interaction in real time. The interviews offered an opportunity to revisit key teaching themes, allowing pupils to expand on discussions and reflections that had taken place during the programme.

Several of the interview questions were directly tied to questions and topics that had already been raised during the teaching, for example: what is nature?, how do humans use nature?, how do you use nature yourself?, and how can you use nature in a good way? This overlap allowed the interviews to function as a space for reflection and as a memory aid as they helped recall pupil responses that were difficult to capture during field observations and offered richer contextualisation of the ideas pupils had encountered. In this sense, the interviews contributed both analytical depth and descriptive completeness to the study.

3.6.4 Interviews with Teachers

To get a deeper sense of how the intervention played out from a teaching perspective, I interviewed the two participating teachers both before and after the teaching programme. These conversations gave me insight into their expectations, reflections, and how they experienced bringing nature-based learning into their subject teaching in Language and Science subjects.

Before we began the teaching sessions, I met with each teacher individually to talk about their previous experiences with *udeskole*, their understanding of *naturdannelse*, and what they hoped to get out of the programme. These early conversations helped me understand where they were coming from and what they valued as educators (Appendix V). After the final session, we met again to reflect on how the past four weeks had gone. We talked about what they had noticed in the pupils, what had worked well, and how their own thinking may have shifted along the course of the intervention (Appendix VI).

Each interview lasted around 45-120 minutes and was held in person at the school. I composed and used a semi-structured interview guide to steer the conversations, but let the dialogue flow naturally when interesting points came up. Everything was recorded and later transcribed to help me draw out recurring themes and insights. Together, the teachers' voices form an important part of this study. They offer a practical and grounded view of what it means to try and bring *naturdannelse* into their separate subject teachings.

3.7 Data Analysis

All data sources were coded using the five relational pathways to *naturdannelse* (Præstholt and Hartmeyer, 2021). The analysis proceeded in layers, beginning with fieldnotes from classroom and outdoor observations, which were used to identify patterns in how pupils engaged with teaching activities and nature. Focus group interviews were then brought in to explore how pupils described and remembered those same moments, offering insight into which experiences were internalised or emotionally resonant. Finally, teacher interviews added a further layer, focusing on how teachers interpreted pupil responses during the intervention and how their own perspectives or practices evolved over time. This included reflections on new dimensions of teaching that emerged through the co-creation process. Together, this layered analytical approach supported a contextualised and triangulated understanding of how *naturdannelse* unfolded through practice, pupil reflection, and teacher interpretation (Bernard, 2017; Sahoo, 2021).

All quotes from interviews and field notes were originally in Danish and have been translated into English by the author. Efforts have been made to preserve the original tone and meaning. When referring to observations it is indicated by either ([Day #], [Subject]) and for interviews it is indicated with ([Focus-group #]) and (Science/Language teacher, Interview).

3.8 Ethical Considerations

This study was conducted in accordance with national and institutional ethical guidelines for research involving human participants. The project followed the General Data Protection Regulation (GDPR) regarding the handling of personal data, and formal permission to carry out the intervention was obtained from the school's administration. All research activities were conducted with informed consent from all participants. The two teachers involved gave written consent to participate in pre- and post-intervention interviews (Appendix VIII), to be observed during teaching, and to have their contributions included in the analysis. Additionally, a separate consent form was distributed to the parents of all pupils in the class (Appendix IX). This form explained the project in accessible terms and requested permission for the researcher to observe pupil interactions during the teaching programme, general photography during educational activities, and participation in a focus-group after the intervention. In total, 23 out of 25 families gave signed consent. To ensure confidentiality and anonymity, all data were securely stored and used only for research purposes. I gave all participants pseudonyms, so that no real names appear in the thesis. Any images or quotes used have been anonymised to protect participant identities. I used a dictaphone to record interviews and stored the data locally and not in a cloud.

3.9 Reflexivity

My academic training in anthropology has shaped my research approach, particularly in emphasizing situated observation, layered meaning-making, and practice-based interpretation. While this study is not a full ethnography, it draws on anthropological methodologies that value immersion in real-world settings and the co-construction of meaning between researcher and participants. This perspective informed my data collection and analysis, allowing me to remain attuned to the nuanced ways pupils and teachers engaged with nature. Acknowledging my own situatedness, I approached this research as a young student with a strong personal and academic investment in sustainability and nature connection. This orientation inevitably shaped the ways I engaged with the co-created intervention and how I interpreted the potential of *udeskole* to facilitate *naturdannelse*, influencing both what I explored and how I made sense of what I observed.

I recognize that knowledge is always partial, situated, and co-produced. I did not enter the field as a neutral observer but as an engaged participant with a growing awareness of my own entanglement with the natural world. During the course of this project, I found myself undergoing a parallel personal process of becoming more attuned to nature in my own everyday life. This shift influenced how I related to the topic of

naturdannelse not just as a concept I was studying, but as something I was experiencing. While this deepened my engagement with the project, it also complicated my position as a researcher, as I had to continuously reflect on how my evolving personal values and emotions shaped the way I interpreted the teachers' and pupils' experiences. This aligns with the view that knowledge in qualitative research is not produced from a distance, but emerges through the interactions between researcher, participants, and context (Barad, 2007). Recognizing this, I aimed not for objectivity, but for transparency and accountability in how I designed and interpreted the research.

When entering the co-creation process, I did not consider myself an expert in either *udeskole* or *naturdannelse* from a practical or pedagogical standpoint. The two participating teachers had extensive experience with *udeskole* and were already leaders in their school community, tasked with guiding other teachers in implementing *udeskole*. In contrast, I came to the collaboration as a student researcher without any formal background in teaching. Although I had spent several months immersing myself in both Danish and international research on nature connectedness and *naturdannelse*, I at times felt uncertain about my role and authority particularly when giving feedback or proposing pedagogical ideas to professionals with far more classroom experience.

Nevertheless, I found that my strength lay in bridging research and practice. My role became one of translating emerging academic insights into a shared design space where theory could inform practice. This position of partial expertise rooted more in theory than in applied teaching shaped how I contributed and also how I related to the teachers. It made me aware of the layered expertise present in the room and encouraged a stance of collaborative learning rather than top-down recommendation. In this sense, the co-creation process could be seen as both a research method and a space of mutual negotiation of knowledge and roles.

The participatory nature of the project align with human ecological principles of working with rather than on communities. However, this format require considerate navigation in the tension between facilitation and critical inquiry. My desire for the intervention to succeed may have influenced how I framed research questions, interacted with participants, and interpreted the data. I attempted to mitigate these risks through methodological triangulation, reflective journaling, and regular debriefing with my supervisors.

4. Analysis

The following section analyses the full body of empirical material, with a focus on how concrete pedagogical strategies supported pupils' *naturdannelse* both within individual subjects and across disciplinary boundaries. It explores how the five pathways were activated through the teaching programme, and how these approaches contributed to subject-specific learning. The analysis also considers how teachers' professional development shaped the implementation of *naturdannelse* in local school contexts. To begin, table 3 offers a cross-subject overview of how each of the five pathways were supported through observed teaching activities in Science and Language, and how these aligned with the subjects' core curricular goals. This overview serves as a foundation for the qualitative sections that follow.

Table 3: Alignment of Teaching Activities with the five pathways to naturdannelsen and Curriculum Goals and Competencies.

Naturdannelsen Pathway	Udeskole teaching activities supporting pathway in the Language subject	Danish Language Core Competency Goals	Udeskole teaching activities supporting pathway in the Science Subject	Natural Science Core Competency Goals
Experiential	Activities such as treasure hunts, birdwatching, and nature sound listening were used to inspire expressive and interpretive writing and discussion.	Interpretation, Expression, Communication	Treasure hunt formats engaging pupils in using their senses to find signs of animal life and habitats, and were followed by plenum discussions and presentations of findings, which engaged pupils in ecological topics through collaborative reasoning and sharing.	Real-world Contextualisation and Investigation
Emotional	Treasure hunts and birdwatching engaging pupils' curiosity and affective attention through open-ended exploration. These experiences were deepened through expressive writing tasks and reflective dialogue, allowing pupils to articulate feelings and symbolic interpretations rooted in nature.	Interpretation, Expression, Communication	Treasure hunt formats fostering spontaneous emotional reactions, such as awe, excitement, and nervousness by encouraging free movement and unstructured discovery.	Real-world Contextualisation and Communication
Cognitive	Pupils engaged in reflective synthesis by composing essays and engaging in classroom debates linking nature experiences to broader themes.	Reading, Interpretation, Communication	Pupils engaged in place- and inquiry-based learning that inspired plenum discussions on ecological phenomena such as habitats and interdependence.	Real-world Contextualisation and Communication
Philosophical	Pupils explored ethical and existential questions through creative writing tasks imagining nature's perspective, followed by teacher-led class discussion.	Interpretation, Expression	Pupils participated in teacher-led class discussion about land use, conservation dilemmas, and biodiversity, using real-world scenarios to explore values.	Real-world Contextualisation, Communication
Material	Pupils analysed photographs of landscapes altered by human activity and discussed their implications in teacher-led class discussion.	Interpretation, Expression, Communication	Pupils observed the impact of human behaviour in protected environments, reflecting on consequences and adapting their actions during field visits.	Real-world Contextualisation and Investigation

Table 3: Produced by the author. The official curriculum goals for competency development and knowledge acquisition for each subject are used as a reference point to assess whether and how the observed teaching activities were disciplinarily grounded. The Science subject is guided by four core competencies: investigation, modelling, real-world contextualisation, and communication. Pupils are expected to explore natural phenomena and reflect on the interaction between humans and nature as a basis for environmentally responsible action (Fælles Mål, 2019). The Danish subject develops competencies in reading, expression, interpretation, and communication. It supports pupils in exploring aesthetic, ethical, and cultural dimensions of language and experience (Fælles Mål, 2019).

As the table shows, both Language and Science subjects supported all five nature connection pathways, they did so in distinct and complementary ways, reflecting the pedagogical logic and curricular focus of each subject. The Language subject showed particular strength in emotional, philosophical and experiential connections. This is likely due to its curricular emphasis on expression, interpretation, and reflection, which naturally supports perspective-taking, emotional engagement, and ethical discussion. Tasks such as storytelling, reflective writing, and class dialogue offered structured opportunities for pupils to explore feelings, values, and existential themes grounded in preceding nature-sensory experiences.

The Science subject excelled in experiential, cognitive, and material connections. Its emphasis on investigation, modelling, and real-world contextualisation aligned closely with inquiry-based and experiential learning. Pupils engaged deeply with ecological systems through sensory exploration and observation, and were invited to reason and reflect through place-based learning and structured dialogue.

The following sections examine how these dimensions unfolded in practice, beginning with a shared format that shaped both subjects: the treasure hunt.

4.1 The Treasure Hunt Format

Across both the Language and Science subjects, the experiential relation to nature was cultivated through a deliberate shift in pedagogy. A shift that placed sensory engagement as more than a precursor to learning, but as a learning goal in itself. Pupils were repeatedly invited to carefully observe, touch, smell, listen, and move through natural spaces. In doing so, the intervention foregrounded noticing, attentiveness, and bodily presence as valuable in their own right, echoing Richardson's (2023) emphasis on sensory attunement and as the first and most foundational pathway to nature connectedness (Richardson, 2023).

