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### 'The sun was so thirsty it drank all the water!' Co-constructing pedagogies for environmental education in UK primary schools

### Francesca Salvi <sup>1</sup><sup>a</sup>, Teguh Wijaya-Mulya <sup>1</sup><sup>b</sup>, Alex Sabine <sup>1</sup><sup>c</sup> and Evy Tjahjono<sup>b</sup>

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#### ABSTRACT

Children are often positioned as future leaders, yet given few opportunities to lead in their local communities - schools a prime example. In response to calls for more inclusive and child-led pedagogies, we carried out a study around the guestion: What pedagogies might we embrace that introduce environmentalism, while also supporting children in leading their own learning? Reflecting on a period of three months of participant observation in two urban primary schools in the South of England, between April and July 2023, we draw our experiences together around the concept of 'doing-together-inplace'. This articulates a pedagogical approach to environmentalism that promotes a positive uptake of uncertainty in practice: uncertainty is both the departure point of our reflection, the end outcome of an education system that must prepare younger generations for societies and environments that we do not yet know, and the process to achieve our ambitions. Recognising the inevitable loss of comfort uncertainty in educational practice entails, we argue that a stronger focus on locality on the one hand and relationality on the other hand may offer viable opportunities for reframing uncertainty as a positive and enabling value. **ARTICLE HISTORY** Received 14 June 2024 Accepted 2 April 2025

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Uncertainty; pedagogy; environmentalism; UK; primary school; placeresponsive education

#### Introduction

In May 2023, on a particularly hot Wednesday afternoon, seven-year-old Reuben explained to a group of children, two researchers and five university students how climate change plays out in practice. 'The sun was so thirsty it drank all the water!' There was laughter, and there was running around in the playground. We – the authors of this paper – were not sure what to make of Reuben's claim, but there was something in it that kept on nudging us. Reuben had made some connections between his environment (it is hot) and himself (I get thirsty when it is hot) and used this to generate knowledge around more abstract concepts such as climate change. This paper takes heed of Reuben and focuses on how to build knowledge by making connections between people, materiality and the environment. In centring children like Reuben, we weave together current policies and pedagogical theories, suggesting ideas for participatory practice.

In April 2022, the UK Department for Education (2022) produced a policy paper titled 'Sustainability and climate change: a strategy for the education and children's services systems', which set the objectives to be achieved by 2030. These revolve around the need for educational settings to

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achieve 'net zero' in working towards better environments, while also increasing young people's resilience to climate change, in a context of continued excellence in education. Although some of these can be achieved via architectural/engineered solutions around retrofitting and green energy consumptions, others are heavily dependent on the human factor (Devine-Wright et al. 2022). This positions educational communities as key actors in the fight to mitigate and adapt to climate change: within these, children should not only be included as passive policy recipients.

By means of identifying ways for children to more actively participate in policy implementation, this paper reports back from a period of three months of participant observation in two primary schools in the South of England, between April and July 2023. The schools were in an urban setting and did not offer any environmental education to the pupils, despite expressing the desire to enhance their provision in this sense. In these schools, the first author ran an after-school club with approximately 5 university students completing their undergraduate degrees in Childhood Studies, and up to 20 children aged 5–7. The sessions offered children the opportunity to engage with various activities broadly aimed at nurturing an emotional bond with their immediate environments. In line with Malone (2013), we believe that a positive interactive cycle of accessibility, mobility and engagement with the environment opens up possibilities for environmental change agencies.

We reflect upon these experiences through a New Materialist framework (Barad 2007) that acknowledges the entanglements between the materiality of space - the school playgrounds we ran the clubs within - children's actions and our involvement and interpretations. In so doing, we ask: What pedagogies might we embrace that introduce environmentalism, while also supporting children in leading their own learning? In articulating our findings, we find inspiration in the work of Kirby, Villani, and Webb (2023), concerning the importance of educating children for uncertainty. We build on their conceptualisation to engage with the (often uncomfortable) instances of uncertainty educational practices may present. The sessions we share here revolve around a practice of 'doing' informed by John Dewey's educational philosophy (1938). 'Doing something' with children in their school playgrounds - where this 'something' is not necessarily planned in advance - necessarily presented as a disruption in educational scenarios that were (and are) mostly structured by adults. This led us to also consider relational pedagogies (Hickey and Riddle 2022) to complete the theoretical framework for this work: mainstreaming uncertainty, in other words, may enable a specific type of agency, one that exists within the relationships that emerge in the production of knowledge. Uncertainty disrupts the age-related hierarchies traditional education – schooling – relies on; yet it may be more meaningfully conducive to children's participation.

