Co-producing Curricula:

Young People's Lived Experience of School-linked Practical Conservation and Citizen Science

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Declaration

I declare that I have composed this thesis myself and that it reflects the results of my own research. Where appropriate, I have acknowledged the nature and extent of work carried out in collaboration with others included in the thesis.

Andrew Ruck

<u>Acknowledgements</u>

As with situational maps, this thesis "broadly conceived" is the product of a wide range of elements extending well beyond this researcher. In defiance of new materialist theories, however, I must acknowledge several of these as being particularly 'central' to the process.

It feels only right to firstly acknowledge the unforeseen change in circumstance that led to my application for this PhD studentship. On first seeing it advertised, my first reaction was to dismiss it as unrealistic, beyond me, not the right time, and so on. I had, after all, just changed jobs within the charity/outdoor education sector, and as I saw it, it would be simply impossible to find the time to research and complete the required Statement of Intent. And besides, after a couple of failed attempts at securing PhD funding following a Master of Research in 2008-9, I'd more or less given up on the idea of PhDs and academia. A couple of weeks later, I was then unexpectedly deemed surplus to requirements by new employers, back to scrolling through job sites, and… Hang on, *now* I had time to write that application. And well, here we are.

Greg Mannion phoned me for an informal and very encouraging chat before I'd even completed that application, and ever since, has continued to be the most friendly, approachable and supportive supervisor I could have hoped for. His encouragement has pushed me to make far more of this PhD journey than I would otherwise have done – persisting with a peer-reviewed publication through multiple rounds of revisions being the clearest example. Particular thanks (and apologies) are also due for those many meetings that extended far beyond their scheduled timeslots.

Many thanks, also, to Alison Hennessy, who stepped in as my second supervisor for the very final stages of this PhD (a longer period than initially advertised), and has gone out of her way to offer insightful feedback and friendly support. Thanks are also due to Kirsty Park and Sandra Eady for their earlier supervisory input.

As in most ethnographic studies, a *lot* of people have been involved in this one. Of these, I owe particular thanks to staff at Learning through Landscapes for keeping me informed of Polli:Nation activities and putting me in touch with participating schools;

teachers for accommodating my visits and keeping me up-to-date despite being super-busy; and of course, the many young people who were generally a pleasure to hang out with.

Finally, I must give absolutely massive thanks and enduring appreciation to my wife, best friend, and unofficial third supervisor, Bregje van Veelen. For being a constant source of ideas and encouragement, for helping out with edits and formatting right up to the hand-in, and for (I think) telling me about the advertised studentship in the first place, it really is difficult to thank you enough.

Abstract

This thesis explores young people's lived experience of the Polli:Nation project – a UK-wide, school-linked environmental education initiative engaging young people in the creation and monitoring of pollinator-friendly habitats in their school grounds. Two inter-connected aims run through this research: firstly, to explore the "curriculum making" processes enabled by young people's participation in Polli:Nation activities and, secondly, to gain young people's own perspectives on the significant activities and features within the project. A qualitative and broadly ethnographic study, this research began with participant-observation in twelve schools participating in Polli:Nation. Twenty focus groups were then carried out with participating pupils. All data were analysed primarily using Situational Analysis. Drawing upon new materialist theories, this thesis highlights a unique approach that served to re-orient these methods, creating a unique "research assemblage". It also, however, reflects upon the challenges that emerged when attempting to accommodate the ontological shifts demanded by these theories.

Four overarching findings are drawn from this research. Firstly, Polli:Nation demonstrated the value of "co-produced" curricula that bring together people and organisations from outside the school system, more-than-human elements, and young people themselves. Secondly, young people valued the informality that characterised participation in practical conservation and citizen science, even as these were brought into *formal* education contexts. Thirdly, whilst the project was framed by a somewhat anthropocentric "stewardship" perspective, young people's lived experience indicated a form of "collective thinking" with other species that appeared to stem from practical tasks, contingent moments, and encounters with other species. Finally, using methods sensitive to new materialist theories demonstrated that key features within Polli:Nation identified by young people gained greater importance from their relations with *other* such features. While pointing to the highly situated nature of young people's experience of the project, these relations also highlight the synergies that were created when these features were combined.

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1. Introduction

1.1. Introduction to Polli:Nation

This thesis explores young people's lived experience of the Polli:Nation project – a school-linked environmental education initiative, centred around practical conservation and citizen science, that took place across the United Kingdom between 2016 and 2018. In doing so, this research makes two key contributions. Firstly, it provides a response to growing calls for in-depth analyses of *how* participants engage in environmental education projects, rather than focusing solely on the aims and outcomes of such initiatives. Secondly, it explores the use of practical conservation and citizen science in formal educational contexts - a largely new area for environmental education research.

In engaging young people from 260 schools across the UK in the creation and monitoring of pollinator-friendly habitats in their school grounds, Polli:Nation aimed both to restore pollinator habitats and populations, and to "create a network of knowledgeable and enthused young conservationists" (Learning through Landscapes 2014, 13). The recent severe decline in pollinator populations, owing to factors such as habitat loss and pesticide use, has been well-documented by biologists (Goulson 2014; Golick et al. 2017), and is just one of a plethora of complex environmental issues currently facing the world (Middleton 2013; Dillon, Stevenson, and Wals 2016). This unprecedented crisis in human-environment relations calls for a sustained response from educational practitioners (Orr 1992; Higgins 2009; Schonfelder and Bogner 2018), and Polli:Nation appeared to provide a timely example of the sort of response required.