This shift was most clearly embodied in the two subjects shared use of the treasure hunt format, which became a key structure for situating pupils' engagement in direct, sensory interaction with the local environments. The treasure hunt format can be seen as a form of questing, a place-based educational strategy described by Clark and Glazer (2004) as a way to engage learners in adventurous, meaningful exploration of their local environment. This format was chosen as a way to frame the teaching activities as invitations for interpretive and sensory engagement. The guided discovery format encouraged movement and curiosity while maintaining a gentle instructional frame. Crucially, it aimed to secure low difficulty and high success rate, which proved to keep the pupils immersed and invested. This was done by avoiding overly abstract terminology, and instead either broad categories as prompts for their search. It also offered

a structure that felt more like play than teaching, which was seen in their engagement, "They just kept going. They didn't swipe out,"(Science teacher, Interview) as the science teacher put it.

In Science, the treasure hunts were explicitly framed as investigative activities. Pupils acted as 'nature detectives', crouching among plants, lifting logs, feeling moss and soil, and listening to soundscapes. Through these activities, they explored ecological concepts such as habitat, decomposition, and biodiversity through first-hand discovery. In the Language subject, the teacher actively facilitated her *udeskole* sessions through both indoor and outdoor activities in the local environment also engaging in questing formats such as birdwatching, listening exercises and picture takings of human-altered nature. The sensory encounters with nature were used as raw data for the pupils to draw on when engaging in core language competencies. These experiences; what they had seen, heard, and felt in nature, were translated into descriptive writing, narrative construction, metaphorical expression, reflective dialogue, and argumentative reasoning. Here, nature functioned not as a background setting for language instruction, but as a source of inspiration for a multitude of oral and written assignments.

In the intervention, the treasure hunt was both a means of sensory engagement, and also a multimodal activity that facilitated several of the five core connections to nature. In the following section, it will be shown how this format appeared to support *naturdannelse* by enabling pupils to notice, wonder, and reason through their own encounters, transforming nature from a passive setting into a source of inquiry, meaning, and connection.

Skattejagt i TRYLLESKOVEN



I SKAL FINDE:

1. Et insekt
2. Noget vand
3. Noget mos
4. En svamp
5. Noget magisk
6. Et fjer
7. En vild hest
8. En solsort
9. Sand
10. Den mindste plante
11. Det største træ
12. En skygge
13. Et dødt træ
14. En gren
15. En gran kogle
16. Noget rødt
17. Noget tang
18. Noget mærkeligt
19. Noget smukt

I SKAL RØRE NOGET:

20. Varmt
21. Koldt
22. Skrøbeligt
23. Blødt
24. Hårdt
25. Glat
26. Vådt
27. Tørt



I SKAL DUFTE TIL:

28. Jord
29. En blomst
30. Blade



Picture 1, Day 4, Mixed, Treasure Hunt in Trylleskoven (The Magic Forest). Produced by the author.

4.1.1 Emotional Reactions During Treasure Hunts

For both Science and The Language subject, the treasure hunt format was particularly useful in engaging the pupils emotionally to nature. Pupils expressed joy, curiosity, nervousness, and pride as they explored local landscapes using open-ended prompts. On Day 4, the class went on an excursion to a nearby protected forest called Trylleskoven (The Magic Forest), where the main activity surrounded a treasure hunt which scaffolded both scientific and linguistic learning while drawing attention to place specific features. The protected forest did not merely host the lesson, it participated in it, as pupils responded to its textures, sounds, and spatial rhythms.

While some initially expressed disinterest, engagement later intensified when they realized that they were to find wild horses allegedly living in the forest. One girl, already fond of horses, took the lead of her friend group and helped guide her peers, visibly taking on a leadership role. As they wandered the site, pupils showed careful movement, whispered when near the horses, and appeared visibly moved upon finding them. One pupil exclaimed: “Oh, it’s so beautiful right here!” (Day 4, Mixed). In pupil interviews, this activity emerged as one of the most memorable moments, described by pupils as magical, exciting, and even a little scary (Focus-groups 2, 3, 4). The wild horses encounter triggered an emotional range that, according to Richardson et al. (2017), is essential to deepening nature connectedness, where beauty, vulnerability, and enchantment work together to foster meaningful bonds. One pupil, initially hesitant to enter the wild horse enclosure overcame his fear with the support of peers. Later the same pupil recalled the moment in his interview as especially meaningful. This suggests that a moment of unease or hesitation perhaps stemming from discomfort or fear can still create positive memories connected to experiences in nature. Environmental aesthetics scholars emphasize that profound engagements with nature often involve a combination of wonder and unsettling emotions, rather than purely positive feelings (Brady, 2020).

Similarly, Lumber and colleagues (2017) highlights that emotional depth including feelings of uncertainty or vulnerability can strengthen pathways to deeper connections to nature. Allowing space for emotional discomfort, such as the nervousness some pupils experienced when encountering the wild horses is then not necessarily harmful. On the contrary, such emotions can form part of an emotionally rich and memorable engagement with nature.



Picture 2: Day 4, Mixed, the wild horses enclosure in The Magic Forest. Photograph by the author.

During the Language sessions, the most noticeable traces of emotional investment were present during a birdwatching activity, which was highlighted in interviews as one of the most memorable parts of the entire intervention across both subject courses (Day 2, Language). With a similar investigative format as the treasure hunt in The Magic Forest, pupils moved attentively through the landscape using identification sheets, listening for birdcalls, spotting species, and enthusiastically sharing their discoveries with peers. While structured as a lighthearted competition, the activity supported attentional focus, perceptual learning, and spontaneous emotional engagement. As they spotted birds, many showed visible excitement, fascination, and occasionally frustration when they missed a sighting. These emotional reactions, from shared discoveries and disagreements over identifications to spontaneous pride in spotting birds, reflect emotional investment in the experience.

The language teacher noted how pupils approached the task with joy and focus, treating it like a treasure hunt rather than a formal assignment. “They were so into it. Helping each other, debating what they saw,

doing it all on their own,” she recalled. “I could see they thought it was fun. Some even said they’d spotted a rare bird. They were so convinced. It really showed how engaged they were” (Language teacher, Interview).



Picture 3: Day 2, Language, Birdwatching activity. Photograph by the author.

The investigative activities across the subjects seemed to cultivate a more attentive, comfortable, and embodied presence in nature among the pupils. Both from own observations and the teachers' interviews, it was visible how pupils who had initially hesitated to touch soil or move among plants matured during the four weeks and appeared more confident in their interactions with the natural world. It was particularly evident during unstructured moments such as when a pupil excitedly called others over to feel moss, exclaiming, "Wow, you have to feel this!"(Day 4, Mixed), or when a pupil was seen staying behind, after a habitat hunt during a science session, and quietly lifted a big rock to observe a beetle colony and leopard slug carefully (Day 3, Science). These instances suggest that the teaching both prompted sensory interaction as well as helped pupils start to internalise a more curious, exploratory stance toward nature. An attentiveness to nature that persisted beyond structured tasks.

Several students even deliberately explained in interviews how they got lost on purpose to stay in the forest longer, suggesting that the experience had become both emotionally engaging and experientially rewarding (Focus-group 3). They were asked if they could recall a 'wow-moment' they had experienced during the four weeks of intervention in their class:

- Fatima: To walk in The Magic Forest and do treasure hunt. It was beautiful and really magical. It just felt nice to be there. Me and Semra, we were in this place, and it was just so...
- Semra: It was really beautiful. There was moss everywhere, and everything was just so green.
- Fatima: And there were flowers, too.
- Semra: And it felt like there was this tree, and then a little hole where the sunlight came through and was just like... Mmm.
- Fatima: And there were also those little flowers, right? It was so pretty, and me and Semra were just completely in shock, we didn't want to leave.
- Semra: There were those flowers. And then the sunlight came.. there was this little hole, and the sun came through and shone right there, exactly where the flowers were.
- Fatima: And there were so many little trees, and we just walked in like... What was it called again?
- Semra: A movie...
- Fatima: Yeah, a movie... It felt like we were inside a movie where...
- Semra: And we got lost and we wanted to get lost. We wanted to be away, because it was kind of fun to be a bit far from everything.
- Fatima: It was also fun to wander a bit off on our own, and just...
- Semra: And enjoy it. And sometimes we'd just sit for a bit, and then... just relax.

(Focus-group 3)

They recall discovering a lush, green area filled with moss, flowers, sunlight filtering through trees, and a sense of calm and wonder. The moment felt so immersive and special that they compared it to being inside a movie and didn't want to leave. Their desire to get lost, to be away from everything, and to simply sit and

enjoy the surroundings reflects key aspects of nature connectedness (Richardson, 2023). Their response suggests both aesthetic appreciation, a sense of place, a mindful presence, and an emotional attachment to the nature they encountered. Their sensory language and emotional response also propose a personal engagement with the natural environment. This perceptual presence resonates with Richardson's (2023) emphasis on stillness, sensory awareness, and attentional engagement as foundational to nature connectedness.

These moments of curiosity, joy, and attentiveness reflect early forms of attunement (Richardson, 2023), where pupils begin to orient themselves affectively toward the more than human world. While emotional responses varied among individuals, the structure of the activities created meaningful openings for emotional connection. Such emotional attunement, even if uneven, echoes Chawla's (1998) finding that early affective experiences in nature can lay the groundwork for environmental awareness and care. The next section explores how these engagements formed a basis for more complex cognitive, philosophical, and material relations with nature.

4.1.2 Learning Rooted in Place and Context

According to the framework behind *naturdannelse* (Præstholt and Hartmeyer, 2021), cognitive knowledge of nature represents a necessary, but incomplete, foundation for fostering a sufficient connection to the natural world. Such knowledge gains its transformative potential when interwoven with lived experience, emotional engagement, and reflective dialogue. In this intervention, factual understanding was not positioned as an endpoint, but as one dimension of a broader, holistic process of sense making grounded in embodied and place-based encounters.

In both Language and Science subjects, nature was placed at the centre of pupils' attention. While this is a natural orientation in Science, where nature is traditionally the object of study, it marked a pedagogical shift in the language subject. Here, nature became the topic of reading, writing, discussion, and digital research. Pupils composed haiku poems, descriptive texts, and argumentative essays, based on their own observations and experiences during *udeskole* sessions. This experiential grounding made the tasks linguistically rich and personal, and aligns with the goals set out in the Danish Language Curricular Goals (Fælles Mål, 2019), which emphasise the development of interpretive, expressive, and argumentative competencies in real-world contexts.

The treasure hunt format served both subjects in engaging *naturdannelse*, but it did so in distinct, subject specific ways. In the case of the Science subject, it invited pupils to think ecologically through place by noticing habitats, comparing environments, and asking emergent questions about biodiversity and systems. In the Language subject, it invited symbolic interpretation, helping pupils develop expressive language rooted in direct experience.

For Science, The Magic Forest was an opportunity to explore and learn the history of the local protected forest and discuss what it entails for a forest to be announced protected and why to protect nature in general. The teacher asked the pupils to think about and discuss why humans are protecting some natural spaces and “If this forest wasn’t protected... what do you think would be here instead?” (Day 4, Mixed). These reflective questions encouraged the pupils to link environmental issues to societal priorities of land use and existential considerations about what has value and why. This philosophical discussion came to cover why nature is protected, what might happen if it were not, and what alternative land uses might have been chosen. By situating philosophical discussions within the specific context of a local, protected forest, the specific place becomes a trigger for ethical and existential thought. This was a key moment where the programme facilitated room for the philosophical connection to nature to develop.