We see this paper as an exercise in 'forcing knowledge open' (Reinertsen and Thomas 2023), as we identify where the practice of knowledge – *knowledge-ing* (Taylor 2020) – could progress next. With this in mind, we set off by building the theoretical framework this works takes inspiration from and wishes to contribute to. Here, we inevitably blur the lines between research and teaching, as we are academic researchers working in educational spaces. For example, we acknowledge and rely on New Materialism to analyse the data stemming from this project, but are keen to emphasise the value of this line of inquiry for educational and pedagogical practice. The body of education research influenced by posthumanist philosophies has been growing rapidly (Rosiek et al. 2024) – unsurprisingly maybe, due to its focus on moving beyond anthropocentric frameworks to consider the entanglements of humans, non-humans, materialities, and technologies in educational processes.

In identifying the more-than-human synergies between a pedagogy of doing and relational pedagogies, we propose the concept/practice of 'doing-together-in-place'. We choose lay words ('doing', 'together', 'place') to define the pedagogical contribution of this paper to still 'make space' for minority voices (children's voices) to come to the fore – not only during the generation of data but also now as we write up – so that the collaboration between researchers and children remains at the root of our position.

#### Positioning doing-together-in-place

In looking back at the sessions with the children, we identify three concepts that are particularly useful in illuminating the data that emerge. These are the concept of uncertainty, a place-based approach to experiential learning (Yemini, Engel, and Simon 2025) the idea of relational pedagogy (Hickey and Riddle 2022). We address these in turn here.

It is only recently that Biesta (2022) framed the Covid-19 crisis as an interruption - of routines, progress and ultimately, of normality in education. Yet - Biesta warns - we should not see interruptions as rare phenomena, they are inevitable. For some of us, this means reframing objectives, priorities and routines. For others – especially in the context of precarity and disadvantage, this may mean never really settling. This is what transpires from the work of Scoones and Stirling (2020), who argue that uncertainty – as the consequence of said interruptions – is key to understanding how we experience the world. For them, uncertainties are constructions of knowledge, materiality, experience, embodiment and practice that challenge singular notions of modernity and progress as a hard-wired 'one-track' 'race to the future' (1). Uncertainty is therefore something we face (think of climate change for example) as well as a condition of knowledge itself: how we understand, frame and construct possible futures (Scoones and Stirling 2020, 4). This leads to two considerations, in the field of education. Firstly, that we face the imperative to educate for uncertainty (Kirby, Villani, and Webb 2023), and secondly, that uncertainty cannot solely be an outcome of educational practices but needs to be embedded within these educational practices as a doing as well. In climate change education scholarship, there are studies discussing uncertainty, but this is very limited, such as van Schaik's (2023) study on representations of uncertainty in educational games about climate change; our study joins and seeks to extend these existing explorations of uncertainty in (environmental) education.

Further, if educational practices are to proceed in such uncertain terrains, where do we then turn for relief? In the absence of assumptions about what *should be*, we have found relief in Dewey's (1938) focus on experiential learning – an understanding that knowledge emerges through lived experience. Yet, our engagement with learning as an active, material process draws us closer to the entanglements Barad (2007) describes. What we come to know and do is not merely an outcome of individual agency but is shaped through intra-actions – dynamic entanglements between human and non-human forces that bring space, materiality, and embodiment into play.

The benefits of applying New Materialism frames to education have been widely acknowledged – so much so that Rosiek et al. (2024) identify place-based research as a specific genre of posthumanist inquiry, while Mannion (2020) underscores its implications for environmental and sustainability education. Across various strands of research – from place-responsive pedagogy (Lynch and Mannion 2021), to outdoor education (Stewart 2020) and learning in nature (Nelson and Cowie 2024), the intra-active emergence of knowledge becomes evident. Acknowledging how subjects and matter co-constitute one another through these intra-actions is not just a theoretical insight but a vital bridge between research and pedagogical practice. It is in these entanglements that we find both relief and possibility, revealing how learning materialises within and through the vibrant, unfolding relations of the world.

Much of the important work carried out in the UK sees environmentalism as connected with nature and the outdoors. Forest Schools, for example, emphasise play, preferably in a woodland environment (Blackham, Cocks, and Bunce 2023; F. Harris 2021). Yet, the environmental potential and opportunities for schools that are localised in overly built environments and urbanised areas remain underexplored. For example, the outdoor areas of the urban schools we generated data with may not offer ready access to 'nature', in comparison with rural schools. This element defines what and how learning can be pursued through materiality, which for us was an inevitable starting point. Space, in other words, defines the realm of what is possible by means of offering boundaries to what we could and could not be. This repurposing of 'doing' then 'puts to work' Dewey's humanist conceptualisation in a nod to Barad's (2003) notion of apparatuses, as

constituted through particular practices that are perpetually open to rearrangements, rearticulations, and other reworkings. The nature of what is possible hinges upon this articulation of human and more-than-human entities, which become by means of interacting with one another. This means that the nature of the children taking part in this study became intelligible by means of them engaging with the materiality of the school grounds. Similarly, we became more aware of spatial arrangements as we interacted within them alongside the children. At the same time, space is experienced through the senses involving the whole body (Løkken and Moser 2012). This approach is reminiscent of Lynch and Mannion's (2021) concept of attunement, which calls on us to respond through our actions *with* the world (866). Attuning to – or responding to – the environment positions it not only as a context to human actions, but as a more agentic entity, which we engage with interactively in negotiating aims and identities.