Polli:Nation was unique in its nationwide scope, as well as its involvement of a variety of people and organisations from outside the school system. The project was funded by the UK's Heritage Lottery Fund (HLF), and run and managed primarily by Learning through Landscapes (LTL) - a nationwide charity promoting outdoor learning in formal education contexts, with a particular emphasis on utilising school grounds for this purpose. It took place in both primary and secondary schools, primarily engaging upper primary and lower secondary-aged pupils (pupils aged around 9 - 13). LTL staff were responsible for most of the face-to-face engagement with teachers and pupils during Polli:Nation, but the project was also supported by a "Polli:Nation partnership" formed

of staff from other conservation and science-focused NGOs. These included The Conservation Volunteers (TCV), Buglife, Butterfly Conservation, the Field Studies Council, and the Open Air Laboratories (OPAL) network. The University of Stirling was also included in this partnership, in an evaluative capacity. As well as these organisations, the project often involved other individuals not normally associated with formal education contexts, such as parent helpers, and experts brought in to run sessions on specialist skills or topics relevant to a particular school's Polli:Nation activities. These individuals included beekeepers, members of local wildlife trusts, woodwork and landscaping experts, and at least one graffiti artist.

Polli:Nation was also unique in terms of the activities comprising it, in that it brought practical conservation and citizen science - activities more commonly associated with informal contexts - into *formal* education contexts. The project was primarily built around practical conservation tasks, which included planting pollinator-friendly flowers, planting fruit trees, installing ponds, building and filling "planters" made from various materials, and creating "bug hotels" of various sizes and types. Whilst earlier studies have focused on conservation tasks carried out in informal contexts on a voluntary basis (Hine, Peacock, and Pretty 2008; Guiney and Oberhauser 2009; Lorimer 2010), and on young people learning *about* conservation through visits to nature reserves and national parks (Zint et al. 2002; Burnett et al. 2015), the active participation in landscape transformation in formal education contexts represents a largely new area for environmental education research.

Another key aspect of the project was the Polli:Nation survey completed by all schools at the start and end of the project, and (optionally) at various points in between. The survey was designed by staff from the project's partner organisations, including the OPAL network, who maintained the large-scale database to which survey data contributed. This was an example of citizen science, which refers to the involvement of members of the public in scientific data collection. Citizen science is a fast-emerging area of research in terms of its impacts on participants (Cooper et al. 2007; Drushke and Seltzer 2012; Haywood 2015), and to a lesser extent, its application in formal education contexts (Karrow and Fazio 2010; Bonney et al. 2015; Silva et al. 2016). Although citizen science formed a smaller part of Polli:Nation than practical conservation

activities, the project nonetheless presented an opportunity to carry out research that contributed to this developing field.

1.2. Research aims

This PhD study came about through the University of Stirling's involvement in the Polli:Nation project. The University had been brought into the Polli:Nation partnership with a view to conducting the "monitoring and evaluation" of the project. Alongside writing a summative evaluation report of the project as a whole (Ruck and Mannion 2019a), then, this involvement presented a parallel opportunity for a PhD project to be set up. Polli:Nation's scale, scope and constituent activities, in turn, provided unique areas of focus for this doctoral study.

A significant proportion of previous research into environmental education contexts consists of attempts to 'measure' the outcomes of a given intervention in terms of changes to participants' attitudes and behaviours towards the environment (Christie and Higgins 2012). Indeed, the stated purpose of the University of Stirling's involvement in Polli:Nation was to "ensure evaluation of behavioural change outcomes as well as natural heritage outcomes" (LTL 2014, 4). For the PhD element of this research, however, I chose to focus instead on young people's *lived experience* of their participation in practical conservation and citizen science activities, and what young people *themselves* considered to be the significant elements of the Polli:Nation project. This stemmed from growing calls for environmental education researchers to focus on what participation in environmental education programmes "looks and feels like for the learners concerned", as well as/instead of the aims and outcomes of such programmes (Rickinson, Lundholm, and Hopwood 2009, 97) – a key gap that is explored in more detail in Chapter 2. In summary, this thesis has two interconnected aims, which are briefly explained below:

1. **To explore the "curriculum making" processes that were enabled by young people's participation in the activities comprising the Polli:Nation project**: The focus on curriculum *making* (Ross and Mannion 2012) is influenced by the emphasis on processes rather than outcomes outlined above, and is further grounded in the new materialist theories outlined in section 1.3 below. The

conceptualisation of 'curriculum' in this thesis, meanwhile, is influenced by Aoki's (1993a, 1993b) notion of a "curricular landscape" that is produced at the intersection of the "curriculum-as-plan", and the various "lived curricula" experienced by teachers and young people. This again has strong resonances with new materialist theories. This study provided an opportunity to investigate a project in which organisations and individuals from outside the school system, "more-than-human" elements (Tsing 2013), and young people themselves, all had opportunities to co-shape the processes by which curricula (or "curricular landscapes") were produced.

2. **To explore young people's own perspectives on the significant features and processes comprising the project:**

Following Rickinson, Lundholm, and Hopwood's (2009, 97) call for research that investigates what involvement in environmental education projects "looks and feels like for the learners concerned", I wanted to move away from research in which researchers themselves "select the dependent variables that they deem important" (Chawla 2015, 445). This meant avoiding the use of a pre-determined framework for assessing the attitudes or competencies possessed by young people at a given moment. Instead, I sought to capture their perspectives on activities and processes that were grounded in the Polli:Nation project itself, and to determine which of these were, in their view, important elements of an environmental education project.