Such place-based questioning aligns with Smith and Sobel’s (2010) claim that local environments can act as “texts” for ethical inquiry i.e. spaces that spark reflection when learners are physically embedded in them. The forest became more than a teaching site. It was a backdrop that invited deeper thinking about value, ownership, and responsibility all grounded in the specific context. This reflects a core aspect of place-based learning (Gruenewald, 2003; Sobel, 2004), which views places as culturally and historically layered environments, as well as situated learning. In this perspective, learning is situated in physical surroundings while it also engages with the unique character, meaning, and stories embedded in specific landscapes (Sobel 2004).

During this discussion it was also collectively discussed how one might behave in protected areas. Here, it was learned that it is not allowed to break off branches and to harm or remove anything from the area. Such discussions can be argued to be contributing to the pupils’ material connection to nature, where the individual realizes his impact on the non-human world. With this in mind, the pupils were then prepared to engage in the treasure hunt now also with a scientific dimension. There were also included illustrated more place-specific Science related prompts such as when they are asked to find ‘a wild horse’ or ‘a dead tree’ (Picture 1), sparking opportunities to begin conversations about the characteristics of protected nature.

The treasure hunt format opened new possibilities for the language teacher to work meaningfully with language development, interpretation, and imagination, purposes closely aligned with the subject’s

formalised curriculum (Fælles Mål, Danish). Before the treasure hunt in The Magic Forest, the class discussed the name of the site, and reflected on what makes a place feel magical (Day 4, Mixed). This discussion prompted both imaginative, symbolic and animistic reflections towards the place, preparing pupils to engage more emotionally deep with the aesthetics of the forest during the treasure hunt (Brady, 2020). During the actual treasure hunt, prompts like find ‘something magical’, ‘something fragile’, or ‘something beautiful’ (Picture 1) then encouraged them to interpret nature subjectively, form opinions, and apply new or abstract vocabulary to describe their discoveries. They moved beyond simple observation by engaging their senses and translating experience into expressive language.

The place-based approach can also facilitate interdisciplinary opportunities, which emerged when the teachers facilitated the plenum discussion of The Magic Forest’ place name. Pupils learned that the trees could not be cultivated for production due to poor, sandy soil. Because the ground was too sandy and unstable, the trees grew crooked and for some, mysteriously and magically looking (Danmarks Naturfredningsforening Solrød u.d.). This activity, while couched in storytelling and symbolism, made it possible to understand how physical material conditions limit human use, linking natural characteristics to land use decisions. This is another example of how the material connection to nature was enacted in the teaching programme. With an indirect focus on resource extraction, this discussion centered around recognizing limits, and reading the landscape as a site of constraint and possibility. Such discussions supported pupils in seeing nature as more than a resource, but as a living system both shaped by and itself shaping human action. The material connection to nature was thus enacted through recognition of constraints, use, and interdependence, providing a foundation for engaging in broader ethical and ecological understanding.

In both cases, place-based interaction became the ground of learning. The same forest could be used to prompt a Science session to discuss the protection of nature, and a Danish Language session to discuss symbolism and place names. Had the setting been different, the same format could have taught entirely different content for each subject, underscoring the adaptability and place specific richness of the treasure hunt format, as it could hold both inquiry and narrative, both ecology and symbolism.

Clark and Glazer (2004) describe questing as a didactic approach that enables participants to connect with natural and cultural heritage through active discovery. Central to their perspective is the idea that education should emerge from the landscape itself. One should learn from places’ ecology, physical landmarks, and collective memory making learning both situated and meaningful. The treasure hunt in The Magic Forest illustrates how pupils engaged with the forest as a place layered with story, constraint, and aesthetic

presence. The activity provided more than subject-specific content, it invited pupils to build understanding through direct, participatory experience, rather than through decontextualized information.

Overall, the treasure hunt format can be seen as supporting a non-linear, inquiry-driven engagement with ecological knowledge, where pupils' curiosity and perceptual discoveries guided the learning process. This resonates with Barfod and Daugbjerg's (2018) findings on the potentials of *udeskole* for fostering inquiry-based teaching. Their study illustrates how outdoor environments can foster open-ended exploration and embodied inquiry, positioning pupils as co-investigators of natural phenomena (Barfod and Daugbjerg 2018). By engaging them in this investigative role, the teaching activated a mode of learning grounded in wonder, sensory perception, and contextually rooted interpretation (Barfod and Daugbjerg 2018).

The pedagogical strategies applied in both subjects also emphasised creating space for questioning, exploration, and shared meaning making (Pedaste et al., 2015; Barfod and Daugbjerg, 2018; Smith and Sobel, 2010). A particularly illustrative moment of inquiry-based teaching occurred during one of the discussion activities in The Magical Forest. The Science teacher had chosen a quiet spot to ask pupils what it means for a forest to be protected. In the middle of this open-ended discussion, one pupil looked down and asked: "Don't the small shoots on the forest floor become trees?" (Day 4, Science). The question emerged spontaneously not from instruction but from attentive observation. This moment demonstrated both ecological reasoning, but also exemplified how place itself can activate inquiry. The discussion that followed touched on forest regeneration, human versus natural planting patterns, and biodiversity linking current observation with prior knowledge. The teacher supported this line of inquiry by inviting other pupils to reflect and extending the conversation, allowing understanding to unfold through shared reasoning. This instance demonstrates how inquiry-based and place responsive teaching can support the cognitive connection to nature.

In the Science sessions, instead of acquiring knowledge through textbooks, lab experiments, or direct instruction, pupils engaged primarily in exploratory outdoor activities. These were followed by outdoor plenum discussions, where they shared observations, posed questions, and collaboratively reasoned through the ecological processes they encountered. The teacher was able to adjust the level of abstraction based on pupils' input sometimes deepening the complexity of the discussion, other times anchoring it in concrete examples. This dialogic structure allowed knowledge to emerge through interaction and interpretation, grounded in pupils' own sensory and perceptual experiences. Concepts such as decomposition, interdependence, and biodiversity were constructed firstly through lived inquiry and then afterwards connected to scientific definitions. This approach seemed engaging and well suited for the two teachers

and the school class. They functioned well in the spontaneity and unstructured format driven by input and inquiry, and the pupils were actively participating in the discussions.

In the Language subject, pupils explored nature through interpretive and creative language tasks, building cognitive understanding through metaphor, description, and perspective-taking. In Science, pupils used what they encountered outdoors as the basis for reasoning about ecological systems developing hypotheses, drawing connections, and explaining their thinking to peers and the teacher. Pupils were not passive recipients of information but active participants in meaning making. As Lave and Wenger's (1991) situated learning theory suggests, knowledge emerges through participation in specific material and social contexts.



Picture 4. Day 4, Science, discussing findings from treasure hunt. Photograph by the author.



Picture 5. Day 2, Language, listening to sounds of nature. Photograph by the author.

The following section will demonstrate how the two subjects engaged the pupils in reflective activities which instead of burdening pupils with responsibility for environmental problems, attempted to create space to develop awareness and reflective capacity encouraging more thoughtful and imaginative approaches to the more than human world.

4.2 Philosophical Reflections Through Discussions and Non-human Perspectives

Throughout the programme, pupils were encouraged to reflect on how nature is perceived, used, and protected, prompting ethical considerations towards the more-than-human world. Pupils' philosophical engagement emerged most clearly in the language sessions when pupils were invited to imagine, reflect, and adopt perspectives beyond their own. Pupils explored existential and moral themes through creative writing, metaphor, and dialogue. These activities ended up connecting directly to the Danish curriculum's aim to strengthen reflective and interpretive thinking, personal voice, and personal nuanced expression.

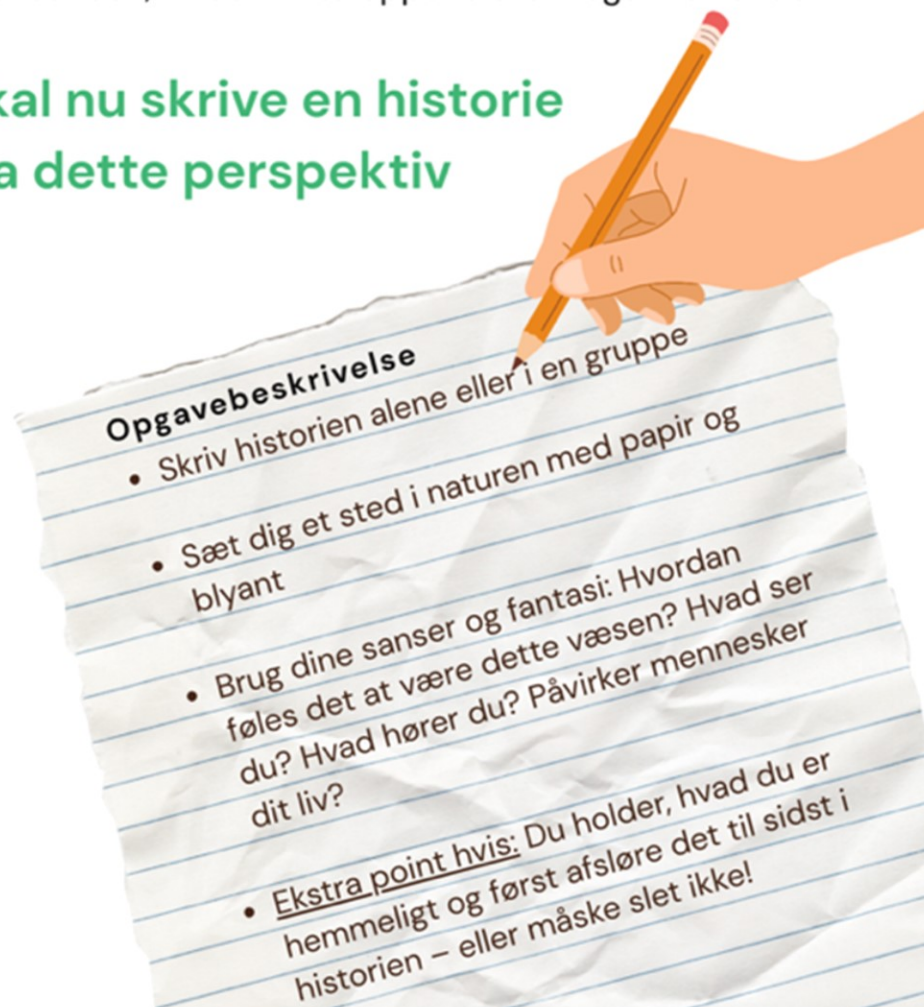
A key activity which illustrates how the philosophical connection was activated was a writing activity conducted right after the excursion to the protected forest (Day 4, Language). The pupils were asked to adopt the perspective of a non-human being; an animal, plant, or natural element, without revealing its identity until the end. This narrative frame encouraged perspective taking and prompted pupils to imagine life from another being's point of view. The activity was conducted indoors in the classroom, which served as a complementary space for the *udeskole* sessions. The classroom offered a space for introducing new themes, conducting online research, producing written poetic or narrative text or creative collages, and reflecting on nature experiences. In this way, the programme reflected core principles of the Nordic *udeskole* tradition, where the outdoor environment plays an active pedagogical role, and where outdoor and indoor teaching are in synergy with one another (Bentsen et al., 2009; Mygind, 2007; Bærenholdt and Hald, 2020). The writing activity could however, just as well have been conducted outside.

Hvis naturen kunne tale, hvad ville den sige?