Last, once the comfort of knowledge-as-known is removed and uncertainty embraced as possibilities, then the process of knowledge-ing (Taylor 2020) relies more heavily on relationality and affect. Learning is not only experiential but also collaborative. For Reinertsen and Thomas (2023), de-comforting goes hand in hand with minoring, a process whereby subjectivities become embodied within spatiality and temporality: more-than-human entanglements are thus also plural, and interdependence becomes key in recognising others as agentic. Similarly, Mannion (2007) argues that a focus on spatiality necessarily overlaps with one of relationality, because children's lives are interdependent with the lives of adults: the spaces children experience are not only enabled by adults, but they are invariably created out of the contested intergenerational knowledges and practices (4090). In other words, adults imagine childhood, weave it with adult concerns and needs, for instance around risk and usability; this means both children and adults are always present in the human/non-human entanglements. This is particularly relevant to the context for our research, a deeply politicised space where education sits at the crossroads between adulthood and childhood, mainstreaming one as detaining knowledge, and the other as aspiring towards. Yet, we found ourselves letting go of this assumption, making space for others to lead or to point to their 'not-yet-known'. In this, we recognise the value of a relational type of pedagogy (Bingham and Sidorkin 2004), one that focuses on the production of knowledge whilst recognising that the relationships developing in that process are also instruments to the outcome. In the same vein, a few previous researchers (see Hecht and Nelson 2022; Souza, Wals, and Jacobi 2019; Verlie 2019) have explored this relationality in climate change education, highlighting its potential for transformative practices, and called for further explorations – an offer we take up here.

#### Methodology

This paper draws together a period of three months of participant observation in two infant schools in the South of England – Tweed Infant School and Hawthorn Infant School.<sup>1</sup> Both urban schools serve a diverse population: one of the schools has a high percentage of pupils whose first language is not English (34.1% against 22% at the national level). Both schools have a nationally aligned proportion of pupils eligible for free school meals (24.3% and 19.2% against a national average of 25.9%). We did not collect personal data as part of this study (Department for Education 2023).

In each school, the first author ran 6 free 1-hour long after-school sessions with 5 undergraduate students in Childhood Studies, and up to 20 children aged 5–7. The sessions offered children the opportunity to engage with a number of activities broadly aimed at nurturing an emotional bond with their immediate environments.

Sessions were carried out on the school grounds and revolved around how children relate and use the school's outdoor areas. Each session started with community building: We sat in a circle, on the floor and shared healthy snacks brought in by the researcher. While eating, we told each other something about ourselves or recounted something meaningful that had happened to us since the previous session. This was an effective tool to build rapport, as children came to expect this and were more and more willing to share something. Similarly, we found out more about them and were able to use this to build activities tailored to their interests.

Activities offered to children followed a yearning for both continuity and change: we established some continuity between weeks, as well as introduced new activities to challenge children and support them to generate new ideas and responses. We would ask children to remind us what we did the previous week and use their memories to anchor ideas for the day. For example, one day we ran an activity around our senses and the environment, calling these 'windows' as they offered us a chance to get something from the environment (information, or feelings), and to give something back (care, but also disruption). The following week we used this metaphor to introduce a portable weather station – a 'sense machine' – which continuously collects data. Our session plans resembled decision trees: activities offered children prompts that they could take in various directions, for us to observe and map for future (tentative) plans. These and other activities are discussed in the analytical sections below.

Data was generated during these sessions via unstructured participant observation: the first author took notes during the activities and, mostly, as soon as possible afterwards. These were then used analytically, but also reflexively to develop activities for upcoming sessions. We took photographs of what the children produced (drawings, plans, bug hotels): some of the visual is reported and analysed in this paper alongside textual reflections. We observed children's practices, 'doings' in schools, to configure an understanding of their current position as implementers of change, animated by the belief that that learning-by-doing (Gaffney and O'Neil 2019) carries a strong potential for embodying change.

