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Thinking with fire, water and sun – material-discursive entanglements in Swedish outdoor education

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ABSTRACT

In this paper, we empirically demonstrate emerging material-discursive entanglements of different bodies in Swedish outdoor education, and thereby provoke openings for questioning some aspects of the conceptualization of a nature/culture divide. Outdoor and environmental education have been criticized for upholding this divide by not paying attention to the power structures through which bodies become sedimented as either human or nature. By discussing entanglements, and how educators might attend to them as a pedagogical tool, our paper responds to this line of thinking. Vital materialism and agential realism were put to work in a post-qualitative study at a Swedish folk high school. Through engagement with a group of outdoor students, empirical material was created and examples of material-discursive entanglements analyzed. We conclude that outdoor educators can create possibilities for attending to the entanglements of different bodies, thereby making possible a learning with them. This may open alternative ways to conduct outdoor education that challenge the conceptualization of a nature/culture divide.

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Introduction

The concept of nature is firmly sedimented into our way of thinking of the world, and so is its alleged separation from the presumed human realm of culture. According to many scholars, this separation has enabled an othering and a utilization of bodies¹ assigned to the nature side of the divide which has contributed to numerous injustices (Barad, 2012; Bennett, 2010; Kahn, 2010; Mcphie & Clarke, 2020). Education in general and outdoor education in particular have been brought forward as a possible means to challenge human exceptionalism and the conceptualization of a nature/culture divide (Kahn, 2010; Mcphie & Clarke, 2015). However, outdoor and environmental education are also criticized for upholding this divide by merely arguing that humans need to reconnect to nature, which in effect conceptualizes them as separate entities (Fletcher, 2017). This means that questions about how they emerge, how they matter and for whom are never asked, which hides power structures at play in their sedimentation (Barad & Gandorfer, 2021; Mcphie & Clarke, 2015). When attending to entanglements, Bennett (2010) argues for the importance of acknowledging the way in which matter is vibrant and always already part of our everyday doings, and recent empirical studies have shown that

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outdoor education can contribute to an increased awareness about these entanglements of multiple bodies as well as the possibilities to learn with them (e.g. Jukes & Reeves, 2020; Mannion, 2020; Mikael, 2018; Morse, 2021; Weldemariam, 2020).

A note on language is pertinent here. Throughout this text, the words *culture*, *human/s* and *nature* are sometimes written with a strikethrough. This is inspired by Jukes (2021), but originates from Derrida's intentions of marking that a concept is under erasure. By doing this, we also follow Barad (2007) when they claim that concepts are 'specific material articulations of the world' (p. 139) and as such they do not merely describe, but perform worlds (Barad & Gandorfer, 2021). Hence, by using ~~culture~~, ~~human~~ and ~~nature~~ where there are no additional constructions mitigating their given-ness, such as 'the conceptualization of', we wish to acknowledge that they are contested. For example, McPhie and Clarke (2020) alert us to the fact that the concept of nature is multifaceted and many of the different ~~natures~~ that are being performed actually blur the boundaries to ~~culture~~. This use of language is also an attempt to be loyal to an ontology of entanglements where concepts cannot be established prior to the tracing of their connections. This said, there is a delicate balance between avoiding the reproduction of concepts that we believe should be troubled and the writing of a concise coherent paper with the expected literary quality accessible to a broad (~~human~~) audience, in a language where these concepts are firmly sedimented. Our text is a humble and tentative attempt to juggle both positions.

This paper focusses on a research study situated within a group of outdoor students at a Swedish folk high school², and thus contextualized within the Scandinavian practice of *friluftsliv*³. This means that the study was embedded within a narrative where ~~nature~~ traditionally denotes specific places that ~~humans~~ visit to gain certain benefits such as well-being and freedom (Sandell & Sörlin, 2008). We will return to this point in the discussion. The study was theoretically framed by agential realism and vital materialism. These frameworks point out that matter and meaning are always already entangled, and that we are not discrete beings acting on or in an outside environment, but permeated with all sorts of materialities, acting within and being acted upon (Barad, 2007; Bennett, 2010). Methodologically, the study was guided by post-qualitative research inquiry which aims at placing material-discursive relations at the centre of understanding (Gunnarsson & Bodén, 2021; St. Pierre, 2018). We argue that outdoor education can be intentionally adapted to establish conditions for a possible learning with multiple bodies. This may ultimately foster an acknowledgement of and attunement to the intricate entanglements of all existence and open up for a troubling of the conceptual divide between ~~nature~~ and ~~culture~~ – a possible contribution to a more sustainable world.