1.3. Methodological context and research questions

I initially took a purely ethnographic approach to this study, carrying out participant-observation in twelve different Polli:Nation-participating schools across Scotland, drawing upon Situational Analysis (Clarke, Friese, and Washburn 2017) for the ongoing analysis of fieldnotes. I later, however, decided to address my research questions more directly with twenty focus groups carried out in eighteen different schools, this time across England, Wales and Northern Ireland, as well as Scotland. The activities forming these focus groups were informed by processes and features pertaining specifically to Polli:Nation, identified in my fieldnotes and through Situational Analysis. I also carried out interviews with eighteen teachers who had taken

a leading role in facilitating the project in their schools, as well as members of LTL staff who had run regular Polli:Nation activities in these schools. I then drew again upon Situational Analysis as my principal means of analysing all data.

Throughout this research, I drew upon new materialist theories for methodological orientations. Whilst somewhat resistant to brief definition, these theories are broadly characterised by an acceptance of the inseparability of humans and the material world (Jackson 2013), and studies that are oriented "towards processes and flows rather than structures and stable forms" (Fox and Alldred 2015, 407). These orientations had clear resonances with this study's focus on processes rather than outcomes, and on a project built around a particular engagement between humans and the material, or "more-than-human" (Tsing 2013), world. Various challenges and tensions emerged, however, when attempting to pursue a study that adhered comprehensively to new materialist theories, eschewing the "normalising humanist concepts" inherent in qualitative research (St. Pierre 2014, 2). Acknowledging these tensions, I chose to characterise this research as a "site of experimentation" (Bridges-Rhoads 2015, 704) that enabled me to learn and begin to enact new materialist theories whilst in the midst of doctoral study, and through which existing qualitative research methods came to be re-oriented, creating a new and unique "research assemblage" (Fox and Alldred 2015, 2017, 2018; Ruck and Mannion 2019b). The insights into these methodological challenges, as well as the reorientations that stemmed from them, are another key contribution made by this thesis.

The research aims and methodological considerations outlined above are reflected in the following six key research questions identified for this study:

1. What are the common activities and features within the Polli:Nation project?

2. How are curricula produced through the common activities and features within the Polli:Nation project?

3. What do young people see as the significant activities and features within the Polli:Nation project?

4. What is the nature of the relations between these significant features and processes?

The following additional questions were closely linked to the evaluative requirement of this research. They also, however, had important influences on this doctoral study, and are addressed towards the end of this thesis (Chapters 8 and 9):

5. How do young people describe the learning that is produced by the Polli:Nation project?

6. What are the implications of these findings for school-linked environmental education initiatives, in particular the use of practical conservation and citizen science within these?

1.4. Structure of thesis chapters

Having outlined the overall aims of this thesis and the key questions addressed by it, I now provide a brief overview of the chapters that follow.

Chapter 2 details the process of reviewing related academic literature in the initial stages of this research. Given the stated aim of the University of Stirling's involvement in Polli:Nation, I began this literature review with a focus on the links between environmental education and environment-related 'behaviour change' (LTL 2014, 4). I go on, however, to explore literature highlighting a need for further research into participants' lived experiences, as well as difficulties in 'measuring' behaviour change and in defining terms such as 'pro-environmental'. I also review the existing literature exploring participants' lived experiences of environmental education projects, and relating to young people's participation in practical conservation and citizen science.

Chapter 3 outlines the methodological considerations that laid the foundations for the methods described in Chapters 4 and 5. I first introduce new materialist theories and their suitability for this study, and the implications these have for the ways in which key educational concepts such as 'curriculum' are understood. I also introduce the "post-

qualitative" methodologies that are often proposed as approaches to research that are sensitive to new materialist theories, and the challenges and tensions presented by attempts to employ these comprehensively. I outline two key ways in which I re-oriented my approach in a manner sensitive to new materialist theories: drawing upon "multi-species" (Pacini-Ketchabaw, Taylor, and Blaise 2016) and "relational" (Desmond 2014) ethnographic approaches, as well as Situational Analysis (Clarke, Friese, and Washburn 2017).

Chapter 4 focuses on the participant-observation carried out during this study. I detail how schools were selected and approached to be part of this research, before outlining the methods used for the writing and analysis of fieldnotes, and changes that were made to these in light of the ontological considerations outlined in Chapter 3. Throughout, I acknowledge the remaining tensions between drawing upon new materialist theories, and the use of apparently "conventional humanist" qualitative methods, yet consider what was nonetheless produced by the "research assemblage" (Fox and Alldred 2018) thereby created.

Chapter 5 details the focus groups I carried out later in the research process, as well as the "relational maps" (Clarke, Friese, and Washburn 2017) that served as my principal method of analysis on completion of all participant-observation and focus groups. I firstly outline the processes by which schools and young people were selected, as well as the methods used within each focus group. As in Chapter 4, I then reflect on the tensions with using an apparently "humanist" method such as focus groups, and the steps taken to mitigate these tensions.

Chapter 6 provides an overview of what the Polli:Nation project looked like in practice, with reference to project resources such as the Polli:Nation Activity Plan (LTL 2014), and the early stages of my own participant-observation. Addressing the first of the research questions listed in section 1.3, I highlight the common activities within the project, the key discourses that appeared to be underlying it, as well as the project's stand-out features in terms of its position in relation to school timetables and curricula.

Chapter 7 is the first of two 'findings' chapters, and draws mainly on participant-observation to explore the processes by which curricula were produced through Polli:Nation. It therefore addresses the second of the above research questions. I demonstrate how curriculum making processes were often unplanned, embodied, as well as co-produced by more-than-human elements, visiting experts from outside of schools, teachers, and young people themselves. I also highlight *lived* curricula that differed considerably from the key discourses and ideas underlying the project.