Opgave: Forestil dig, at du er en del af naturen...

Forestil dig, at du er et dyr, en plante eller et andet væsen fra naturen. Måske en bølge ved stranden, en lille sten i vejkanthen, en rod i skovbunden, vinden i trætoppene eller noget helt andet.

Du skal nu skrive en historie ud fra dette perspektiv



Picture 6, Day 4, Danish, Perspective-taking assignment. Produced by the author.

The idea of writing from a non-human perspective invited reflection on what it means to exist as another being and what kinds of experiences, threats, or emotions that being might face. Drawing on their own nature experiences, the task created space for the pupils to interpret those experiences in narrative and ethical terms embedding moral and ecological reflections into their stories. This resonates with Schilhab's (2015) claim that embodied sensory experiences, when consciously reflected upon, become deeply encoded in memory suggesting that these earlier moments in nature may have provided fertile ground for the philosophical insights pupils expressed in their writing.

Some of the pupil's stories were playful, others introspective. A dramatic eagle monologue described displacement by logging and storms, ending with the line: "Can these humans not just leave?". A tree, communicating through "the forest's internet", expressed fear: "Sometimes humans do things they shouldn't.". Other stories focused on care, vulnerability, and survival such as a squirrel hoarding food to soothe loneliness or a bird seeking food for its young before being shot.

When asked why they were assigned the perspective taking writing task, pupils offered a range of reflections that touched on empathy, respect, and moral awareness. "So you might stop yourself from when you see a spider to just step on it and kill it." Said one girl (FG 1, Girl 2), suggesting that imagining the life of another being might affect how one treats it. Others echoed this moral framing, linking the exercise to greater consideration for nature: "Yeah, or so that we can have more respect for animals... You get a little sense that it's actually not so nice for the trees when they're cut down." (Focus-group 2, Page 3).

Some pupils expressed the value of stepping outside their own perspective: "To see what it's like to be something other than just a human." (Focus-group 3, Boy 8), or highlighted the vulnerability of non-human life: "We also have to think about the others. You know the animals, and their habitats." (Focus-group 3, Girl 4), and "To see how they can be scared, and how they might hide" (Focus-group 3, Girl 5). Though varied, the responses underscore a sensitivity to how human actions affect other beings.

Interestingly, the perspective-taking writing task revealed that some pupils who had been less verbally expressive or socially dominant in earlier outdoor activities produced some of the most thoughtful, ethically engaged, and emotionally resonant texts. Their written work surfaced a depth of reflection that had not been visible in group dialogue or exploratory tasks. This highlights how varied pedagogical forms, such as introspective writing and creative storytelling, can open access points to nature connection for pupils who may not thrive in discussion or physically active formats (Schilhab 2015).

Besides this writing task, the Language teacher played a key role in fostering philosophical engagement through reflective dialogue. Her facilitation style was consistently open and responsive, often building

spontaneously on pupils oral contributions. Whether wrapping up tasks or leading class discussions, she regularly connected the themes to pupils' everyday lives and experiences, making the topics feel personal, relevant and accessible. Among the reflective questions she posed were: "What is nature to you?", "What is wild, and what is human-made nature?", and "How are we treating nature?". Her approach seemed to create a space where the pupils felt safe to explore ideas and engage in reflective thinking. This was reflected in the high level of engagement and the many hands in the air when opportunities to share arose.

Pupils' expressions during the Language sessions underscore that the philosophical aspects of *naturdannelse* can be supported through imaginative, reflective activities grounded in lived experience (Lave and Wenger, 1991). The writing activity offered an authentic opportunity to draw on these situated encounters and construct meaning in personally and ethically relevant ways. Overall, the writing task, together with open-ended class dialogue, enabled pupils to explore ethical and existential themes in a way that complemented both subject goals and broader human-nature connections.

4.2.1 Cognitive Connection Across Subjects

As seen throughout the previous sections, pupils were encouraged to engage with nature emotionally and imaginatively, but also intellectually. They were asked to analyse human shaped landscapes, reflect on the meaning of protected forests, recognise and research bird species and write from the perspective of other elements of nature. These tasks supported observation, reasoning, and the ability to express complex ideas.

Many of the perspective-writing stories created by the pupils were clearly influenced by knowledge they had encountered during the programme, such as birdlife, habitats, tree root communication, biodiversity, food chains or environmental degradation, suggesting that cognitive content had been woven into their narrative imagination. This blending of imagination and ecological understanding illustrates how pupils acquired knowledge, but also reimagined and integrated it creatively through language, demonstrating deep cognitive processing. Although the Danish sessions were intentionally structured to provide pupils with direct outdoor experiences on its own as a foundation for language-based activities, observations and pupil work showed that many also drew upon experiences from the Science course. Rather than being a limitation, this revealed a valuable instance of cross curricular learning, where knowledge is mobilized across subject boundaries. This reflects educational theories that emphasize the value of integrated and interdisciplinary learning, particularly Situated Learning (Lave and Wenger, 1991), which stresses that knowledge becomes meaningful when applied across authentic, context rich settings. Pupils' ability to carry ecological content

from Science sessions into creative and reflective expression in Language sessions demonstrates cognitive transfer and reinforces the educational potential of thematic coherence across school subjects.

By using nature as a topic for writing, argumentation, or perspective-taking, the Language subject helped pupils move between lived experience and abstract thought. In doing so, it supported *naturdannelse* cognitively, while also aligning with the Danish Language curriculum's broader goal of developing reflective, articulate, and critically thinking students (Fælles Mål, 2019).

4.3 Recognising Impact: Pupils' Material Connection to Nature

In the science sessions, the material relation to nature became visible through moments where pupils reflected on how humans use, shape, and are constrained by the physical world. These reflections were both about resource extraction but also extended to ecological systems, land use, and limits of control.

One particularly significant moment came during the final session of the four week programme, when the class visited the protected Magical Forest. Several of the pupils expressed familiarity with the forest area, having been there with family or earlier school excursions. In the three prior sessions, teachers had repeatedly struggled to keep pupils from picking plants, snapping branches, or otherwise disturbing the teaching by fiddling with whatever they found. Despite reminders, this behaviour persisted as a kind of restless or unconscious interaction with the surroundings. However, when the concept of protected nature was formally introduced during the last session in the Magical Forest, the dynamic shifted noticeably. Upon arrival at the forest, the teacher explained that nothing should be broken or removed because the area was protected by law. This framing seemed to carry more weight in the pupils' understanding than previous rules. As the day progressed, pupils began to self-regulate and correct each other, reminding peers to stop breaking branches or to be more careful. The difference was striking. It suggested that when pupils were invited to reframe their interaction with nature as something governed by shared rules and ethical boundaries, their material relation transformed. Nature was no longer just a setting to move through or manipulate. It became a space with status, integrity, and limits. This shift from impulsive contact to respectful restraint suggests a deepening realisation of one's own physical impact on nature, which is central to the material dimension of *naturdannelse*.

A second example unfolded during the same excursion. As the class stood deep inside the protected forest, the teacher asked, "If this forest wasn't protected, what do you think would be here instead?" The pupils

hesitated. She then pointed beyond the trees and asked, “What’s just out there?”, referring to the beach behind the forest. When they answered, “the beach,” she followed up: “Don’t you think a lot of people would want to live this close to the beach?” This helped pupils connect the idea of protection with land use pressure and desirability, leading them to respond, “Yes, they’d tear it down and build houses or factories.” This spontaneous line of reasoning led to a deeper realisation that without legal or collective intervention, natural spaces risk being overwritten by human interest. It was a clear moment of pupils linking environmental value with political and economic forces and beginning to grasp how landscapes exist in tension between preservation and exploitation.

In the Danish language sessions, the material connection to nature was explored through plenum discussions. While the focus was not on ecological facts, pupils used language to articulate their ideas about human interaction with nature, often grounded in visible traces of use and transformation. One strong example occurred during day 3 where pupils had just completed a task involving photographing and writing argumentative texts about landscapes shaped by human activity. To build on this, the Language teacher gathered the class in the classroom and used a blackboard illustration to contrast two types of forests; one densely planted and uniform, the other more irregular and overgrown. Drawing on insights from a recent biodiversity conference she had attended, she explained, “There can be many reasons why people plant trees like this such as to use them for something specific. It looks quite nice, but over there on the left square, that’s where the animals are having a party.” (Day 3, Language). She said it with energy and emphasis, clearly wanting to direct pupils’ appreciation toward the unstructured, chaotic, biodiverse side of nature and not the neat and controlled. It was a joyful reframing, offering pupils a new way to value the living world: not in terms of visual tidiness, but in terms of its ability to support life. She then encouraged them to look for this pattern elsewhere, such as when they would be driving along motorways, where rows of identically spaced trees often appear. Several pupils responded that they had seen this before, expressing surprise and recognition. This moment reflects how place-based learning can support the material connection to nature by turning familiar, local landscapes into opportunities for critical interpretation (Gruenewald, 2003; Sobel, 2004). By contrasting wild and managed forest types, the teacher invited pupils to “see” biodiversity in everyday settings aligning aesthetic perception with ecological function.

Although it was the teacher who introduced the distinction, not the pupils, the exchange still helped them build a vocabulary and lens for noticing ecological design. In doing so, it activated the material connection as a way of interpreting the built and planted world, linking visible patterns to underlying intentions and ecological consequences. Rather than inducing guilt or concern, the tone of the teaching remained inviting and curious helping pupils develop attentiveness and appreciation for wild, biodiverse nature. Together,

these activities show how the material connection to nature can be cultivated even in a subject not typically associated with environmental education. By observing, discussing, writing, and reflecting on how nature is used, altered, or limited, pupils practiced thinking with and about the material world, even when they were not physically engaging with it. These examples illustrate one value of the *udeskole* practice in teaching, which is in when outdoor and indoor sessions supplement each other and become a longer meaningful process experience (Hald and Bærenholdt, 2020). The Language sessions reveal how language can act as a bridge between thought and environment, helping pupils conceptualise their relationship to nature in ways that extend beyond consumption into awareness, judgement, and ethical positioning.

4.4 Rethinking Sustainability Education

According to the subject aims for Science in the Danish Folkeskole curriculum:

”Pupils must develop an understanding of the interaction between humans and nature in their own and other societies, as well as a sense of responsibility towards the environment, as a foundation for engagement and action in relation to sustainable development.” (Folkeskole Act §5, section 3)

This clearly positions sustainability as a curricular priority, but it frames it primarily as a matter of teaching pupils cognitive understanding and ethical responsibility in relation to environmental issues. Sustainability is here framed as a societal issue that pupils should learn about and respond to (Folkeskole Act, 2025). In contrast, the framework of *naturdannelse* offers a complementary perspective where the connection to nature is not comprised to mere knowledge and moral duty, but also to sensory experience, emotional connection, and existential reflection. It recognizes that lasting care and responsibility may not grow from obligation, but from connection (Præstholt and Hartmeyer, 2021). In this light, *naturdannelse* can thus qualify the school’s approach to sustainability by creating a foundation so that action and responsibility do not arise solely from external demands, but from internal relationships, embodied experiences and personal meaning.

This contrast was evident in a value-based continuum activity (Day 3, Science), where pupils were asked to place themselves among three statements that best reflected their relationship to nature: ‘Nature makes me happy’, ‘I only use nature to get from A to B’, and ‘I always treat nature with respect.’. The most popular response was the final option and was supported with moral justifications from the pupils: “You shouldn’t litter,” (Day 3, Science) “You shouldn’t break branches.” or “You shouldn’t cut down trees.”