Aligned with the aforementioned argument, we aim to demonstrate emerging material-discursive entanglements of different bodies in Swedish outdoor education, and in turn provoke openings for questioning some aspects of the ~~nature/culture~~ divide, such as the passivity of matter (Bennett, 2010) and the notion of separate entities with fixed properties (Barad, 2007). Throughout the discussion, we explore how thinking with material-discursive entanglements might offer alternative ways of doing outdoor education.

In the first section of this paper, we share an overview of the Swedish outdoor education context and some previous research on outdoor education. In the next section, we elaborate on selected theoretical frameworks and their implications for education. In the third section, we outline our methodology and the study, and in the fourth section, we unpack and analyse three vignettes. In the final two sections, we place our analysis in conversation with previous research and the theoretical frameworks, then suggest some possible ways forward.

Context

In Sweden, outdoor education is included in the subject physical education and health (PEH) as *friluftsliv* in the national curricula from primary to upper secondary school. The central subject

features include safety, navigating using maps, rights and obligations in nature, outdoor activities in different seasons, and knowledge about the Right of Public Access (Swedish National Agency of Education, 2022). Outdoor courses are also offered in a number of other educational settings such as folk high schools, study associations, interest organisations and private companies (Keystone Education Group, 2022; Studieförbundet, 2022; Sveriges Folkhögskolor, 2022b).

Swedish studies of outdoor education have mainly been set within PEH and have shown that there are challenges related to the geographical location of the school, students' prior experiences, and lack of time and curriculum guidance (Backman, 2008, 2011; Lundvall & Maivorsdotter, 2021). Furthermore, PEH has been found to rest on a division between humans and nature with a preference for carrying out extreme and material-intense activities in remote areas (Backman, 2008; Harju et al. 2020; Klaar & Öhman, 2014). This divide, along with a focus on human benefits, has also been dominant in outdoor education outside of Sweden (Gannon, 2017; Mcphie & Clarke, 2015; Remmen & Iversen, 2022).

The enactment of a nature/culture divide in Swedish outdoor education has provoked our contention that it is an important setting for research focusing on entanglements. This is supported by studies indicating that outdoor educators could think with entanglements to open for alternative doings. For example, Mikaelis (2018) found that PEH teachers could question taken-for-granted educational setups, such as equipment intense activities in remote areas, when places were contextualized through multiple connections of history, power, and ecology. This enabled teachers to work in innovative ways with sustainability learning as their main goal. In addition, Weldemariam (2020) found with preschool children that attuning to the emergent agency of actors such as weather might deconstruct simple boundaries between humans and nature and acknowledge interconnectedness.

Similarly, international studies have identified that outdoor education could contribute to students' ability to recognize the entanglements and interdependence with other bodies by attending to surprising encounters beyond curriculum contexts (Gannon, 2017) and to multiple stories (Jukes & Reeves, 2020). Outdoor education could also challenge the boundaries between different bodies by attending to how movement is co-created with places and technological devices, which could in turn conceptualize learning as embodied and relational (Jukes et al. 2023). It could also disrupt human-centered learning assemblages and actualize capabilities for sustainability by following unexpected encounters with other bodies (Mannion, 2020). Inviting students to move with other bodies and listen to their stories could prompt pedagogies that tune in to interconnectedness and disrupt human exceptionalism (Morse, 2021). This may also be achieved by thinking with particular landscapes and the bodies that dwell in such landscapes to prompt ethical questions of values for all (Jukes, 2021).

In summary, there is a growing body of research on outdoor education focusing on entanglements, but it is still scarce in a Swedish context. Our study with Swedish folk high school students offers a contribution to this research gap.