In Chapter 8, I use focus group data to explore young people's *own* perspectives on the key features and processes of the Polli:Nation project. With reference to relational maps, and related memos, I then explore the relations between these elements and others within the unique configuration of activities, features and processes within the project. This chapter also highlights the strong entanglements among the significant features of Polli:Nation identified by young people - that is, how these combined to create synergies in the unique context of the project. Finally, this chapter includes a section examining young people's reporting of the learning that was produced during Polli:Nation, highlighting the influence of this particular "research assemblage" (Fox and Alldred 2018) on their responses. This chapter therefore addressed the third, fourth and fifth research questions identified in the previous section.

Chapter 9 brings together the previous "chapter conclusions" to identify four overarching findings, and attempts to place these in a wider context, thereby addressing the sixth research question identified above. These findings give rise to discussions around alternative pedagogical approaches, as well as approaches to the ways in which curricula are assembled. These in turn give rise to discussions around the challenges of applying them in practice, which are also considered in this chapter. These overarching findings are also summarised in section 1.5 below.

Finally, referring back to the research questions outlined above, Chapter 10 provides a summary of the thesis as a whole. It also acknowledges the limitations of this research, and provides a number of short recommendations for schools, and environmental education practitioners working with schools, based on its key findings.

1.5. Summary of overarching findings

The overarching findings from this research, explored in greater detail in Chapter 9, can be summarised as follows:

Finding 1: **This research demonstrates the value of a process of curriculum making involving people and organisations from outside the school system, more-than-human elements, and young people themselves. Indeed, young people considered the manner in which these elements came together to be a key feature of the Polli:Nation project.**

Finding 2: **The informality that characterised young people's participation in practical conservation and citizen science within formal education contexts appeared to add value to their experience of the Polli:Nation project.**

Finding 3: **The practical tasks, contingent moments and human/more-than-human encounters within Polli:Nation enabled the enactment of lived curricula that indicated a form of "collective thinking" with more-than-human elements, and which differed considerably from the "stewardship" perspective underlying the project.**

Finding 4: **Key features within Polli:Nation gained greater significance from their relations with *other* key features within the project. While pointing to the highly situated nature of young people's experience of the project, these relations also highlight the synergies that were created when these features were combined.**

Finally, it is important to highlight again the tensions created by the use of new materialist theories within a structured, time-bound research project with a parallel "monitoring and evaluation" element. The insights provided into these tensions, and the re-orientations of existing qualitative research methods produced by the subsequent "research assemblage" (Fox and Alldred 2018), should be kept in mind as a key contribution made by this thesis.

2. Literature Review

2.1. Introduction and aims

This chapter details the process of literature reviewing in the initial stages of this research. In the following chapter, I describe how conclusions drawn from this initial literature review led me to explore new materialist theories, and how this enabled me to develop my final research questions (see section 3.9). In Chapter 9, I then highlight further literature whose relevance became apparent as the empirical stage of this research progressed, exploring this in relation to my own conclusions. This literature review, however, began with a different set of aims and questions to those that would be iteratively developed as the study progressed. These questions and aims were developed *before* any empirical research or in-depth exploration of new materialist theories had been carried out, and are detailed in this introductory section.

There were two points of departure for this initial literature review. These were, firstly, two key assumptions underlying the Polli:Nation project, and secondly, literature relating to the proposed activities comprising it. The two key assumptions were evidenced in the Polli:Nation Activity Plan (Learning through Landscapes 2014) - a document laying out in detail the main activities within the project, as well as its desired outcomes. These assumptions were, firstly, that immersion in 'nature' can be linked to positive behaviour change towards the environment, and; secondly, that such behaviour change can be 'measured' in order to assess the impact of environmental education projects. As I will later demonstrate, much of the key literature explored here highlights difficulties with these assumptions, which led to an iterative development of my research questions (along with a suitable methodology). The proposed activities within the project were explained in detail in the Polli:Nation Activity Plan (LTL 2014, 27-30), and could be broadly summarised as "identifying and recording the natural heritage" (28) and "conserving and restoring the natural heritage" (29), as well as sessions aimed at educating young people about the ecological role of pollinators.

The first of the assumptions outlined above - that immersion in 'nature'[1] can be linked to positive environmental behaviour change - is most clearly demonstrated in the following passage from the Activity Plan. The passage indicates a belief that changing young people's attitudes and behaviour "can be achieved" through "engaging them in their natural heritage", as well as strongly implying that learning about the ecological role of pollinators will also influence young people's future choices.

"As the future custodians of our natural heritage there is a need to change the attitudes and/or behaviour of children and young people. This can be achieved by engaging them in their natural heritage and by developing the skills of those supporting them. The Polli:Nation project is a response to the decline in the abundance and diversity of pollinating insects in the UK; (and) the demand from schools to broaden children and young people's understanding of the links between pollination and food security… Pupils will learn about the role pollinating insects play in ecosystem services and be able to apply it to the choices they make and the actions they take" (Learning through Landscapes 2014, 3).

The second assumption - that such behaviour change could be 'measured' - is demonstrated in descriptions of my own role within the project. The Activity Plan clearly indicates an expectation that as a researcher attached to the project, I help to evaluate its desired impacts, stating that "the Polli:Nation Partnership was extended to Stirling University... (to) ensure evaluation of behavioural change outcomes as well as natural heritage outcomes" (LTL 2014, 4). Indicators of these desired outcomes are specified elsewhere in the Activity Plan, and include pupils' "participation in conservation work outside of schools and the transfer of learning between the two contexts", and "how likely (pupils) are to act in the future to conserve and protect natural heritage" (32).