(Day 3, Science). The least chosen statement was ‘Nature makes me happy,’ which suggest that their emotional engagement with nature may be underdeveloped, or at least less readily articulated.

This gap between normative knowledge and personal connection was also noticed by the science teacher, who remarked that pupils’ responses seemed driven by what they thought adults expected: “Littering is always like, ‘I think that’s what the teacher wants to hear me say.’”(Science teacher, Interview). This reflects a broader challenge in environmental education namely, that pupils may reproduce socially desirable answers without these being grounded in deeply internalised values (Clayton et al., 2017). As Zylstra et al. (2014) caution how, ethical norms without accompanying emotional and existential engagement often fail to translate into lasting environmental attitudes or behaviour. For *naturdannelse* to take root, pupils must be supported not only in understanding environmental rules, but in forming personal, emotional, and philosophical bonds with the natural world (Chawla, 1998; Præstholt and Hartmeyer, 2021).

Together, these findings show how the five pathways to *naturdannelse* was enacted through different *udeskole* teaching strategies and subject framings. The following discussion will reflect pupils opinions on receiving *udeskole* teaching and then how the two teachers experience, realisations and development throughout the intervention.

4.5 Experiencing the Programme: Pupil Engagement and Teacher Development

This section explores how both pupils and teachers experienced the teaching intervention. Drawing on pupil interviews and teacher reflections, it illustrates how *udeskole* opened up new forms of engagement, emotional investment, and pedagogical transformation. While pupils described the sessions as more varied, collaborative, and meaningful than traditional classroom teaching, the teachers began to re-evaluate how sensory, emotional, and experiential practices could enrich subject-specific learning. Together, their perspectives show how *naturdannelse* can unfold in lived educational contexts through both curriculum planning, as well as through emergent interaction, reflection, and participation.

4.5.1 Pupil Perspectives on *udeskole*

Across both Science and Language subjects, pupils consistently described *udeskole* as more engaging and enjoyable than regular classroom instruction (Focus-group 1-4). In Science, pupils particularly highlight the investigative and sensory aspects “you could see what you were learning about”(Focus-group 1), which aligns with Barfod and Daugbjerg’s (2018) description of *udeskole* as a practice with potential for inquiry-based teaching. In the Language subject, it is the creative and personal dimensions that is highlighted, where pupils enjoy the freedom and opportunity to express themselves differently compared to traditional textbook-based teaching.

Beyond subject content, pupils emphasised the physical, social, and emotional benefits of outdoor learning. Movement, fresh air, and informal interaction were repeatedly described as motivating factors. These responses align with research on *udeskole*’s positive impact on well-being, attention, and social cohesion (e.g. Mygind et al., 2019; Elsborg et al., 2024). Pupils also indicated that the informal, collaborative format of outdoor sessions strengthened their relationships with peers and teachers. This reflects Hald and Bærenholdt’s (2021) view of *udeskole* as a relationally rich form of teaching, and aligns with Lave and Wenger’s (1991) theory of situated learning, which emphasises participation in meaningful, socially embedded practices.

4.5.2 Pedagogical Reorientation and Teacher Growth

While the programme aimed to support pupils’ connection to nature, it also prompted significant pedagogical reflection among the participating teachers. Their evolving perspectives highlight how *naturdannelse* can challenge traditional subject disciplinary boundaries and prompt deeper consideration of what counts as meaningful learning.

The co-creation process surfaced both opportunities and challenges in integrating *naturdannelse* meaningfully into school subjects. Although the programme was presented as a flexible, collaborative framework, the Science teacher later shared that she felt constrained by the suggested structure and would have preferred fewer, more in-depth activities focused on core subject goals. This response likely stemmed from early ambiguity around shared expectations. While the activity booklet was meant as inspiration, it may have appeared more finalised than intended. Institutional time constraints further limited joint planning, making it difficult to define subject-specific aims

particularly in Science, where I lacked expertise. As a result, much of the design relied on professional intuition rather than explicit curricular anchoring.

These conditions reflect a broader tension in pedagogical innovation: how to embed new ideas like *naturdannelse* into existing structures without marginalising core disciplinary objectives. The Science teacher expressed enthusiasm for the intervention, but also struggled at times to align reflective and sensory activities with traditional science content. She described this ambiguity as a learning process not only for the pupils but for herself. Despite these constraints, the co-creation process provided space for experimentation and revealed valuable insights into the pedagogical shifts required to support *naturdannelse* in practice.

Over the course of the programme, both teachers began to re-evaluate how nature-based learning could support core subject competencies. Initially, the Science teacher was sceptical about sensory activities and questioned their academic value. However, she soon noticed that pupils were developing ecological reasoning through direct engagement: “They could draw circles in nature... leaves decompose and become soil again.” This observation revealed how systems thinking could emerge through lived experience rather than through theoretical instruction. As the programme progressed, she began to value experience as a legitimate entry point into science learning: “I think I’ve come to realise that nature and natural science are easier to understand if you approach the task a bit differently.” Her evolving stance reflects the principles of systems thinking (Stone, Barlow and Capra, 2016), which emphasise relational understanding over fragmented content delivery.

The Language teacher also experienced a shift in perspective. She described how pupils’ engagement during birdwatching led her to pay closer attention herself. She deliberately positioned pupils as capable observers, encouraging shared discovery and emotional investment. Importantly, she began to see the Language subject not just as a vehicle for processing experiences from Science, but as a starting point for independent nature connection: “It’s more meaningful when we can take our starting point in the Language subject itself.” This reframing highlighted the potential of language education to engage with nature through imagination, expression, and interpretation.

In both subjects, learning deepened when it was rooted in pupils’ personal experiences. Activities such as describing a meaningful place in nature or reflecting on everyday encounters helped foster emotional accessibility and relevance. As the Science teacher put it: “It was in the children’s own language... It’s really about starting from a point where everyone can participate.” This resonates with theories of embodied

and situated learning, which emphasise how perception and understanding are shaped through sensory grounding, personal interest, and meaningful real-world engagement (Schilhab, 2015; Richardson, 2023).

Crucially, the intervention showed that *naturdannelse* does not concern only pupils it also invites teachers to rethink their practices and perspectives. Both teachers experienced moments of realignment as they learned to navigate between curriculum expectations and open-ended, inquiry-driven learning. Their reflections suggest that realising *naturdannelse* in schools requires thoughtfully designed activities but also professional space for reflection, experimentation, and co-learning. To support this shift, schools must legitimise *udeskole* as a pedagogical approach in its own right. As Bentsen and Jensen (2013) and Beames, Higgins and Nicol (2011) argue, real-world contexts offer fertile ground for learning in which cognitive, emotional, and sensory dimensions can co-exist.

5. Discussion

This study contributes practical, subject-specific examples of how *naturdannelse* can be fostered in the context of ordinary school subjects. This study suggests that *naturdannelse* not only fosters meaningful connections between pupils and nature but also enhances core subject learning when embedded thoughtfully into teaching. Rather than competing with curricular aims, the five pathways to *naturdannelse*; experiential, emotional, cognitive, philosophical, and material were activated in ways that supported and deepened disciplinary competencies in both Language and Science subjects.

While existing research has emphasized the importance of human-nature connection (Ives, et al. 2018), there has in the literature so far still been limited empirical knowledge on how these ideas could be enacted within disciplinary teaching. By analysis of how *udeskole* support different relational pathways in both Language and Science subjects, this study helps address this gap and offer concrete illustrations of how *naturdannelse* can align with curricular aims and pedagogical practice.

5.1 Cross-subject Insights and Pedagogical Implications

Across both subjects, *udeskole* provided the pedagogical conditions that made this integration possible. Its regular, place-based format enabled pupils to encounter content through direct experience, reflection, and sensory engagement. These experiences served as entry points into disciplinary learning, making abstract ideas more tangible and encouraging ethical, emotional, and critical engagement. In this way, *udeskole* functioned not merely as a setting but as a pedagogical method that opened space for holistic, *Bildung*-oriented learning (Hald and Bærenholdt, 2020; Præstholt and Hartmeyer, 2021).

The findings also highlight how each subject offered different affordances for *naturdannelse*. In Science, *udeskole* supported inquiry-based learning and ecological reasoning by anchoring scientific concepts in lived observation. In the Language subject, pupils used nature as a source of expression, interpretation, and perspective-taking activities closely aligned with the subject's emphasis on language, identity, and ethical understanding. These differences were not limitations, but complementary strengths. Together, they suggest that *naturdannelse* may be most effectively supported through a multi-subject approach that allows different pathways to emerge through the particular goals and methods of each discipline.

Teachers played an active role in this process. Both reflected on how their teaching practices shifted through the intervention. The Science teacher began to value perception, sensory and emotional resonance as part of scientific inquiry, while the Language teacher embraced nature as a context for reflective, imaginative, and ethical work. While subject framing and curricular structures clearly shaped each teacher's approach, individual teaching style and professional comfort with open-ended learning may also have influenced how they facilitated *naturdannelse*. The Language teacher's ease with reflective, imaginative tasks aligned well with her subject and her own pedagogical orientation. The Science teacher, by contrast, expressed more hesitation around affective or exploratory activities, which may reflect both subject conventions and personal teaching style. These insights suggest that teacher development is deeply embedded in the process of working with *naturdannelse*. Rather than being something teachers must have beforehand or achieve afterward, it evolves through their engagement with new pedagogical practices (Graf, Krogh and Qvortrup, 2023).

Although limited in scale, the findings contribute to broader research that identifies education as a deep leverage point for sustainability transformation not simply by transmitting knowledge, but by reshaping how pupils perceive, value, and relate to the natural world (Abson et al., 2017; Ives et al., 2019; Richardson, 2023).

In sum, this study highlights how *naturdannelse*, when supported through regular and curriculum-aligned *udeskole*, can enrich both environmental awareness and subject-specific learning. Its successful integration depends not only on outdoor settings or creative activities, but on teaching approaches that create space for reflection, engagement, and meaning-making within and across subjects.

5.2 Strengths and limitations

This study offers a situated and in-depth exploration of how *naturdannelse* can be enacted through *udeskole* within subject teaching in the Danish primary school context. A key strength lies in the fact that the intervention was conducted in a school that represented a highly supportive setting for *udeskole*. The case school represents a best-case scenario for this type of intervention. School leadership had already begun embedding *udeskole* into daily teaching practice by appointing dedicated teachers with time allocated to help colleagues implement outdoor learning across subjects. Two of these teachers participated in the intervention, and during interviews they shared that they had already begun introducing some of the activities to other staff particularly in special needs classes, where they observed strong engagement among

pupils with learning difficulties. These insights suggest that when *udeskole* is supported through school structures and peer-to-peer implementation, *naturdannelse* activities can be adapted and scaled meaningfully, even for diverse learner profiles. This reinforces the value of embedding such approaches into school-wide strategy, rather than relying solely on individual teacher initiative.

While this study offers insight into the integration of *udeskole* and *naturdannelse* in school subject teaching, certain limitations must be acknowledged to contextualize the findings. This research was conducted in a school already highly engaged in *udeskole*, with teachers who served as mentors in their local context and had prior involvement in outdoor education research. This “best-case scenario” may not reflect conditions in less experienced schools and limits how broadly the findings can be applied (Lincoln and Guba, 1985). The intervention spanned only four weeks and included two teachers and one class. The limited timeframe and participant pool restrict conclusions about long-term impacts or broader applicability (Merriam, 2009).