Ethical clearance for this approach was granted by the University of Portsmouth (UK) on the 5th April 2023 (Reference FHSS 2022-055). Although this study did not raise sensitive topics per se, it entailed working with primary-aged children, who are usually considered vulnerable subjects (Danaher, Danaher, and Moriarty 2007). This calls for particular caution, especially as this study promotes an agentic approach to childhood, in line with that enshrined within the United Nations Convention on the Rights of the Child (United Nations 1990, art. 12). The process to gain consent followed a multi-stage approach: local schools were first contacted by the PI. After initial conversations with interested institutions, the after-school sessions were advertised to families/carers, who also received Participant Information Sheets to clarify the research project. Those who chose to sign up their children were asked to complete parental consent forms. Assent from children was achieved verbally and during the first session of the after-school club. The nature of this collaboration also required the process of consent/assent to be 'ongoing' (Heath et al. 2007): children did not always want to participate. In this case, the PI assessed circumstances in situ, and proposed less demanding activities, so that the children were never at a loss (see section below on 'Uncertainty'). There is also a risk connected to the so-called 'imperative of participation' (A. Harris 2006): recent social changes have pushed for an agenda of child participation, which is supposed to pedal active citizenship. Yet, demands of participation can be oppressive in nature, and can ultimately lead to blaming children for their failure to engage. This risk was minimised by the voluntary nature of these sessions, which children and families could opt in, without participation being imposed by the school.

# Results and discussions: doing-in-place, doing-together-in-place and the importance of uncertainty in pedagogies

The following sections share snippets of data: fragments of time spent with children in their schools' outside spaces. In so doing, we explain how we came to appreciate the value of uncertainty in relation to pedagogical practice: the first snippet we present set off as a planning failure – yet, it is from this failure that we made meaning leading to subsequent sessions, and the claims we share in this paper. Once we 'got lost' (Perpetua Kirby and Webb 2023) we had to come up with strategies to find our way again. These strategies revolve around experiential learning (Dewey

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1938) – a learning by doing that is inevitably grounded within human/non-human entanglement (Barad 2003). We call this 'doing-in-place'; and relational education (Hickey and Riddle 2022), that we call 'doing-together'. Our aim in discussing these elements is to point to the possibilities for knowledge entailed by 'Doing-Together-in-Place'. Each section of the analysis stems from visual data relating to the after-school sessions we ran with children. We hope that this will ground our claims in a more comprehensive and compelling way.

#### Uncertainty

The excerpt that follows recounts the tribulations of one particularly hot afternoon. After two very rewarding sessions with the children, we installed a weather station in the school. We had been talking about the weather and wanted to see how the children might react to a 'toy' that would produce data day in, day out. A week later, the feedback from both teachers and children was very positive: children were keen to 'play' with the station, and teachers had embedded it into some of their lesson plans. Unsurprisingly, we were keen to build on this, so the first author brought in data from a local met station, which had recorded changes in weather for 150 years. The plan was to use this to talk about climate change. This is what happened:

I had done my homework, and used the Met Office website to collect data on how the temperature had changed in the last 150 years from the [hidden for review purposes] station (now closed). My masterplan was to engage with the data the children collected, compare with the changes in the last 150 years and talk about what climate change means. I also brought in blankets and a sleeping bag so we could make an experiment about temperature rising!

We sat down to share some snacks, and the first 'word' David uttered to me was a very, very loud grunt. It was not even the one grunt, but a sequence of many, sometimes high-pitch, sometimes just loud, grunts. Every single child appeared to be so hyper they were unable to focus for longer than 10 seconds. I asked another child how their week had been so far and their reply was a resounding 'Bananas!!'.

Dexter shouted in response to any attempt to talk. Brian removed himself from our circle and spent the session walking about. Esther shouted: We do not want to sit here, we want to sit there! We want to plaaaaaaaayyyyy! So this was it.

I remember coming home that day and feeling a combination of frustration and failure: was it me, trying too hard? Was it them? Or, possibly, had I ceased to engage with the differences between a voluntary after-school club and a compulsory classroom? In my reflection, I focused on how the overlapping of children, researchers and spaces produced specific possibilities for pedagogies and learning. This led to a number of considerations.

Firstly, it pointed to the nature of knowledge as a process: together with Reinertsen and Thomas (2023), and Taylor (2020), we see knowledge as *doing*. The focus is therefore on what happens along the way, rather than the destination. Pursuing knowledge is for the most part an uncertain endeavour. If we had answers, then we would not need to engage with knowledge production. As we do, we position knowledge as the outcome, the end result of the process of *knowledging*. And even then, we are aware that sometimes answers may lead to yet other questions, forgoing closure and remaining consistently tentative. Secondly, Kirby, Villani, and Webb (2023) urge us to teach for uncertainty: teaching needs to prepare younger generations for environments and societies that we do not yet know – and for which we can therefore not plan. However, turning practice into the limelight suggests that uncertainty is not only an outcome, but a practice. Rather than seeing uncertainty as a deficit – the lack of knowledge and direction – it must be seen as a possibility. For Scoones and Stirling (2020, 11), uncertainty is, indeed, a positive value.

These are, without a doubt, very uncomfortable positions: Reinertsen and Thomas (2023, 26) point to the need to de-comfort where we step out of the assumptions we hold, to make space for the novel. And by all means, discomfort was experienced – yet, remaining in that space was

necessary in the learning journey, both ours and the children's. It is for this reason that we argue that a pedagogy of uncertainty can be conducive to a more socially just society. Interrupting the educational hierarchy between adults-as-knowers and children-as-recipients may invite a plurality of voices, creating conditions for creativity and innovation that rest in notions of place (Scoones and Stirling 2020, 13).