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[1] Single quotation marks are used in this thesis to highlight the problematic nature of certain terms – for example, 'nature', and in the following chapter, 'data', 'elements' and 'research design'. Double quotation marks are used in all other instances – for example, for direct quotes or where terms are attributable to particular sources, as well as for new terms used in this thesis.

The proposed activities within the Polli:Nation project opened up a number of areas in which to conduct this literature review. The sessions focusing on the ecological role of pollinators would involve a variety of both indoor and outdoor elements, and led me to initially explore the wider literature focused on outdoor learning and environmental education, especially where the two were used in combination. Primarily, however, the project was built around practical conservation activities - "conserving and restoring the natural heritage" (29) - and citizen science - "identifying and recording the natural heritage" (28) - which led me to conduct targeted searches of these much smaller fields. I also drew upon literature from related fields such as place-based education, civic ecology, and science education more generally.

I took a "configurative" approach to literature reviewing for this study (Gough, Oliver and Thomas 2012). Configurative approaches are iterative, and therefore suited to studies where there is a potential need for exploration and variation in the topic area under study with a view to further shaping the inquiry and final research questions. To reiterate, then, the questions outlined below are *not* the final research questions developed for this study - these are detailed in section 3.9. Instead, they are sensitising questions drawn from the assumptions and proposed activities highlighted above, and were used at the start of this iterative process:

- What is already known about the link between environment-related behaviour-change, and immersion in 'nature' through environmental education projects?
- What are the important factors in determining the potential for environmental education projects to achieve their behavioural change aims?
- What is already known about young people's participation in practical conservation and citizen science activities, and how/if this influences behaviour change?
- What are the significant gaps in the literature, what are the key questions that stem from them, and how do these influence my proposed methodology?

Using these sensitising questions, I employed a combination of four approaches in my initial reviews of the relevant literature: Firstly, I conducted searches on Google Scholar using extensive combinations of terms such as "environmental education behaviour

change", "outdoor learning pro-environmental", "citizen science education", and "conservation education". Secondly, I conducted online searches using similar terms in specific journals such as Environmental Education Research, the Journal of Adventure Education and Outdoor Learning, Applied Environmental Education and Communication, and Children's Geographies. Thirdly, I drew upon existing literature reviews (Rickinson 2001; Christie and Higgins 2012) to identify other related studies. Fourthly, I drew upon related articles and books with which I was already familiar through my previous studies, or from recommendations from my supervisors and/or fellow PhD students.

As themes and conclusions were drawn from this literature, however, I began to make changes to the questions I was addressing. This included suggestions by Rickinson, Lundholm, and Hopwood (2009) and Stern, Powell, and Hill (2014) that attention is best placed on participants' lived experience of environmental education projects, rather than on the aims and outcomes of such projects. Additionally, as detailed in the following chapter, I began exploring new materialist theories early on in the PhD process, which led me to conduct further searches for studies where these were linked to environmental education contexts.

The iterative process detailed above is reported in hindsight in this chapter, which is structured as follows. First, having contextualised the Polli:Nation project within recent policy developments and trends in outdoor learning and environmental education, I aim to summarise existing findings on the links between such projects and positive environment-related behaviour change (section 2.2). Whilst the relevant literature *does* point to a link between these, I nonetheless highlight further literature that signalled important changes of direction for this research. In section 2.3, I highlight literature pointing to a need for further research into the *lived experience* of participants in environmental education initiatives – that is, not simply *whether* their stated outcomes are achieved, but *why* they are achieved, and how learners themselves view the process. In section 2.4, I then explore literature that highlights issues with the methodologies underlying many of the studies cited in earlier sections, pointing to the difficulties in defining the terms 'pro-environmental', 'nature', 'connection to nature', and "empirical isolation" (Stern, Powell, and Hill 2014, 602). These studies provide an initial rationale for the relational methodology outlined in Chapter 3. In later sections, I review the

existing literature that explores participants' lived experience of environmental education projects (section 2.5), and more specifically, of practical conservation and citizen science activities (2.6).

The chapter concludes with a summary of the gaps in the literature (2.7), which can be broadly summarised as follows: firstly, a need for further studies that focus on participants' lived experience of environmental education projects; secondly, a closely related need to focus on young people's *own* perspectives, rather than pursuing a study that uses pre-defined concepts and categories that are define by researchers, and; thirdly, a lack of studies focusing on young people's participation in citizen science and practical conservation activities, especially within formal education contexts.

2.2. Environmental education and behaviour change

This section aims to summarise recent developments in policy, research and practice relating to outdoor learning and environmental education, and the ways in which Polli:Nation's assumptions, aims and proposed activities can be clearly linked to them. The following sections then explore literature that raises conceptual and methodological questions about the studies from which these assumptions are drawn, and the ways in which these helped to define the questions and methodology pursued in this study.

2.2.1. Environmental education – policy context

Environmental education is a large and wide-ranging pedagogical field whose boundaries are difficult to define (Gough 2013), and whose approaches are varied and complex (Sauve 2005). The stated aims of the Polli:Nation project, however, have resonances going right back to Stapp's (1969) early identification of the aims of environmental education as a whole. In his essay "The Concept of Environmental Education", published in the first ever issue of the journal *Environmental Education*, Stapp defined environmental education as education that is "aimed at producing a citizenry that is *knowledgeable* concerning the biophysical environment and its associated problems, aware of *how* to help solve these problems, and *motivated* to work towards their solution" (34).

Stapp's article preceded the establishment of the United Nations Environment Program (UNEP) and the subsequent drawing up of the Belgrade Charter (Stevenson et al. 2013), which stated that the goal of environmental education was:

"To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and prevention of new ones" (UNEP 1975, 3).