The study used qualitative interviews and observations methods that are interpretive and context-dependent. While triangulation and reflexive journaling were used to strengthen credibility (Lincoln and Guba, 1985), the presence of me as a researcher during the teaching may have influenced participants’ behavior. My access to participants was facilitated by my external supervisor, who had an established relationship with the teachers due to prior research projects. This connection may have influenced participant engagement or how they presented their teaching practices. Although I, in the co-creation process, contributed with research-based perspectives, I lacked classroom teaching experience. This occasionally created a mismatch between theoretical recommendations and practical feasibility, which for instance was visible when I would propose more activities than could realistically be delivered in a single session. Having defined this study’s boundaries, the findings should be understood as in-depth, context-specific insights that can inform, but not predict practice in similar educational environments.

6. Conclusion

This thesis explored how the concept of *naturdannelse*, a nature-oriented *Bildung* process, can be realised through *udeskole* in Language and Science subjects teaching in primary schools, and what pedagogical opportunities and challenges arise in practice. Focusing on the five relational pathways outlined by Ives et al. (2018), the study examined which kinds of teaching situations and activities appeared to foster different dimensions of *naturdannelse* in subject-specific ways.

The findings clearly demonstrate that the five pathways to *naturdannelse* were activated differently across the two subjects, reflecting their disciplinary orientations. In Science, the experiential, cognitive, and material pathways were particularly evident. These emerged through investigative activities, sensory observation of natural phenomena, and discussions around ecological systems and human impact. In the Language subject, the emotional, philosophical, and experiential pathways were more prominent. Pupils engaged in reflective and creative language tasks, perspective-taking, and ethical discussions inspired by their experiences in nature. Both subjects allowed different dimensions of *naturdannelse* to emerge, shaped by their disciplinary structures and teaching practices.

The findings suggest that *naturdannelse* can not only coexist with subject-specific goals, it may enrich them. In Science, outdoor inquiry supported core objectives such as investigation and real-world contextualisation. The inclusion of reflection on human-nature relationships added ethical and contextual depth. In the Language subject, sensory writing, metaphor, and narrative expression aligned with communication and literacy goals while also fostering personal meaning-making and ethical opinion formation. Pupils were invited to take positions, express values, and reflect on human responsibilities toward nature activities that supported both expressive language development and the cultivation of ethical awareness. Rather than existing in tension with subject aims, *naturdannelse* offered a meaningful extension of them, anchoring abstract concepts in lived, place-based experiences.

The enactment of *naturdannelse* through *udeskole* gave rise to diverse forms of pupil engagement, including curiosity, attentiveness, wonder, emotional resonance, and ethical reflection. Pupils were observed to be physically and emotionally immersed in their surroundings, engaging both with subject content as well as with the natural environment as a living context. Activities such as ecological treasure hunts, reflective discussions, and expressive language work enabled students to connect with content experientially and relationally. These experiences fostered deeper cognitive involvement and personal meaning-making, as pupils formed ethical opinions, expressed values, and reflected on their personal relationship with nature.

Taken together, these findings suggest that *naturdannelse* can be meaningfully realised through *udeskole* in both Language and Science subjects education. The five pathways offer a flexible framework that accommodates disciplinary variation while supporting a shared goal: reconnecting pupils with nature through embodied, emotional, and reflective learning. Pedagogically, *udeskole* enabled this process by providing the sensory, situated, and place-based conditions necessary for *naturdannelse* to unfold. Practically, the findings highlight that *udeskole* should not be viewed as an extracurricular or supplementary method, but as a valid pedagogical approach that can deepen both subject learning and pupils' relationships with nature. When supported by leadership, collaboration, and teacher training, activities rooted in *naturdannelse* can be adapted across disciplines even in diverse learner contexts, as teachers began doing with special needs classes during the study.

That said, this was a small-scale, short-term intervention in a highly supportive school environment. The teachers were experienced, the administration committed, and the implementation context unusually favourable. These factors limit the generalisability of the findings. Future research should explore how *naturdannelse* can be adapted in less ideal settings, across a broader range of subjects, and with attention to long-term effects on pupils' environmental awareness and behaviour. In a time when disconnection from nature is increasingly recognised as both a cultural and ecological crisis, this study reinforces the idea that schools can play a critical role in rebuilding that connection. Not by adding more content, but by teaching differently through experience, reflection, emotion, and place. In this sense, *naturdannelse* contributes not only to the *Bildung* of the individual, but also to broader sustainability efforts in education.

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Appendices

I. Appendix: Naturdannelse Model

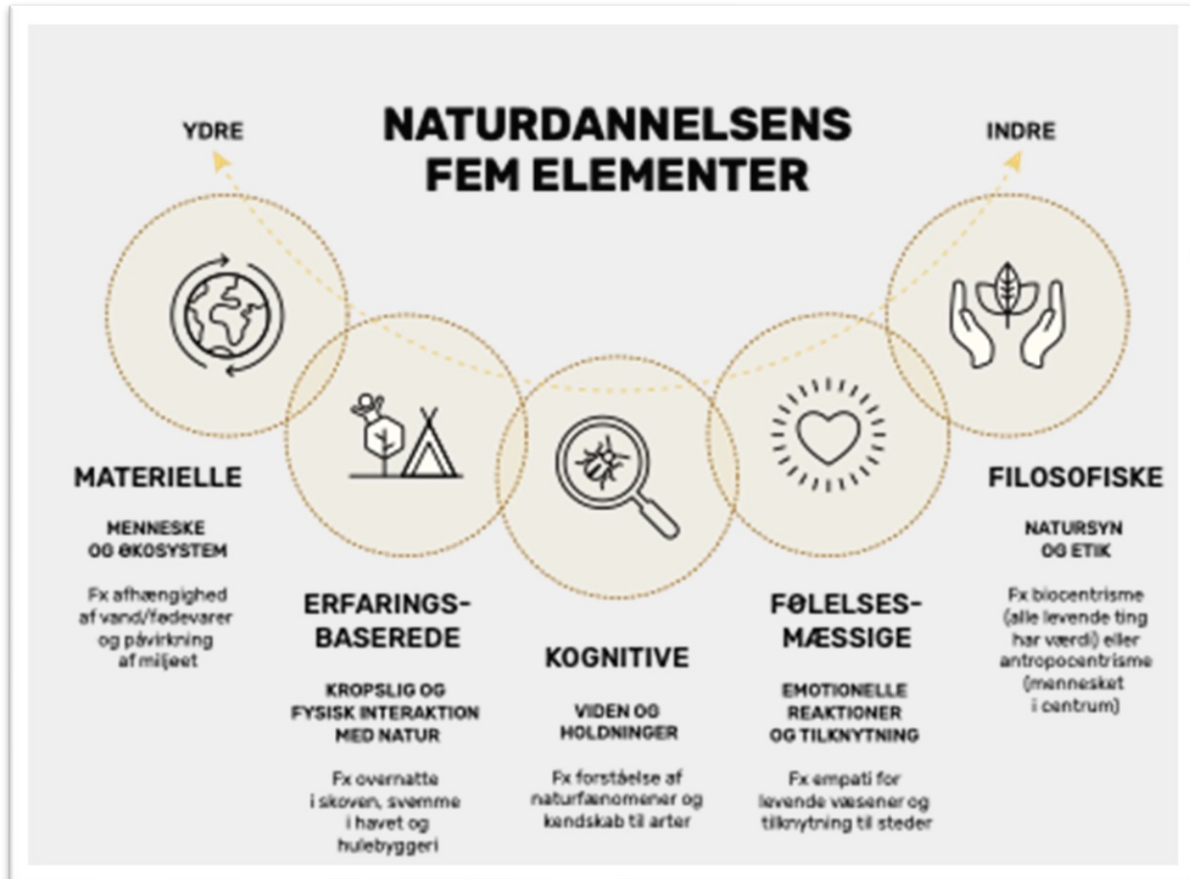


Figure 1: Naturdannelsens fem elementer. (The five elements of naturdannelse) by Præstholt and Hartmeyer (2021) based on review by Ives et al. (2018).

INVITATION TIL DELTAGELSE I FORSKNINGSPROJEKT OM **NATUR OG UDESKOLE** Februar/marts 2025

Vil du og din klasse være med i et spændende forskningsprojekt om **natur og udeskole**? Jeg studerer miljøantropologi og er ved at forberede mit speciale. Jeg undersøger udeskole og hvordan undervisning kan foregå i naturen. I den forbindelse søger jeg lærere, som underviser på mellemtrinnet i **sprogfag** og/eller **naturfag**. Du skal være klar på at lade naturen være ramme for din undervisning og bruge den som afsæt for et fagligt indhold, og samtidig have lyst til at lade mig følge undervisningen.

Hvad indebærer projektet?

- At du er dansk- eller naturfagslærer
- At både du og den anden lærer (dansk/naturfag) samtidig er klar på at bruge naturen som læringsrum i en periode på 4 uger i **februar/marts 2025**. En gang om ugen i hver af de to fag. Det behøver ikke at være tværfagligt.
- Klassen vil blive en del af et forløb, hvor jeg observerer undervisningen to gange om ugen (en gang i hvert fag) før, under og efter, at I har brugt et naturmiljø som setting for undervisningen, fx en skov, en vild park, det åbne land, eller kysten.
- Jeg vil også observere klassen 3 gange forud for forløbet for at lære klassen at kende.
- Der vil blive afholdt interviews med dig som lærer og fokusgruppinterviews med eleverne.

Hvad får du og klassen ud af det?

- Du vil få en introduktion til udeskole i naturfag/sprogfag, og til naturdannelse, samt naturforbundethed.
- Vi giver **en gave til din klasse** som en tak for deltagelsen **til en værdi af 1.500 kr.** – vi aftaler sammen, hvad denne gave skal være.
- Projektet giver jer mulighed for at bidrage til ny viden om naturbaseret undervisning.

Praktiske oplysninger

- Alle data vil blive behandlet anonymt, og deltagerne vil ikke kunne identificeres i resultaterne.
- Projektet er et selvstændigt specialeprojekt, som udføres med vejledning fra Lunds Universitet, og førende forskere i udeskole og naturdannelse ved det regionale forskningscenter, Center for Klinisk Forskning og Forebyggelse.
- Specialet omfatter kun skoler på Sjælland.




Er du interesseret eller har du behov for yderligere information?
Så kontakt mig endelig på ma6452gl-s@lu.se

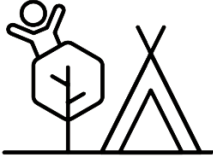

Med venlig hilsen

Mathilde Hansson
Lunds Universitet

II. Appendix: Recruitment flyer

III. Appendix: Observation Guide

Observable Indicators of the five pathways to <i>naturdannelse</i>		
Pathways	Guiding themes	Direct guiding questions
<p>Philosophical connection</p> 	<p>Is reflection being brought into play as intended?</p> <p>If so, how is reflection expressed by the students?</p> <p>What situation triggers the reflection?</p> <p>Is it influential?</p>	<ul style="list-style-type: none"> → Do the students ask reflective questions? → Do they show curiosity? → Does the teacher give students the opportunity to think things through? → Do topics such as ethics and responsibility emerge in their conversations?
<p>Emotional connection</p> 	<p>Are emotions being brought into play as intended?</p> <p>If so, how are emotions expressed by the students?</p> <p>What situation triggers the emotions?</p> <p>Is it influential?</p> <p><i>Watch body language</i></p>	<ul style="list-style-type: none"> → Do the students show enthusiasm? Exclamations, smiles, laughter, engagement → Do the students express care, empathy, joy for nature? “<i>Poor beetle</i>” → Do the students show signs of calm, immersion, or fascination? → Do the students show ownership or attachment to elements in nature? → Do the students express discomfort or negative feelings in contact with nature?
<p>Cognitive connection</p> 	<p>Is knowledge about nature being brought into play as intended?</p> <p>If so, how is that knowledge expressed by the students?</p> <p>What situation triggers this sharing?</p> <p>Is it influential?</p>	<ul style="list-style-type: none"> → Do the pupils connect the received knowledge to their own experiences? → Do the students ask wondering questions? → Do the pupils connect observations to larger systems?