This experience led us to two elements we consider next: the role played by space in defining possibilities for learning, and the importance of relationality.

#### Doing-in-place

This section considers children's embodied interactions with human and non-human entities (Green and Somerville 2015, 3). That activity we discuss here is called 'Explorers':

A group of explorers has just landed on this planet – Explorers stand up! [researchers stand up and look around in awe]. These explorers have just landed on this new planet. They have no idea of how the planet works, what it is great for. But they are in luck! They are not the first to land here ... a first wave of explorers has been here a while, and had the chance to learn about the main features of the planet. First explorers stand up! [children encouraged to stand up].

'First explorers please, will you show us around?'

This initial activity saw groups of children taking the grownups around their setting for a walk. The potential of walking with children for research purposes has been argued for elsewhere (Somerville and Green 2011; Springgay and Truman 2019). For us, this offered a tremendous opportunity for the children to be in charge, selecting what mattered to them. The dramatisation was particularly conducive to interrupting the hierarchy subsumed within the adult/child connection, as we purposefully asked children to explain the 'functioning of things'. The shift in power dynamics led to a change in the interaction: our aim was not to ensure knowledge transfer or 'banking education' (Freire 1968), but to ascertain what knowledge children already had, and to then use this as a starting point to explore possibilities for new knowledge. For example, Tweed Infants' playground had a number of plastic frogs, used for rubbish collection (Figure 1).

This is how the children introduced them to us:



Figure 1. Frog-shaped rubbish bin.

We moved to the side, where we can see a green large object 'It is a frog!' the children inform us. But I do give it a couple of knocks and the 'frog' does not budge. 'It is not real!' 'It is a bin!' The frog-like statue has a large opening in lieu of its mouth, and this is where children can throw their rubbish. I peak inside, and what I can see is mostly compostable waste (discarded fruit) and bits of plastic (empty milk bottles). I ask the children what happens to the rubbish once the frog gets it. 'We do not touch it anymore! It is gone!' But what does it mean that it is gone? Where does it go? The children show us that there is a little door to the back of the frog. 'We do not have the keys, but the teachers do. They can take the rubbish away, put it somewhere else' where does the rubbish go? 'It goes away! It goes somewhere ... they dump it somewhere, maybe underground. That's it, it goes to a place called 'dump'! But what is a dump? I am curious to see whether the children have a sense of the waste process, whether they know that some materials that we discard decompose and become soil, while others struggle to. I ask them what happens to the banana peel I have just thrown in there: 'let's imagine that Mrs Blatt [teacher] has that magic key, so she takes the rubbish to the dump and that is my banana peel gone. A year goes by, but I keep thinking about that banana peel. Can I go to the dump and find it?' 'You will not find it! A dump is too big, you will never find it!'

This short interaction illuminates the nature of phenomena (Barad 2007): here the entanglement of matter (frog bin) and meaning (children's interpretation of the bin is for) cannot be taken separately from discursive knowledge about waste management. Moreover, this excerpt also offers an example of how imagination emerges within material-discursive entanglements. Nordtømme (2012), in her analysis of space and materiality in a Norwegian kindergarten, similarly contends that the physical context creates possibilities for participation and meaning-making that can be vital for children's experience of life. Space and materiality, in other words, contribute to identifying the limits of knowledge, thereby suggesting how pedagogical practices can build on them to support children in their learning journeys. Along the same lines, Taylor theorises *knowledge-ing* (2020, 30) as the 'entangling of knowledge with/in material practices, doings, events and instances'.

As well as acknowledging the role played by materiality in the production of meaning, this approach also offered valuable strategies to identify children's understanding of their environment. For example, at Hawthorne Infants children used the initial exploration to show us where bugs and snails were mostly to be found in their school's playground. One specific tree seemed to have attracted snails, while the children knew what native hedge to go to, if they wanted to spot bugs.



Figure 2. Annette's ants playpark.

Conversations around local insects sparked the children's interest into 'doing something for them'. They were keen to ensure insects had a home to go back to, and enough water – particularly important given that the sessions occurred during the summer half-term, which can present particularly parched weather conditions in some parts of the UK. A project was thus born: children decided to build bug hotels, as the example evidences (Figure 2).

Annette started to design a house for bugs, but as she was drawing, the wetness of her colouring pen had caused a little tear on the paper, which ants had started to explore by means of crawling through and around. This observation – and her attunement with the more-than-human (Lynch and Mannion 2021) – changed her plans:

What are the black dots on your house Annette? I asked her. 'Oh it is just that there are ants at the borders of the paper, and underneath. I thought they may enjoy coming through the paper, so I have used the colouring pen to make little holes – can you see?' I peered in. I could see an ant making its way through one of the holes. 'Then I was worried that they may come through one of the holes, and wander around, and not know how to get back, so I started to make more holes so they do not feel trapped'.