Theoretical frameworks

In vital materialism, Bennett (2010) argues that matter is actively engaged in co-creating its discursive meaning. Thus, it questions the idea of humans as the only active subjects and draws attention to the complexity with which a world of lively matter unfolds. In agential realism, Barad (2007) argues that any given entity is defined by both inclusions and exclusions in patterns of differences that come to matter, thus momentarily stabilising specific qualities of that which we perceive as bounded and meaningful entities. This *intra-action*⁴ is 'the material-discursive boundary-making practices that produce 'objects' and 'subjects' (p. 93), and the whole material-discursive practice, the *phenomenon*, needs to be the referent for the qualities of an entity. Thus, changes in the phenomenon also change the quality of the entities emerging

within it. However, the boundary-making within phenomena does not mark an absolute once-and-for-all separation, but rather 'relations of joining and disjoining' (Barad, 2012, p. 46) rendering boundaries between entities porous and iteratively reworked.

Focusing on entanglements renders concepts such as agency and responsibility emergent, meaning that agency is not an attribute of individuals and no single entity can be held responsible for a certain outcome, nor be in control of a chain of events (Bennett, 2010). This also reworks the concept of responsibility from being responsible for particular effects to the ability of responding to what agencies we are part of upholding and what possible marks they leave on the bodies involved. In this way, ethics is embedded in and emergent through all intra-actions (Barad, 2012).

Both vital materialism and agential realism reject dichotomies such as *nature/culture* where phenomena are vertically different in a hierarchy of power and importance. Instead they advocate a flattened representation of acknowledged (but not valued) differences (Bennett, 2010), where all bodies are of the world, entangled and response-able (Barad & Gandorfer, 2021). Importantly though, Barad (2007) acknowledges that while *humans* and *nature* are not regarded as ontologically given, their sedimentation into separate categories does exist and matter, i.e. generate material consequences (marks on bodies). As such, they need to be taken seriously and by reconfiguring them as emerging material-discursive phenomena, we can start tracing what and respond ethically to the inclusions and exclusions that constitute boundaries around what bodies comes to matter (and not) as *human* or *nature*.

In agential realism, *knowing* simply refers to the intra-action through which bodies become intelligible to others. In this way, being and knowing are entangled within all emerging bodies. Hence, learning is not exclusive for *human* minds, but a constant ongoing flow through the world leaving marks on bodies resulting from the emerging agency in the intra-actions of which they become intelligible (Barad, 2007). This means that learning is everywhere and *human* education⁵ needs to be attentive to what intra-actions are forming and what possible marks on bodies they leave. This resonates with the notion of learning *with* something, as part of it rather than apart from it (Weldemariam, 2020).

Methodology and the research apparatus

Our study was informed by post-qualitative inquiry and situated within a group of outdoor students followed by the main researcher for three weeks. In this section, we account for our methodological choices and how the study was conducted.

Post-qualitative inquiry

If the world does not consist of stable entities and everything is iteratively reworked, a methodological framework for exploring the world needs to allow the researcher to follow emerging material-discursive entanglements as they unfold, without rigid structures depending on decisions made beforehand. This is the aim of post-qualitative inquiry (St. Pierre, 2018), where a principal position is the honest recognition of not knowing, which in effect means to enter and move with a continuously evolving reality without a predetermined focus on what to study. 'Thus, the post qualitative inquirer does not know what to do first and then next and next. There is no recipe, no process' (St. Pierre, 2018, p. 604).

A basic assumption of this endeavour is that 'we are a part of that nature that we seek to understand' (Barad, 2007, p. 67), which implies that the researcher is entangled with that which is researched. As such, a post-qualitative study simply tunes in to a movement of agency that is always already there, and there is no such thing as a complete account of the truth from the outside (since there is no outside), only accounting as clearly and unambiguously as possible

for what emerges (Barad, 2007; Gunnarsson & Bodén, 2021). The knowledge production is about creating more, instead of validating the same and about decentering the human as the sole object of study. Consequently, the task for the researcher is to tune in to and attend to the materialized relations of all bodies and how they come to matter in an event (Gunnarsson & Bodén, 2021). This way of taking all bodies into equal account ultimately marks an ethical concern that is all-encompassing throughout the research process (Barad, 2007).

Post-qualitative inquiry has been criticized for making humanistic ideals such as equality and rights invisible (Gunnarsson & Bodén, 2021), as well as for suggesting that this turn is something new, when in fact it operates in the same way as humanist research has always done (Petersen, 2018). We acknowledge these as relevant points that need to be balanced in an inquiry that attempts to decenter humans while at the same time being conducted by two researchers who in this material-discursive practice (writing an academic paper) emerge as distinctively human. As other scholars have noticed (e.g. Jukes, 2021; Affifi, 2020), and as we have already mentioned in the introduction, this is a complex issue that cannot be solved, only handled with care through awareness and openness.