For Stevenson et al. (2013), the significance of this Charter was its emphasis on *action,* which had been lacking in earlier policy innovations. Again, there are strong resonances here with the Polli:Nation project, with its emphasis on developing young people's environmental attitudes and behaviours through their direct involvement in actions to conserve pollinators. The Belgrade Charter was reinforced at the world's first conference focused entirely on environmental education, held in Tblisi in 1977. The resultant Tblisi Declaration (1978) continued to emphasise the development of a combination of awareness, knowledge, attitudes, skills and action (or "participation"). The Declaration stated that the objectives of environmental education were to provide "social groups and individuals" with opportunities for the following (UNESCO 1978, 27):

- Developing a "sensitivity to the total environment and its allied problems" (Awareness).
- Gaining a "variety of experience in" and acquiring "a basic understanding of… the environment and its associated problems" (Knowledge).
- Acquiring "a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection" (Attitudes).
- Developing the skills "for identifying and solving environmental problems" (Skills).
- Becoming "actively involved at all levels in working toward resolution of environmental problems" (Participation).

In the decades following the Tblisi Declaration, environmental education became increasingly bound up with the emerging discourse around 'sustainable development'. The notion of Education for Sustainable Development, explain Jickling and Wals (2008), was launched by the *Our Common Future* report published in 1987, and cemented at the World Conference on Environment and Development in Rio de Janeiro in 1992, whose subsequent Agenda 21 stated that **"**(e)ducation is critical for promoting sustainable development" (1992, 320). It was through science education that environmental education had first entered school curricula in the early 1970s (Gough 2008), but for Eames, Cowie, and Bolstad (2008), the rise of ESD and the related Education for Sustainability demonstrated a move away from scientific study as a means of teaching about environmental issues, to focus instead on the "integration of concerns for social, political and economic development" (35).

This focus on sustainable development has had a clear influence on subsequent educational policy development (Stevenson et al. 2013, 4), and has continued to do so through the Decade of Sustainable Development (UNDESD) promoted by the UN, from 2005 – 2015 (Clarke 2015). The UK has been typical in this respect, with England, Scotland, Wales and Northern Ireland all adopting policies around the integration of sustainable development into their respective curricula – although the extent to which curricular integration has been achieved in practice has been varied (UNESCO 2013). While the Polli:Nation Activity Plan makes no direct mention of sustainable development, its prominence in the relevant policy developments has nonetheless been influential in shaping the educational context in which the project has been implemented.

2.2.2. Outdoor learning and environmental education

These sustainable development-focused policy developments have contributed to an increased emphasis on 'outdoor learning' in UK curricula, which has been increasingly called upon as a means of delivering environmental education goals (Mannion, Mathu, and Wilson 2015; Higgins 2016; King, Christie, and Higgins 2016). Outdoor learning in the UK has traditionally been associated with one-off residential experiences in which young people engage in adventurous activities (Beames and Ross 2010), yet the Polli:Nation project has far greater resonances with more recent trends towards outdoor

learning that occurs regularly in learners' own local areas, and/or aims to encompass curricular areas, rather than being additional to it (Beames, Higgins, and Nicol 2012). In Scotland, for example, this is reflected in the emphasis on outdoor learning (Learning and Teaching Scotland 2010) and "learning for sustainability" (One Planet Schools Working Group 2012) within the Curriculum for Excellence. This emphasis continues through the Scottish Government's "Vision 2030+" strategy (Scottish Government 2016).

Justification for the emphasis on curricular-linked, school-based outdoor learning and environmental education can be found in the academic literature around environmental education and outdoor learning. The sub-sections below summarise the themes in the literature that offer support for environmental education initiatives like Polli:Nation. In summary, arguments put forward in these studies hold that positively influencing values and attitudes is best achieved when an environmental education project involves learning by direct experience of an environment, long-term engagement with a particular place, and the opportunity for multiple curricular areas to be covered, so as to engage with the social as well as scientific aspects of environmental issues.

Behaviour change stems from direct experience of the natural environment:
A significant portion of studies relating to outdoor and environmental education has consisted of attempts to evaluate its effects on participants, especially their development of positive values and behaviours towards the environment. These have been variously referred to as "responsible environmental behaviour" (Hines, Hungerford, and Tomera 1987), "environmental responsibility" (Palmberg and Kuru 2000), "pro-environmental behaviour" (Jensen 2002; Steg and Vlek 2009; Prince 2017), "environmental knowledge, attitudes and behaviour" (Duerdeen and Witt 2010), and an "ethic of care" towards the environment (Christie and Higgins 2012). In a literature review exploring the links between outdoor learning experiences and "attitudes to sustainability", Christie and Higgins (2012, 8) note two prominent sub-types within this type of study, to which other studies drawn from my own literature reviewing can be added.

The first of these types of study are "experimental or quasi-experimental studies" that attempt to measure the effects on learners' attitudes and behaviours of different types of

environmental education interventions (Christie and Higgins 2012, 8). These often use survey measures to quantitatively measure these effects, comparing the results of an 'experimental' group with those of a 'control' group before and after a particular intervention. Such studies, in general, highlight two key trends. Firstly, that "direct" experiences of an environment, such as experiencing wildlife in its natural habitat, have greater potential to affect attitude and behavioural change than "indirect" experiences such as learning about wildlife in a zoo or wildlife centre (Duerden and Witt 2010; Kruse and Card 2004; Palmberg and Kuru 2000). Significantly for this study, two studies have recently focused on young people's attitudes towards bees in particular. Again, these found that the greatest positive effect on these attitudes occurred in education programmes involving direct experience of bees (Cho and Lee 2018; Schonfelder and Bogner 2018). Secondly, these studies have tended to find that potential for the development of pro-environmental attitudes and behaviours increases with the *duration* of the programme. These, however, still focus primarily on one-off experiences – for example, comparing a one-day residential programme with a five-day one, and finding the five-day programme to have greater positive effects on test scores (Bogner 1998; Braun and Dierkes 2017).