<p>Experiential connection</p> 	<p>Are the senses being brought into play as intended? If so, how are the senses expressed by the students? What situation triggers sensory involvement? Is it influential?</p> <p><i>Watch for body language</i></p>	<ul style="list-style-type: none"> → Do the students actively use their senses? (Touching, smelling, listening, observing details in nature.) If not, why? → Do the students express statements about sensory experiences? <i>“Listen to that sound!” or “It smells different here”</i> → Do the students physically engage with nature? (Climbing, digging, exploring with their hands)
<p>Material connection</p> 	<p>Is the theme of humans material consumption of nature being brought into play as intended? If so, how is it expressed by the pupils? What situation brings this theme into play? What does the situation invoke?</p>	<ul style="list-style-type: none"> → Do the students talk about the use of nature? → Do the students show awareness of their own impact on nature? <i>“Should we leave it there?”</i> → Do the students show understanding of a practical use of nature’s materials?

IV. Appendix: Interview Guide Pupils Post-intervention

Interview guide

Post-intervention: Semi-structured Focus-group Pupil interviews
5th Grade pupils' Experiences and Reflections on Nature and udeskole in Language and Science subjects

Theme	Question
Introduction	<p>You've had lessons in nature. You've had them over in the forest by Rævebakken, out by the fields and the lake behind the school, and in the Magic Forest. You've also had lessons in the schoolyard and other places at the school where we worked with nature in both Danish Language and Science.</p> <p>Today, I'd like to hear how you experienced the lessons in nature and what you now think about nature. There are no right or wrong answers just say what you think. You should know that it's completely up to you whether you want to take part, and if there are any questions that are too difficult or that you don't want to answer, that's totally fine. It's a really big help for my project that you're willing to talk with me today.</p> <p>I'd really like to hear something from all of you. Please remember to be kind to your classmates and let everyone finish speaking without interrupting. We raise our hands when we want to talk.</p> <p>Are you ready? And is it okay if I start the recorder?</p>
If yes, start the voice recorder	
<p>First, I just need to get your names. <i>I'll write them down in the order they're sitting.</i></p>	
Nature view (philosophical relation)	<ul style="list-style-type: none"> ● What is nature to you? ● What do you think nature means to us as humans? ● What do you think makes nature good or healthy? ● How do you think people should treat nature?
What made the biggest impression (Experience based relation)	<p>Great. Now let's think back to the last four Tuesdays, when we were out in nature having lessons.</p> <ul style="list-style-type: none"> ● Is there a day or an experience in nature that you remember especially clearly? ● Can you tell me a bit more about what happened?

<p>Senses</p> <p>(Experience based relation)</p>	<p>Now I'd like to hear a bit more about your experiences in nature. We've talked a lot about the senses and used them in our sessions. Try closing your eyes for a moment. You use your senses, for example, when you see with your eyes... hear and listen with your ears... feel and touch with your hands or your body... and smell things with your nose. Try to think back to what you experienced during those sessions...</p> <ul style="list-style-type: none"> ● Which sensory experiences do you remember the best? What could you hear? What did you notice? Did you feel anything in your body? You can open your eyes again. <ul style="list-style-type: none"> ○ What was it like to use your senses in nature? ○ Were there any of the senses you liked using more than the others? Why? ● Why do you think we did sensory exercises in nature? (What do you think you can learn by using your senses when you're out in nature?)
<p>Feelings in and for nature</p> <p>(Emotional relation)</p>	<ul style="list-style-type: none"> ● How did you feel when you were out in nature having lessons? (Was there anything you felt in your body?) ● Was there anything that felt different compared to being in the classroom? (What was the atmosphere like? How did you feel inside?) ● What do you think was the most "wow!" moment? (Something that made you happy, surprised you, or that you just thought was really cool?) ● Do you remember the day when you had to imagine that you were an animal, a plant, or something else from nature, and then write a little story from its point of view? ● What was it like to step into the shoes of something from nature? Was it hard or easy? ● Why do you think it was hard or easy to imagine what it's like to be something else than human? ● Why do you think we did that assignment?
<p>Thoughts and learnings</p> <p>(Cognitive relation)</p>	<ul style="list-style-type: none"> ● Have you learned something new about nature or about how humans use nature? (Can you think of any examples?) ● Was there anything that surprised you?
<p>Making use of nature</p> <p>(Material relation)</p>	<ul style="list-style-type: none"> ● How do humans use nature? ● How do you personally use nature? ● If you take something from nature, how can you do it in a good way?
<p>Now you've told me a bit about nature and what you experienced in nature. Now I'd like to talk a little about outdoor school and having nature as a topic in your lessons.</p>	
<p>Udeskole intro</p> <p>Interdisciplinary</p>	<ul style="list-style-type: none"> ● What does <i>udeskole</i> entail? How long have you had <i>udeskole</i> in school? Do you have it in other subjects as well? ● When you think back on the sessions, could you always tell the difference between when it was Language and when it was Science? (How did you know?)

	<ul style="list-style-type: none"> ● If you hadn't known which teacher you had, do you think you could have guessed the subject based on what you were doing? ● Was there anything special about the tasks that felt more like Language or more like Science?
Danish - with nature as both the setting and the content	<p>You've done different tasks in the Language subject in nature - for example, when you wrote stories from the perspective of a being, created haiku poems, or talked about and described nature and birds. Now, I'd like to hear a bit about how it was to have Language sessions in that way.</p> <ul style="list-style-type: none"> ● What was it like to have <i>udeskole</i> in the Language subject? <ul style="list-style-type: none"> ○ Is there anything in the Language subject that becomes more fun when you're outside? ○ Other good things about having <i>udeskole</i> in the Language subject? ○ Was there anything that was difficult or not so good about having <i>udeskole</i> in the Language subject? (And why?) ● If you could choose, which parts of the Language subject would you want to do outside? <p>One thing is that we were outside, but you also worked with nature as something you could write about, read about, and think about in the Language subject.</p> <ul style="list-style-type: none"> ● What was it like to have nature as a topic in the Language subject?
Science - with nature as both the setting and the content, in a more sensory and reflective way.	<ul style="list-style-type: none"> ● What was it like to learn about nature while you were out in it, instead of sitting in the classroom and reading about it? <ul style="list-style-type: none"> ○ What was good about having <i>udeskole</i> in Science? ○ Was there anything that was difficult or not so good about having <i>udeskole</i> in Science? ● If you could choose, which parts of Science would you want to do outside?
Reflection about the exhibition product	<ul style="list-style-type: none"> ● You've created an exhibition about what you've experienced in nature. What have you chosen to display? ● Why did you choose exactly that? What do you hope others will understand or see when they look at your poster? (What do you want to tell others with your poster?)
Final reflection	<ul style="list-style-type: none"> ● Do you think differently about nature now, compared to before I came? ● If you could choose what you did next time you had sessions in nature, what would it be? And in which subjects? <ul style="list-style-type: none"> ○ What do you think is the very best way to have sessions outside?
Ending	<p>I don't have any more questions. Is there anything you'd like to add or talk more about before we finish? If not, I'd like to say thank you for your time and for being willing to help me with my project!</p>

Note: This version was translated from Danish to English. An effort has been made to avoid losing nuances from translation.

V. Appendix: Interview Guide Teachers Pre-intervention

Interview guide

Pre-intervention: Semi-structured Individual Teacher Interviews

The teacher's background and expectations

Theme	Question
Introduction	<p>Thank you for agreeing to take part in my interview. We'll be spending around 30-45 minutes together, during which I'd like to hear about your experiences and thoughts on <i>udeskole</i> and <i>naturdannelse</i> in teaching. The purpose of the interview is to gain a better understanding of your background, your experiences with outdoor teaching, your expectations for the program, and your reflections on <i>naturdannelse</i> in your subject. I'm also curious about your own view of nature and your relationship with it.</p> <p>To make sure I can focus on our conversation and analyze it properly afterwards, I'd like to record the interview. The recording will be used solely for research purposes, and all information will be treated confidentially and anonymized in my thesis. You can choose to stop the interview or skip any of my questions at any time. Are you okay with me recording the interview?</p> <p>There are no right or wrong answers - I'm interested in your experiences and perspectives. If there's anything you'd like to elaborate on or skip, that's completely fine. Does that sound okay to you?</p>
If yes, turn on the voice recorder	
The teacher's background	<ul style="list-style-type: none"> ● Would you briefly tell me about yourself and your educational background? ● How long have you been a teacher? ● Which subjects and grade levels do you teach? <ul style="list-style-type: none"> ○ What motivates you to teach those subjects? ● What made you want to participate in my project?
Making use of outdoor school	<ul style="list-style-type: none"> ● What are your experiences with outdoor schooling? <ul style="list-style-type: none"> ○ Which subjects + for how long? ● What made you start using outdoor schooling in your teaching? <ul style="list-style-type: none"> ○ How did you learn to do it? ● When do you feel that students gain the most learning through outdoor schooling? ● Are there any practical or organizational factors that make it easier or harder to work with outdoor schooling?

<p>Nature view and relationship with nature</p>	<ul style="list-style-type: none"> ● How would you describe your own relationship with nature? ● Can you give an example of a nature experience that has meant something to you? ● How do you think the students' relationship with nature is? ● How do you use nature in your teaching – if at all? ● What values or messages do you think are important when teaching about or in nature? ● What understanding of nature would you like to pass on to your students? ● What opportunities and barriers do you see for working to strengthen students' relationship with nature in your teaching?
<p>Expectations for the program</p>	<ul style="list-style-type: none"> ● What academic goals do you want to work towards with this program? / What is important for you that the students learn in this program? ● How closely do you want the subjects to work together? ● What role do you think the school and teaching should play in promoting a closer connection between students and nature? <ul style="list-style-type: none"> ○ And in relation to larger societal challenges? ● What do you hope to take away from the program yourself?
<p>Ending</p>	<p>I don't have any more questions. Is there anything you'd like to add or discuss before we finish? If not, I'd like to thank you for your time and for helping me with my project. I really appreciate it.</p>
<p>Turn off the voice recorder and save the file</p>	

Note: This version was translated from Danish to English. An effort has been made to avoid losing nuances from translation.