Research apparatus

The concept of research apparatus denotes that the whole research project constitutes a material-discursive practice and that every part(-icipant) is emerging within it, both affecting and affected by the research process. Phenomena such as analysis, data collection, report, preparation, research question, researcher, and participant are entangled and continuously recreated. The post-qualitative researcher must stay attuned to their central concept (in this study material-discursive entanglements) while being sensitive to whatever emerges as intelligible in relation to that concept. Still, necessary choices are made due to limitations in time and space combined with the impossibility to cover everything in a complex reality. Hence, every research apparatus is formed by inclusions and exclusions meaning that some phenomena will be highlighted at the expense of others. This co-creation has to be acknowledged by the researcher, who has an ethical responsibility for the apparatus they are part of enacting (Gunnarsson & Bodén, 2021).

The material for this study consisted of notes, recordings, and photographs and emerged during the engagement with a group of outdoor students and their teachers at a Swedish folk high school. The main author followed the group for three weeks; two of them were spent in the school and one in a mountainous region about five hours drive north of the school. The group consisted of three teachers and 21 students enrolled in a one-year outdoor education course. All of them gave their written consent for the researcher to engage in their daily activities, and guided by the research aim take notes and photographs, make recordings and use the collated material for academic research purposes. Before making recordings or taking photographs where human participants were recognizable, additional consent was sought. Notes were taken both during and after engaging with the group, always with the intention of attending to the vitality of whatever materiality (human or other) was at play in each given event. The doing of the engagement depended on what emerged as suitable for the moment. Sometimes this was realized as participating in activities such as making canoes, ice fishing, and skiing; sometimes listening to conversations; and, sometimes sitting in a corner of a room noticing all the sounds, smells, emotions, and movements. There were also times when the group asked to be alone and the researcher left.

The empirical material was analysed by means of a *tracing analysis* where phenomena are followed to see how they are (re)shaped through different intra-actions; a *diffractive analysis* investigating how parts that seem unrelated create patterns that matter; and, a *rhythm analysis* focusing on how doings and practices are organized around every-day rhythms, and what can

happen when they change or are disturbed (Gunnarsson & Bodén, 2021). The decision to employ these particular kinds of analysis emerged throughout the study in response to the ways in which the material formed into certain patterns while making itself intelligible to the researchers. This occurred during and after the field work, which meant that all participants were in some phases involved in the shaping as well as the analysis of the material, even though the final research writing was undertaken only by the authors.

The entire study followed the recommendations for 'good scientific practice' (Swedish Research Council, 2017) and was guided by the four main points of the European Codex for research integrity: reliability, honesty, respect, and responsibility (ALLEA, 2018). These were secured by: a thorough engagement with the theoretical and methodological frameworks; openness with the underlying study assumptions and transparency throughout the process; extensive procedures for informed consent and care not to disclose any compromising details in the account; and finally, constant awareness of the assemblages that were set in motion during the study and their possible consequences. Throughout the school visit, there was a readiness for addressing any emergent ethical issues, but no events that evoked specific ethical concerns were encountered.

The post-qualitative intention of not-knowing certainly posed a challenge when conducting a study where some things had to be known in advance, for example where to go when and approximately what to focus on. Before engaging with the student group, we knew that we wanted to attend to material-discursive entanglements, but not how they would unfold. Then as the school visit progressed, certain actors made themselves intelligible through these entanglements by making certain marks on certain bodies (e.g. holes in a canoe or written words in a notebook). In this respect, they became 'known' as empirical material. However, throughout the research process and in the drafting of this account (and through your reading of it), they keep intra-acting and making themselves intelligible in new ways. This means that the iterative movement between not-knowing, knowing and back to not-knowing is always already at play and any claims we make have to be seen as momentary sedimentations within specific intra-actions.

Findings and analysis

The photos and vignettes in this section were all taken/written down by the main author during the school visit, and we collaboratively chose these from a large body of material on the basis of what resonated most with the intent of this paper. Vignettes might be seen as merely representations of events frozen in past time, an account of what was. However, the following vignettes are also events in themselves and as much an emergent part of the research apparatus as the researchers, participants or research question (Gunnarsson & Bodén, 2021). As mentioned above, they show how actors emerged as intelligible during the study, while at the same time performing new entanglements each time they meet a reader and we hope that they will offer ruptures with the ability to affect (Masny, 2014).