Drawing is mostly used for representation purposes in the primary school classroom (Darling-McQuistan 2017): drawing an object, or reproducing an image, are common educational strategies to promote focus and engagement. However – she continues – drawing can contribute significantly to meaning-making, becoming a very powerful pedagogical tool, as Annette's experience exemplifies. Again, a Baradian analysis is relevant here, as Annette, the ants, and the resources she has around her (colouring pens and paper) come into being through intra-actions. In other words, Annette is only able to create small cuts in the paper – to *choose* to cut the paper – because her colouring pen is accessible to her, and the thinness of the paper does not offer resistance to Annette's strengths in operating her pen. Without ants, Annette may not have imagined a possibility for a playpark.

Annette attuned with the more-than-human: the ensuing phenomenon decentralises then her agency, and distributes it among herself and matter, whereby both come to be immanently. The potential for learning plays out within all of these elements entangled within the more-than-human, as well as the affect displayed, which replaces notions of subjectivity and objectivity. This example of attunement is interwoven with emotional connectedness with the environment: Annette is striving to think as ants and to identify what they may appreciate, what they may find difficult, while also working to reduce potential stressors for them. This snippet supports Malone's (2013, 391) findings from Australia, claiming that making space for – and recognising – children's agency may enhance their sense of connectedness and stewardship for the local environment and inevitably their sense of responsibility for the planet.

For us, a pedagogy of doing-in-place has proven a valuable starting point, as we used it reflexively to identify existing knowledge, thereby ensuring that learning was grounded within the experiences of those involved (children in this case). This points to the potential of doing-in-place for educational inclusion. Moreover, doing-in-place supports the development of knowledge around our immediate environment, which in itself can be conducive to a stronger awareness of interconnections between humans, other species and the materiality of space. We progress this focus on interconnections by moving on to consider relationality: the examples above point to the role played by communication among children and adults in identifying learning journeys. The overlapping between children and space – or childnature (Stevenson, Mannion, and Evans 2020) – is not independent of adult interactions.

#### **Doing-together**

The examples discussed so far speak of a practice that relies on 'planning' that is permanently tentative and constantly negotiated. Our session plans resembled decision trees: an approach we used to manage our own professional roles, while also continuously inviting children to change the direction or to add to what was there. Practice, thus envisioned, moves away from its anchoring around knowledge: the emphasis shifts on to the relationships, where one identifies the boundaries of existing knowledge, and the other advises on how best to progress to further that knowledge. Incidentally, this is where uncertainty plays a key role: there is no expectation that the interaction will shamefully find the *knower* unprepared.

In the example above about frog bins, we had not set out to explore waste management. As a consequence, we lacked key information about how schools manage waste. Uncertainty, in other words, animated the quest for knowledge, whilst the process of learning presented itself as a constant catching up: as researchers and practitioners, the sessions we ran with the children were instrumental in defining our own learning journeys, as they gave us something to find out once the sessions were over. This was both in preparation for further sessions and to engage with the complexities of arrangements we sometimes scraped the surface of. How does a dump work? How do schools get charged for waste, and what strategies do they use to ensure savings are made? What are the differences between schools that are run by Local Councils and Academies?

Learning, it became apparent, was not directional, it did not transpose knowledge from the adults to the children but pointed to a process that all participants could engage with, and which was, because of this, inherently inclusive. Such an approach repositions knowledge as not external to individuals but found within the intra-actions within humans and the non-human elements around them. For example, Annette's playpark evidences how her ability to choose – to exert agency – is grounded within the entanglements she is part of. The pedagogical consequence of this is a shift in position, whereby the emphasis is not on what we ought to teach and learn – as a top-down imposition – but on what we were drawn to understand because that understanding ultimately makes us who we are.

Yet, despite the possibilities entailed by uncertainty, de-comforting (Reinertsen and Thomas 2023, 26) can take its toll:

I am not going to lie: I was anxious about today! After last week [planning failure, discussed in 'Uncertainty'] I have struggled to come up with ideas about what to do, and how to keep the children engaged. So I went in to the school with a very limited plan – this made me feel 'out of control'. However, things turned out differently from what I expected. Meg [university student] suggested that, given the children's interest in the (many!) snails they had in their wilderness area at school, we could further this with a session on mini-beasts, aided by the magnifying glasses and microscopes. And so we did. The children were very focused with the tools we brought in, and were keen to use them to explore both their setting – the wobbly bridge and trim trail area for example – and the bugs within it. Snails and woodlice were the main beasts they could spot, alongside ants and spiders.