The second type of study noted by Christie and Higgins (2012) are those that have attempted to link hands-on, outdoor experiences in childhood with positive attitudes towards the environment in later life. Such studies include a paper by Palmer et al. (1998) in which environmental educators commonly cited early experiences in 'nature' as an influence on their choice of career, and Guiney and Oberhauser's (2009) study of adult participants in conservation programmes, who traced their motivation to participate back to childhood experiences. Wells and Lekies (2006), meanwhile, who conducted telephone interviews with a random sample of adults across the USA, again found that many of those with pro-environmental attitudes pointed to influential childhood experience in 'nature'. Conducting a review of numerous similar studies, Chawla and Derr (2012) confirm that childhood play in nature is one of the most common types of experience associated with care for nature in adulthood, alongside another key influence: adult figures who communicate the value of nature.

Benefits of long-term and regular engagement with local outdoor spaces:

In addition to the conclusions around direct experience and duration outlined above, studies have also pointed to the importance of long-term and regular engagement with a particular place, in order to develop a 'connection' to it. Empirical studies pointing to the importance of regular, long-term engagement include Bodzin's (2008) study of a regular after-school science club programme, which indicated that long-term investigation of a pond ecosystem "enhanced environmental attitudes, promoted a sense of environmental stewardship, and fostered responsible environmental behavior" (47).

These studies give further support to the growing call for more "place-based" approaches to outdoor learning and environmental education – that is, educational endeavours that take place regularly in the learners' own local area, and are sensitive and responsive to the particularities of those places (Woodhouse and Knapp 2000; Baker 2005; Wattchow and Brown 2011). This, for Beames and Ross (2010, 104), contrasts with outdoor learning that, traditionally in the UK, takes place in a "faraway landscape that some others have deemed more beautiful or valuable". Sobel (1996) contends that such regular engagement with a place has the potential to foster a deep emotional attachment to that place which, he argues, is crucial to encouraging young people to act in a pro-environmental manner in later life (see also Smith 2002; Gruenewald 2003; Sobel 2004). In summary, Christie and Higgins (2012, 4) conclude that "attitude and ultimately behaviour change stems from a connection to a place; in other words young people will make the effort to love and care for something that they are positively connected to". More recent studies, focused on both curricular and extra-curricular science learning, continue to emphasise the importance of learning that begins in learners' own communities (Ballard, Dixon, and Harris 2017; Iversen and Jonsdottir 2018), contending that this has the greatest potential to develop young people's interest in a topic.

Benefits of (cross) curricular application of environmental education:

Alongside the increased emphasis on regular, locally-based approaches to environmental education and outdoor learning is the related call for the integration of these within curricula, rather than as additional to it. As Beames (2012, 7) suggests, "rather than being regarded as an infrequent, recreational disruption to learning, taking classes outdoors should be seen as an extension of, or indeed integral part of classroom

activities and used to meet the curricular and other needs of students". Sciences are perhaps the area of school curricula that have seen the greatest recognition of the potential of environmental and outdoor education as alternatives to classroom-based approaches – indeed, according to Gough (2008), it was through natural and environmental sciences that environmental education first entered school curricula in the early 1970s. Studies have since argued both for making the learning of science more "relevant" to environmental debates and to young peoples' lives (Jenkins 1999, Ashley 2000, Osborne and Collins 2001), as well as pointing to the benefits of science being taught outdoors, suggesting that this is a powerful way to create "authentic learning experiences" (Carrier 2009, 35), and would guard against the tendency for students to "compartmentalise" science at school as being separate from their experiences outside of school (Carrier, Tugurian, and Thomson 2013).

Others, however, point to the importance of making sure outdoor/environmental education is not just curricular, but *cross*-curricular. Karrow and Fazio (2010), for example, argue that in attempts to foster a "sense of place" in young learners, much potential is missed when the focus is purely on scientific investigation. The authors instead argue for a more holistic outdoor learning experience that gives opportunities for creative activities as well as scientific ones (see also section 2.6). Rios and Menezes (2017, 1409) similarly critique the tendency of school-based environmental education to "focus more on cognitive dimensions than on affective components of learning". Iversen and Jonsdottir (2018), meanwhile, point to "socioscientific" topics as being the most engaging to young people – that is, those where scientific studies can be linked to issues of citizenship and community participation.

2.2.3. Polli:Nation and recent trends

In summary, Polli:Nation can be clearly linked to the trends in policy and research outlined in this section. Aiming to engage young people directly in their local environments indicates a clear belief in the potential of such experiences to foster behaviour-change outcomes. Also resonant with the themes identified above are the planned implementation of the project over a long period (two full academic years), and its location in young people's own school grounds. Finally, LTL staff also emphasised the potential for cross-curricular integration of the project, especially in primary

schools, with the inclusion of a number of resources aimed at this on the project's website (Learning through Landscapes, n.d). As highlighted from the outset, however, the project is fairly unique in its focus on engaging young people in practical conservation work, as well as its inclusion of citizen science. As section 2.6 demonstrates, literature exploring the inclusion of these activities in formal education contexts is relatively limited, and represents significant gaps for this study to address.