Vignette one: tracing fire

On stands outside the crafts building, two canoes are lying upside down with a thick white canvas cloth spanning over the wooden boards. They are waiting to be coated with tar, but first lint has to be burnt off the surface in order for the canvas to accept the tar. The students are using gas burners, but the flame has to be handled with care. The teacher explains that canvas is not highly flammable as long as it stays together. But at the edges where the fabric has unravelled, fire might get the upper hand and the glow can eat its way into the canvas and on to the wooden boards. The students carefully move the hot flame back and forth over the surface until it is smooth. Then they go over the edges one extra time with their fingertips, making sure

that no threads are glowing before leaving the canoes for a break. After an hour or so they come back to find two holes where the glow has eaten into the canvas (See Figure 1). The wooden boards underneath are also burned, though not destroyed. One missed glow and they now have to start mending the canvas before they can apply any tar. This time, just a few patches of cloth were necessary, but the teacher tells a story from another occasion where the intra-action of canvas, fire and wood left a hole in the front of the canoe. (Field notes, March 2022)

In this event, fire made itself intelligible as an indispensable part in the intra-action of fire, canvas and tar that would make the canoe float. But, when frayed edges joined in, the emerging agency transformed the canoe body from able-to-float to in-need-of-more-repair-work. In this particular situation, wood was being used as a frame for the canvas, and fire for removing undesirable matter. Hence, they took on a different discursive meaning than they would in for example a wood stove. However, as soon as fire took hold of the edges, wood and canvas became burnable material and the whole event changed. In Barad's (2007) terms, the material-discursive phenomenon fire left certain marks on the canoe body instead of only the canvas, as intended by the students. Following Bennett (2010), fire was not just a passive element, but an active actor in the emergent learning situation.

This vignette shows that the materiality of fire, i.e. the visual effect of a chemical reaction, can change discursively depending on how, where and by what bodies it is encountered. Hence, the phenomenon fire is reshaped through every intra-action (Barad, 2007), and depending on the emerging agency of a particular intra-action, it may become desirable or not. In this vignette, fire made itself intelligible through the unexpected encounter with frayed edges, which disrupted the intended student learning activity (Mannion, 2020) and offered a surprising encounter (Gannon, 2017). We suggest that if educators stay with this disruption, by for example thinking with the interconnectedness of bodies (Weldemariam, 2020) and differences that comes to matter in both senses of the word (Barad, 2012), learning with fire as a part of an entangled whole could be made possible.

Vignette two: diffracting a glass of water

The student looks weary when gazing at the almost empty water buckets. Maybe the two-day journey has taken its toll and the afternoon is inviting to a nap instead of fetching water? But, perhaps a sense of loyalty to the group gets the upper hand when they pick up the buckets, hang them on their yoke and wander off through



Figure 1. Glow-canvas-boards-holes in the canoe photo: Karin Isaksson.

the slushy afternoon snow. They disappear behind the little hill, then return after about fifteen minutes with heavy steps, crouching under the burden. Almost there. Then in the split of a second the snow gives way from underneath the feet and the human body sinks to the thigh. The open buckets are not suitable for holding water during a sudden movement like that and half of the valuable load is lost to the already wet snow. (Field notes, March 2022)

In this event, actors such as buckets, water-as-snow, a creek, **human** muscles, a yoke, group loyalty, the sun and thirst were involved in the intra-action of fetching water. In the mountains, water had to be fetched from a creek about five hundred meters from the cabins (See [Figure 2](#)) along a snowmobile track. To fetch water for over twenty people, the students used a yoke and buckets. This technique, however, made the student-yoke-bucket-water phenomenon about twenty kilos heavier on the way back from the creek, hence more demanding for the underfoot snow to bear. To avoid falling through, water could be fetched on the hard morning snow or by using snowshoes or skis. In the vignette though, the student responded to the intra-action of which they were a part by doing nothing to mitigate the impact on the snow. This response left them with the possibility for embodied knowledge of the emerging agency of soft snow, **human** feet and heavy water buckets, instead of rendering two full water buckets for their friends. In other words, the student could learn with snow as a vibrant actor (Bennett, 2010), in a material-discursive entanglement that blurred given boundaries between place, technological bodies and their **human** body (Jukes et al. 2023).