VI. Appendix: Interview Guide Teachers Post Intervention

Interview guide

Post-intervention: Semi-structured Individual Teacher Interviews

Intro	
<p>Thanks a lot for participating in my thesis and for contributing with such openness to my project, which has tried to investigate whether and, if so, how students' relationship with nature can be strengthened through teaching Danish and Science in upper elementary school. With you as experienced outdoor education practitioners, I have been truly honored to be welcomed into your world and embraced so warmly throughout the entire period.</p> <p>As a conclusion, I would like to hear your thoughts and reflections that you have made during and after our four-week program, and together, try to get closer to what we can take from these experiences as recommendations for future work in strengthening students' relationship with nature - through a subject-based practice.</p>	
<p>As mentioned, I would like to record our conversation. Are you okay with me turning on the microphone? Turning on the microphone.</p>	
Theme	Question
	<ul style="list-style-type: none"> ● When you think back on the program, what is the first thing that comes to mind? A mood, an experience, something that stuck with you? It can be something good or something that was difficult. ● How did you experience working with <i>naturdannelse</i> in your teaching? Just in general. ● How was it balancing <i>naturdannelse</i> with the academic goals in your subject?
Evaluation:	<ul style="list-style-type: none"> ● Were there any exercises that you particularly liked? Where you could sense that the students became engaged both in nature and with the academic goals? ● Which activity do you think was the most beneficial – both academically and personally?
	<ul style="list-style-type: none"> ● Before we continue, I'd like to show you some pictures from the activities during the program. They might help us remember and talk a bit more specifically about how it went and what made an impression. <ul style="list-style-type: none"> ○ What do you remember from this activity? ○ How did you experience the students' reception of it? ○ Was there anything particularly noteworthy here - either academically or in terms of <i>naturdannelse</i>?

	<ul style="list-style-type: none"> ● Would you do anything differently if you were to do it again? ● What do you think the students took away from this exercise in terms of Danish and <i>naturdannelse</i>? <p>Is this an activity you could see yourself using again? In the same subject or maybe in a different way?</p>
<p>Where do you see possibilities?</p> <p>What do the teachers think are the opportunities for <i>naturdannelse</i> in their subject?</p>	<ul style="list-style-type: none"> ● Do you see opportunities for <i>Naturdannelse</i> in your teaching? If yes, where? ● Are there any situations, themes, or times when you especially see potential? ● When you look back on the program – is there anything you think could have made the activities even better? Are there any activities you would change or further develop? ● Can you see other parts of the teaching where <i>Naturdannelse</i> could be included? ● Have any new ideas or thoughts come to you along the way - something you'd like to try later?
<p>Obstacles:</p>	<p>What has been the most challenging aspect of incorporating nature into your teaching?</p>
<p>Preparation:</p>	<ul style="list-style-type: none"> ● How did you feel prepared to teach in this program with <i>Naturdannelse</i>? ● How did you experience the amount and format of the planning meetings we had? Was there anything you missed along the way? ● Would you have preferred more joint preparation? ● Would you have liked more introduction to <i>naturdannelse</i>? ● Were there any aspects of <i>naturdannelse</i> that you felt particularly unsure about or comfortable with?
<p>Comparison of the students' outcomes and engagement in the teaching before and after</p>	<ul style="list-style-type: none"> ● How have you experienced the students during the program? Have you noticed any changes in the students' curiosity, understanding, connection to nature, engagement, and level of reflection? ● Were there any students who surprised you along the way - maybe someone who blossomed when meeting nature or in certain activities? ● What do you think about the students' view on the human relationship with nature? Is it something you have seen change throughout the program?
<p>Interdisciplinary reflections</p>	<ul style="list-style-type: none"> ● How did the collaboration between Danish and Science? Do you feel the two subjects complemented each other well, or were there areas where it was difficult to find synergy? ● Were there any activities that worked particularly well to combine Science and Danish? ● How did you experience the students' reactions to the interdisciplinary teaching?

	<ul style="list-style-type: none"> • Can you see potential in continuing to work with naturdannelse from an interdisciplinary perspective?
Personal development	<ul style="list-style-type: none"> • If you were to start a similar program again – what would you do differently? • Is there anything from the program that you can see yourself continuing with in your teaching?
Rounding off and saying thanks	<p>I don't have any more questions. Thank you so much for your answers and your time!</p> <p>Is there anything we haven't discussed, but that you think is important to include?</p> <p><i>Turn off the microphone.</i></p>

Note: This version has been translated from Danish to English. Efforts has been made to avoid losing nuances when translating.

VII. Appendix: Overview of four-week teaching programme

	Activity	Type of Activity
Day 1: Science	Search for signs of life in various habitats in a local natural area	Sensory
	Discuss signs of life and biodiversity	Reflection
	Search for life in specific habitats	Sensory
	Discuss possibilities for life in various habitats (human affected / untouched)	Reflection
	Discuss what nature is and pupils' personal relationships or experiences with nature	Reflection
Day 1: Danish	Read a story about different views on nature	Reading
	Find a place in nature that fits the story [^]	Sensory
	Describe and discuss choice of location. Reflect on different ways of perceiving nature	Reflection
	Discuss the sounds of nature and personal memories from the listening homework	Sensory
Day 2: Danish	Introduction to common birds and their calls through audio presentation in class	Factual input
	Nature treasure hunt for birds: listen for calls, spot them, and identify species	Sensory
	Walk and talk: in pairs, pupils read bird facts aloud to each other	Reading
	Investigate online and present chosen bird species	Cognitive
	Reflect and take a stance on personal relation to nature	Reflection
Day 3: Science	Sit alone in silence in nature and reflect on what can be learned from nature	Sensory
	Search for food chains and discuss their value	Sensory
	Photograph an example of human affected nature	Visual
Day 3: Danish	Describe and argue how humans have influenced the site	Argumentation
	Discuss the difference between wild and human shaped nature	Cognitive
	Write haiku poems about nature while being in nature	Expression
	Excursion to nearby protected forest.	Reflection
Day 4: Mixed (Science)	Discuss meaning and purpose of protected nature.	Reflection
	Explore the name and meaning of "Trylleskoven" (The Magic Forest)	Symbolism
	Nature treasure hunt with focus on sensing	Sensory
	Excursion to nearby protected forest.	Reflection
Day 4: Mixed (Language)	Class discussion on how nature can be seen as magical and alive	Reflection
	Write a story from the perspective of something in nature	Perspective taking
	Create a final creative poster summarising personal learning and key experiences	Visual synthesis

VIII. Appendix: Consent Form Teachers

Samtykke til deltagelse i specialeprojekt om UDESKOLE & NATUR

Projektets formål

Dette studie undersøger, hvordan naturdannelse kan understøttes og udvikles gennem udeskole i et tværfagligt forløb i natur/teknik og dansk på folkeskolens mellemtrin. I den forbindelse inviteres en klasse og to lærere til deltagelse i samskabelsen af ovennævnte undervisningsforløb samt tre interview runder. Interviews med lærerne vil blive afholdt både før og efter forløbet. Sidste interview runde foregår med klassens elever (med godkendt samtykke) efter forløbets afslutning.

Datasikkerhed

- Observationer og lydoptagelser fra interviews vil blive pseudoanonymiseret, så ingen kan identificeres i det endelige resultat.
- Data bruges kun til dette specialeprojekt og videregives ikke til tredjeparter.
- Alle data opbevares sikkert og slettes, når projektet afsluttes.
- Man kan til enhver tid trække sit samtykke tilbage ved at kontakte Mathilde Hansson på mathilde.h@live.dk, hvorefter alle data, der er indsamlet om dig, slettes.

Jeg giver hermed tilladelse til:

at den specialestuderende må observere mig under forløbet og at interviews må lydoptages og bruges i specialeprojektet.

Jeg bekræfter, at jeg har læst og forstået oplysningerne om projektet, og at jeg er klar over, at deltagelse er frivillig, samt at jeg altid kan trække mit samtykke tilbage.

Navn: _____

Dato: _____

Underskrift: _____

Hvis du har spørgsmål, er du velkommen til at kontakte mig, Mathilde Hansson.

Mail: mathilde.h@live.dk

Dept. of Human Geography, Master in Social Science, Human Ecology - Culture, Power and Sustainability, Lunds Universitet.

Dette er et selvstændigt specialeprojekt med vejledning fra Lunds Universitet og førende forskere i udeskole og naturdannelse ved det regionale forskningscenter, Center for Klinisk Forskning og Forebyggelse.



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IX. Appendix: Consent Form Pupils

Kære forældre

04.02.2025

Jeg hedder Mathilde og er universitets studerende. Jeg skriver speciale om brugen af udeskole i dansk og naturfag. Jeg er særligt nysgerrig på, hvordan det kan styrke elevernes relation til naturen. For at få indblik i, hvordan det fungerer i praksis, vil jeg gerne spørge om jeres tilladelse til at følge med i jeres barns klasse, når de har udeskole.

Jeg har fået tilladelse fra skolens ledelse til at følge med i undervisningen. Hvis I også accepterer, vil jeg følge klassen én dag om ugen i hvert fag i fire uger med start i februar/marts. Under observationerne, vil jeg tage noter af undervisningssituationen: altså lærernes arbejdsmåder, undervisningens forløb og elevernes generelle adfærd under udeskole.

Jeg vil især gerne blive endnu klogere på elevernes egne oplevelser og perspektiver på udeskole-forløbet, og håber derfor, at I vil lade jeres barn deltage i et anonymt fokusgruppe-interview på ca. 45 min. Deres input vil være meget værdifuldt for mit projekt.

For bedre at kunne illustrere de unikke elementer ved udeskoleundervisningen beder jeg også om samtykke til at tage billeder af eleverne under mine observationer. Billederne vil udelukkende vise eleverne i undervisningsrelaterede aktiviteter, og jeg vil undgå at fotografere ansigter.

Hvad får klassen ud af det?

Klassen vil få en gave som tak for deltagelsen til en **værdi af 1.500 kr.** Vi aftaler sammen med lærere og elever, hvad denne gave skal være + Mulighed for at bidrage til ny viden om naturbaseret undervisning.

*Gaven gives af Center for Børns Sundhed, Trivsel og Læring.



Samtykke til deltagelse i specialeprojekt om UDESKOLE & NATUR

Datasikkerhed

- Ingen navne eller personlige oplysninger vil blive indsamlet under hverken observationer, interviews eller billeder.
- Observationer og lydoptagelser fra interviews vil blive anonymiseret, så ingen elever kan identificeres i det endelige resultat.
- Data bruges kun til dette specialeprojekt og videregives ikke til tredjeparter.
- Alle lydoptagelser opbevares sikkert og slettes, når projektet afsluttes.
- Man kan til enhver tid trække sit samtykke tilbage ved at kontakte mig på mathilde.h@live.dk, hvorefter alle data, der er indsamlet om dit barn, slettes.
- Hvis der ikke er givet samtykke, vil jeg ikke inkludere dit barn i dataindsamlingen. Jeg fokuserer kun på elever med samtykke og undgår at registrere oplysninger om dit barn, også i gruppesammenhænge.

Jeg giver hermed tilladelse til:

- at mit barn må observeres under udeskoleundervisningen: Ja Nej
- at mit barn må deltage i fokusgruppelinterview: Ja Nej
- at mit barn må optræde på billeder fra udeskoleundervisningen: Ja Nej

Jeg bekræfter, at jeg har læst og forstået oplysningerne om projektet, og at jeg er klar over, at deltagelse er frivillig, samt at jeg altid kan trække mit samtykke tilbage.

Barnets navn: _____

Forælders navn: _____

Forælders email: _____
BLOKBOGSTAVER FORETRÆKES

Dato: _____ Underskrift: _____

Hvis du har spørgsmål, er du velkommen til at kontakte mig, Mathilde Hansson

mathilde.h@live.dk

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