In this excerpt, embracing uncertainty meant to accept the limitations of planning, while also opening up to collaboration. This example illuminates Mannion's (2007) argument around the overlapping nature of relations and space, as it is through both of these that we manage to create meaning. Dealing with uncertainty can be particularly daunting in the educational sector, which too often takes knowledge as produced, and now needs transmitting and acquiring. If knowledge and pedagogies are to be co-constructed, it is imperative to open up spaces for others to contribute – and these spaces are uncertain, as we do not know whether or how they are going to be taken up. Because of this, they feel inevitably uncomfortable and 'odd' for those positioned as 'knowers', including teaching staff and often adults more broadly.

Figure 3 represents the outcome of children's exploration of their school's playground at Tweed Infants. The children used magnifying glasses to create little frames, within which they could then draw the bits they had been most impressed with. Daisy was very taken by the leaf, so much so she asked me to go with her outside to the garden to show me what she meant. The lenses enabled Daisy to see that each leaf was actually covered in fur. So we talked about this for a little bit:

F:Well isn't it odd, the leaves have got fur on them! Why do you think they do?D:To keep warm!Student:What else has got fur/hairs on them?D:[pointing at her head] We do!



Figure 3. From micro to macro.

This excerpt illuminates the overlapping of children, adults and space: we make sense of this by employing Brown et al.'s (2019) suggestion that empathy may be key to shaping human/non-human relations, thereby facilitating attunement. In this excerpt – as well as the one above from Annette's playpark – children take up the perspective of non-human species around them, and work to understand them alongside themselves. This can be read as a form of anthropocentricism, whereby the leaves are understood in terms of the human experience rather than in their own right. Yet, Murris and Bozalek (2019) remind us that the ontological stance is relational to begin with, and therefore 'entities do not ontologically pre-exist relationships, but rather that entities come into being through human and more than human relationships' (874). Relationality is here a key element: the interactions among children – and between children and adult – pushed children to reflect on what they were doing, translate experiences in images, explain to others what they meant. Doing-together, thus elaborated, becomes a viable means for learning, reminiscent of Wenger's (2009) reminder that learning relies on social participation.

This section has discussed possibilities for a pedagogy that is not only child-led and place-based, but relational and inherently built around uncertainty. We claim that, by shifting the focus from content to those involved in the educational interaction, we can support learning more inclusively. In the next section, we will strive to bring these concepts together, clarifying the theoretical contribution of our work, or a pedagogy of 'doing-together-in-place'.

#### Doing-together-in-place

In this study, we have put forward the idea that a pedagogy revolving around the overlapping dimensions of locality and relationality may be particularly conducive to introducing environmentalism in the primary school years. We use this section to discuss these findings both theoretically and in practice, by articulating what we call Doing-Together-In-Place. Each snippet we have shared above bears element of 'doing', 'place' and 'together': we have distinguished each aspect for the sake of the analysis, but recognise that in the process of *knowledge-ing* (Taylor 2020), these cannot be disjointed. Hence the need, here, to see them as one. How to articulate this theoretically though?

Uncertainty remains for us both the departing and end point of this elucubration. We were baffled by the impossibility to simply orchestrate sessions that kept children engaged and creative, and we realised this was because we had not actually made space for them to be active in the emergence of their own knowledge. As Rousell and Cutter-Mackenzie-Knowles (2020) point out, children are positioned as future leaders, yet given few opportunities to lead in their local communities – schools as a prime example. Embracing uncertainty was, for us, key to participation, and we therefore urge practice to more readily open up spaces in this sense.

Recognising the loss in comfort in letting go of control when planning and 'delivering' sessions in this way, we found relief in anchoring ourselves more clearly around space. There is a certain tendency to associate environmentalism and sustainability with 'nature', for example, the Department for Education policy (2022) this study stems from identifies the need to develop ways for young people to 'spend time in nature and learn more about it'. Yet, when most of the UK population lives in urban centres (O'Neill 2024), referring to 'nature' may contribute to othering the issue, suggesting that both causes of and remedies for climate change happen elsewhere. Yet, opening up spaces for pedagogies that encourage children to attune (Lynch and Mannion 2021) to their environments – regardless of what these look like – can elicit affective responses, which we associate both with the concept of empathy (Brown et al. 2019), as well as care and stewardship (Malone 2013).

None of this would be possible, however, without reflecting on the plural and dynamic nature of phenomena – the entangled states of matter and meaning that arise through intra-actions (Barad 2007, 33). It is against this backdrop that uncertainty calls for participation, inviting the views of others to fill a potential void with *some-thing*. It is perhaps for this reason that Kets De Vries (2014) argues that doing nothing and being bored can be invaluable to the creative process. Yet doing nothing/something *together* amplifies the potential for attunement, which in turn facilitates the creative process (Figure 4).



Figure 4. Jason's and Billy's tasting machine.