Figure 2. Hole in the ice for fetching water photo: Karin Isaksson.

This vignette can be diffractively read through the act of fetching a glass of water from the tap. The latter seems simple, just go to the tap and fill the glass with water, while in the mountains on a spring-winter afternoon, the act of filling a glass of water could be a lot more physically, temporally and possibly emotionally demanding with many different actors to directly take into account. This might indicate that running water from the tap is more comfortable since it spares us the burden of fetching water in buckets. However, when carefully unpacking and reading the two practices through each other, the emerging differences reveal more complex patterns since the glass from the tap also connects actors such as pipes, pumps, water companies, fees, thermal pressure, political decisions, filters, plumbers' skills, the maintaining of public water reservoirs, billing systems and private economy among many more. The actors involved in the glass of water in the mountains seem fewer: buckets, a yoke, a creek, a hole in the ice, the physical movement of carrying the buckets to and from the creek, but not much more. However, each of these can in turn be unpacked which means that a glass of water, like any material-discursive phenomenon, can indeed become an endless complexity of intra-actions (Barad & Gandorfer, 2021), whether it is obtained in a city flat or by a mountain stream. We suggest that a diffractive reading such as this could provoke questions of freedom, comfort, distance between source and consumption, response-ability, etc. We also suggest that thinking with diffraction as a pedagogical tool might offer educators the possibility to focus on what different entanglements do, as well as open for questions of multiple values and ethics (Jukes, 2021).

Vignette three: the rhythm of daylight

There's a rhythm to the days here, a rhythm that follows the light and the weather systems. In the morning it's calm and quiet and the light is back and the heat comes if the sun shines (See Figure 3). (...) Then, during the morning the energy increases, both in the students preparing for small hikes and in the increasing wind (...) Then some time during the day the energy peaks (maybe following the arch of the sun) and it gradually becomes still, especially when darkness comes. Then in the evening, the darkness and the cold slows everything down until eventually we go to sleep, trying to harness the warmth that is left from the day (stored in your body and kept at bay by the sleeping bag). Then it starts all over again. (Field notes, March 2022)



Figure 3. Morning sun photo: Karin Isaksson.

In the mountains, the rhythm of night and day made itself intelligible by directing *human* movements in the absence of electric light, and as the first-year students were splitting up into groups to leave for three-night journeys, it became a vibrant actor capable of making a difference (Bennett, 2010). When one of the groups went through their plans with the teacher, the conversation partly revolved around the importance of daylight and its implications for planning and conducting a journey. Apart from the advantages of having full visibility when for example setting up camp, using the sun as a light source could also save other light sources such as flash lights or candles, which could be everything from convenient when waking up in the middle of the night, to lifesaving in case of an emergency. Following Barad (2007), the rhythm of the sun became a material-discursive phenomenon co-creating differences that mattered. The teacher told the students that by measuring the distance between the sun and the horizon with their hand, an approximate of the remaining hours of sunlight could be calculated. One finger represented about a quarter of an hour. Hence, the sun, time and the student bodies became entangled. We suggest that by thinking with entanglements and listening to the stories of other bodies (Jukes & Reeves, 2020; Morse, 2021), the students could, in Bennett's (2010) terms, responsibly enter situations in which they would increase their chances of enacting a good and safe journey. This might in turn constitute an embodied learning with the rhythm of daylight.

Discussion

In the previous section, we have demonstrated emerging material-discursive entanglements in Swedish outdoor education and suggested how mending the burned canvas of a canoe, sinking to the thigh in soft afternoon snow or measuring daylight with fingers might have offered students the possibility to experience these entanglements and the different marks they left on bodies. This way of attending to entanglements could enable students to become aware of the entangled state of bodies usually divided into *nature* or *culture*, which might provoke their appreciation that to 'harm one section of the web may very well be to harm oneself' (Bennett, 2010, p. 13). In other words, thinking with material-discursive entanglements might make them more grateful for, and humble before, the importance of entanglements in our everyday lives (Barad, 2007). On the other hand, there is also the possibility that this direct bodily contact enacts a further distancing from a *nature* that is comprehended as 'messy, dirty and inconvenient' (Fletcher, 2015) which might enhance the yearning for dominance and control seen in contemporary Western societies (Bennett, 2010; Kahn, 2010). Entanglements are not always comfortable, and the romanticizing of the 'natural outdoors' as something good and desirable in contrast to an artificial (i.e. *human*-made) indoors is a dichotomy as troublesome to an entangled ontology as the conceptualization of a nature/culture divide (Mcphie & Clarke, 2020; Sandell & Sörlin, 2008). To summarize, we do not claim that attending to and thinking with material-discursive entanglements automatically solves all injustices connected to *human* exceptionalism and the utilization of *nature*, but that it offers a possible disruption of the doings upholding such practices.

Further, a pedagogical approach that entails thinking with entanglements where all bodies are taken into account (Barad, 2007; Bennett, 2010) means that outdoor educators could open up possibilities for challenging the divide between different groups of *humans*. This could implicate a questioning of long journeys to remote locations demanding specialized equipment (Backman, 2011; Lundvall & Maivorsdotter, 2021). In turn, this may mitigate the environmental impacts of outdoor education by enabling less travelling and fewer material-intense activities, thus enhancing sustainable outcomes (Mikaels, 2018). In that respect, an important troubling of this study is that two of the three vignettes emerged during a stay in a remote mountain area which, within the Scandinavian friluftsliv discourse⁶ might be conceptualized as a mix of

what Mcphie and Clarke (2020) call *scary nature* and *scenic nature* – a beautiful, but demanding, white wilderness that people long to visit, but would not want to inhabit (Fletcher, 2015). This was certainly not a place that anyone could have engaged with and the study thus partly reproduces the discourse of extreme friluftsliv (e.g. Backman, 2008, 2011; Harju et al. 2020; Klaar & Öhman, 2014) that may enhance challenges related to geographical location, students' prior experiences, and lack of time (Backman, 2008, 2011; Lundvall & Maivorsdotter, 2021). Importantly though, what we offer as pedagogical tools for teachers to think with are the material-discursive entanglements as such, not claiming that this is how the encounters with fire, water or sun will (or must) play out within other apparatuses. There is an important sense in which these diverse actors can be encountered anywhere, and the possibilities of learning with them are certainly not limited to remote mountain areas.

The vignettes invited us to think with educational situations as intra-active and emergent. When the students could see, touch, smell and feel the agency of the glow-canvas-canoe entanglement or sink to the thigh in soft spring-winter snow, possibilities to learn with fire and water-as-snow unexpectedly presented themselves in ways that would not have been made intelligible had the activities unfolded as planned. An implication for teachers is to consider how the setting up of outdoor education might allow for the unexpected to enter the intra-action? A possibility is to think with some of the many posthumanist pedagogical approaches where the *human* is decentered in favor of entanglements. Two examples are *wild pedagogies* (Jukes & Reeves, 2020) where an openness to the unexpected and the not-yet-become requires a purposeful uncertainty, and *assemblage pedagogy* (Mannion, 2020) where attention to other bodies can disrupt existing *human*-centred assemblages and flow with evolving new ones. In these approaches, agency would not be contingent on *human* subjects, but seen as distributed throughout various material-discursive intra-actions, blurring the boundaries between different bodies (Jukes et al. 2023). We suggest that by not planning in too much detail, leaving a space for thinking with entanglements as they unfold, outdoor educators could open up space for students to experience themselves not as separate entities exploiting an environment, but as part of an integral whole. Matter might then become reconstituted as something 'not-wholly-calculable [embodying] a certain open-endedness to life' (Bennet, 2010, p. 64), and taking all bodies into equal account could offer the disruption of a *human*-centered ethic in favour of an ethic of entanglements (Barad, 2012).

To summarize, we posit that embracing material-discursive entanglements in outdoor education fosters a holistic and critical learning approach involving diverse bodies. Acknowledging teachers as influential contributors due to their institutional authority underscores the importance of their affective abilities, sensitivity, and awareness in shaping and reworking learning environments. Grounding pedagogy in material-discursive entanglements serves as a foundation to encourage both teachers and students to transcend *human*-centered assumptions, emphasizing interconnectedness rather than mere reconnection (Fletcher, 2017). This approach prompts a reconsideration of concepts like the environment, objects, and materiality, challenging the conventional nature/culture divide.