This poster was produced jointly by Jason and Billy, with the support of a student/researcher. As we would always start a session by sharing some snacks, the children in this group used their experiences of snacking to talk about taste. This day we brought tomatoes, grapes, oranges and cookies. The experience led the children to share some information about their favourite foods at home, using these to create a fictional character. Billy invented the 'tasting machine' – visible at the bottom of the poster. This invention gobbles up food in small quantities. However, as soon as the food reaches its 'legs', the machine is able to produce the same food, in much bigger quantities. The discursive power here stems from the human/non-human entanglement – where tomatoes, grapes, oranges and cookies and the experience of eating them led a group of children to imagine an object which does not materially exist, but which is rooted in specific ideas and expectations about human shapes and machines' possibilities.

Pedagogically, this activity offered a number of options to extend children's learning. For example, how would we go about building an actual 'taste machine'? What problems would it solve? What problems would it create? This would encourage children to consider some of the issues they may experience in their lives (say, poverty), generate creative solutions and identify limitations during design and implementation. Although the actual machine may never be realised, the skills developed along the way through the process of *knowledge-ing* (Taylor 2020) remain valuable.

Ultimately, we found that a pedagogy of doing-together-in-place offers valuable suggestions for practice looking to embed uncertainty in the pursuit of creativity, thereby contributing to scholarship that wishes to shift our understanding of certainty. Uncertainty needs not to be presented as a deficit, rather it can positively lead the process of knowledging, as others have started to suggest (Hayden et al. 2011; Kirby and Webb 2023; Scoones and Stirling 2020).

#### Conclusion

In this article, we have explored possibilities for pedagogical approaches to environmentalism that both support children in leading their own learning and embrace uncertainty. We articulate these possibilities around the concept of 'doing-together-in-place'. Using snippets of data from our interactions with children in their schools' outside spaces, we identify how 'doing-together-inplace' in learning might involve (1) uncertainty as an outcome and in practice, (2) local grounded-ness in human/non-human entanglements, and (3) attunement to the relational nature of learning. We have discussed these findings in terms of their theoretical and practical insights in pedagogy.

The contribution of this small-scale, particularist study around pedagogies for environmentalism lies in its potential to force knowledge open (Reinertsen and Thomas 2023). We agree with others (Kirby, Villani, and Webb 2023) that the main difficulty in engaging with uncertainty is that the education systems we operate within are premised on certainty – of the roles played by children and adults in, around what ought to be taught, why and how. Yet, we hope that by adding our voice to the mix we will contribute to rendering education more inclusive, and better positioned to work towards the 'wicked problems' our societies need to pose ourselves and future generations, which require complexity, nuance and uncertainty.

There are some limitations of the current study which need to be considered in terms of transferability and applicability. The data in this study came from a specific contextual activity, namely, a small-scale, researcher-organised, after-school programme in the UK; readers are advised to consider the (spatial, pedagogical) locality of their own contexts in applying the insights of this study. Being mindful of the flexible and experiential nature of the after-school programme might also be important, considering that educators are often required to negotiate standards set by the national curriculum and the school as an institution. Further studies are encouraged to explore possibilities (and challenges) of this 'doing-together-in-place' approach in various pedagogical contexts and socio-geographical locations. The implications of this study are twofold yet deeply interconnected: pedagogical and spatial. Pedagogically speaking, we see schools as important places for communities. The focus on the locality we call for through this paper opens up possibilities for practice that extend beyond the school grounds. In-between sessions, we would bring our notes, thoughts and ideas home, discuss with families, friends and neighbours. New ideas, new approaches would emerge, which would be taken back to the schools and further negotiated. For example, when the children at Hawthorne School decided to build bug hotels, they first designed the structures they wanted to build and developed a shopping list for the researchers. This list, however, never made it to the shops: it was instead shared and discussed within the team of researchers, other students, families and neighbours. Ideas came to life, with a few bits and pieces offered from their gardens. The benefits of relational pedagogies can extend beyond the immediate participants, to include others in the community. A further avenue in this sense would be to open up opportunities for intergenerational collaborations around schools.

In terms of children's spatiality and its potential for climate change adaptation and mitigation, a focus on locality could effectively mediate global approaches to environmentalism. In this sense, future avenues would further contribute to recent work around glocal pedagogies (Mannion 2015; Mannion et al. 2011). For example, a focus on local bugs could, as evidenced here, support the development of place-responsive education, but could also be used to connect the lived experiences of other settings, in other parts of the world. This experiential focus on place could be used to better understand global issues from a localised perspective. Last, we have suggested that using human/non-human entanglements as a starting point for educational encounters may work best around the notion of affects, which replaces both subjectivities and objectivities in identifying new ways to relate to each other and the environment – an affective placemaking practice. In the context of uncertainty, this, we find, figures as an honest and heartful (Taylor 2020, 42) way to proceed into tentative learning journeys.

#### Note

1. All names (institutions and participants) have been changed to preserve anonymity.

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