Concluding remarks and way forward

This study empirically supports the claim that outdoor educational settings can create possibilities for attending to the entanglements of different bodies, and thereby make possible a learning with them (e.g. Gannon, 2017; Mannion, 2020; Morse, 2021; Weldemariam, 2020). Though not claiming that this is an inevitable consequence, we have suggested that when teachers think with material-discursive entanglements, this might open alternative ways to conduct outdoor education to possibly challenge the conceptualization of a nature/culture divide. However, we have also acknowledged that in an entangled world this is possible anywhere, and we firmly believe that different settings should be approached from this perspective. For this study, we chose Swedish

outdoor education since it has been shown to reproduce a conceptual divide between **humans** and **nature** through its dominating discourses and practices (e.g. Backman 2008; Harju et al. 2020; Remmen & Iversen, 2022). Within this paper, we have shown how this can be challenged by embracing a pedagogy that recognizes the significance of materiality in shaping educational experiences. This challenges the notion of outdoor education as a planned intentional practice and embraces a not-knowing perspective as a deliberate pedagogical strategy.

The choice to engage with material-discursive entanglements related to the conceptualization of a nature/culture divide excluded other matters of concern that might have been important for the specific group in this study and/or for educational practices in general. This choice was solely ours and highly influenced by a lifelong embeddedness in the enactment of *friluftsliv*, with **nature** conceptualized as specific places outdoors that **humans** can visit to encounter certain kinds of actors and satisfy certain kinds of needs (Sandell & Sörlin, 2008). This in turn affected what entanglements had the chance to make themselves intelligible to the main author during engagement with the group, which may well have excluded entanglements of bodies that would have been conceptualized as what Mcphie and Clarke (2020) term *artificial nature*, such as computers, cars, cellphones or books – entanglements that could have come to the fore had we asked other questions during the research process and that could have contributed to a troubling of a conceptual divide between **nature** and **culture**. Since researching a complex and entangled reality means always already missing out on most connections (Bennett, 2010), this is not a question of errors that should be corrected. However, it creates an important limitation to the intention of a completely open and not-knowing perspective. It also points to the importance of further inquiry into the conceptualizations of nature and culture that might linger in research on outdoor education and how researchers might become even more aware of these. In other words, a ‘genealogical analysis of how these crucial dimensions are materially and discursively produced’ (Barad, 2007, p. 32).

Aligned with the above, we wish to again acknowledge our position as two **human** researchers attempting to decenter the **human** while still writing (in **human** language) a text intended for a **human** audience. In this, our own biases, beliefs and perspectives are inevitably entangled with every given choice throughout the research process. We can only hope that our immense engagement with all kinds of bodies throughout this study has rendered them intelligible to the reader and in some ways mitigated our inevitable **human** position.

Notes

1. Whenever we use the word **body**, we are referring to any materialization perceived as an entity, i.e. both those that are conventionally called **human** and those that in many critical and posthuman approaches are called **nonhuman**, **more-than-human** or **other-than-human**.
2. Adult education outside of the regular Swedish school system.
3. *Friluftsliv* denotes outdoor activities and recreation. In contrast to for example sports, *friluftsliv* generally refers to non-competitive activities, even though there are overlaps between the two (Backman, 2018). When we talk about outdoor education in a Swedish context, this generally means *friluftsliv* education.
4. As opposed to *interaction*, which denotes the relation between already defined entities, the neologism *intra-action* is used by Barad (2007) to underline that “...distinct agencies do not precede, but rather emerge through, their *intra-action*” (p. 33).
5. Although we wish to recognize all bodies as emerging from learning *intra-actions*, the context of this study is still the **human** educational system. Hence, when we discuss learning, it is the learning of **human** bodies that we are referring to. This means that the setting of the study gives it a lingering **human-centeredness** that we humbly acknowledge.
6. In raising this point, it is important to recognize the inherent Western perspective embedded within the entire *friluftsliv* movement. Additionally, we acknowledge that various elements instrumental to this study’s realization (**human** students, plastic skis, cars, snowmobiles, etc.) may be subject to scrutiny in light of contemporary challenges such as climate change and mass extinction. Furthermore, we are mindful of the fact that two of the vignettes presented in this paper depict events that transpired on Sami lands.

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