2.3. "Nature and dynamics"

Having summarised the literature linking participation in outdoor learning and environmental education with the development of pro-environmental attitudes and behaviours, I now turn to a key remaining gap: namely, the lack of focus on *participants' lived experiences* of the outdoor and environmental educational initiatives under investigation.

As Christie and Higgins (2012, 24) conclude, studies on the whole suggest at least the potential for a variety of outdoor and environmental education projects to contribute to the development of a "broader ethic of care towards the environment". As previously mentioned, a large proportion of these studies are based on pre- and post-intervention survey measures attempting to quantitatively measure the extent to which a project's aims have been met. As Rickinson, Lunholm and Hopwood (2009, 97) have pointed out, however, research into the "nature and dynamics" of what takes place during such projects is still relatively limited, and little has been written about what the provision of outdoor and environmental education "looks and feels like for the learners concerned".

This key gap, for Rickinson, Lunholm and Hopwood (2009, 97), suggests an "urgent need for more and better research-based understandings of environmental learning and students' experiences" (97). As Stern, Powell, and Hill (2014, 604) succinctly put it, there is a need to better understand "not only if (environmental education) works, but also *why* and *how* it works". For the purposes of this study, this led me to conclude that emphasis would be better placed on the contexts and processes enabling pupils to make an active response to environmental issues, rather than the 'pro-environmental' dispositions they may be found to possess at a given moment. I also kept in mind a key problem with many studies focused on young people, cited by Chawla (2015):

Particularly in studies that use "experimental, quasi-experimental, and correlational methods", she reminds us, it is adults, the researchers themselves, who "select the dependent variables that they deem important" (445). This, for me, further highlighted the need for a qualitative study that explored the processes taking place within the project, and how these were experienced by the young people themselves. This had important implications for the methodological considerations explored in Chapter 3. The initial insights into these theoretical orientations in the following section provide necessary background for these considerations, since it was conclusions drawn from them that helped steer me towards a more in-depth exploration of new materialist theories.

2.4. Issues and methodological implications

The lack of focus on participants' lived experiences of environmental education initiatives highlighted in the previous section began to steer me towards a qualitative methodology that focused on gaining the perspectives of young people themselves. This section highlights further methodological issues with attempts to correlate young people's 'pro-environmental' attitudes and behaviours with their experience of outdoor and environmental education initiatives, and explains how these provided further signposts towards the methodology described in chapters 3-5. These issues are summarised, with reference to the relevant literature, under the headings below, each of which begins with a problematic word or phrase encountered regularly in the literature cited above.

2.4.1. 'Pro-environmental'

The first issue with studies that attempt to measure the effects of programmes on the attitudes and behaviours of young people towards the environment, is the definition of the very thing they are attempting to measure (I use the term 'pro-environmental' here, but the same challenge applies to all the alternative terms listed in section 2.2.2). Furthermore, any environmental education programme that aims specifically towards the development of a pre-defined set of values, runs the risk of being "indoctrinatory" (Jickling 1992). Several studies in the field of environmental education have cited an unnecessary desire for "consensus" around the ways in which people and societies 'should' behave towards the environment (Sauve and Berryman 2005; Priestley et al

2010). Jickling and Wals (2008), for example, point out that "Education for Sustainable Development" rests on the assumption that sustainable development is an entirely uncontested concept. Bonnett (2007, 710) raises concerns about the "orthodoxy" of the idea of sustainable development, despite its ongoing ambiguities, such as "precisely *what* is to be sustained?" and *"*precisely *whose* needs are to be met?"

In response, Jickling and Wals (2008, 8) instead advocate approaches to environmental education that *"*enable students to debate, evaluate, and judge for themselves the relative merits of contesting positions". Iversen and Jonsdottir (2018) make similar arguments for "participatory" or "democratic" approaches as opposed to "moralistic" ones, whilst Sjoblomm and Wolff (2017, 331) criticise initiatives that aim towards "'right' values and pre-set goals". Echoing the gaps identified in the previous section, Sund and Lysgaard (2013) subsequently call upon researchers to pay greater attention to the "learning processes" taking place within environmental education initiatives, rather than the values or attitudes possessed by participants at their conclusion.

With these critiques in mind, a number of frameworks instead seek to assess the development of young people's ability to respond critically to environmental issues. These include "action-competence" (Jensen and Schnack 1997; Jensen 2004; Mogensen and Schnack 2010), "ecological literacy" (Orr 1992; Cutter-MacKenzie and Smith 2003), "environmental citizenship" (Dobson and Bell 2007), "uncertainty competences" (Tauritz 2012), and more recently, "environmental science agency" (Ballard, Dixon, and Harris 2017). The array of different frameworks cited here, however, suggest a lack of clarity with regard to what exactly is being measured, and perhaps as a result, no one framework has really "caught on" in terms of wider use across the field of environmental education research. Moreover, there are ongoing critiques over their applicability and precise definition of some of these frameworks, as well as (in keeping with the gaps cited in the previous section) a lack of understanding of the processes that give rise to their generation. "Action-competence" provides an example. Jensen (2004) breaks the concept of action-competence down into four desired aspects: an understanding of the various *effects* and *causes* of environmental issues; the ability to evaluate possible *strategies for change*; and the ability to conceive of *alternatives and visions* for how we might live differently. Issues with action-competence, however, include debates around whether anyone can fully 'possess' it, since it is an ongoing

process, always possible to be developed further (Mogensen and Schnack 2010). Added to this is the relative lack of empirical studies drawing upon action-competence, which limits the available insights into *how* it is developed.

In addition to the difficulty of defining or measuring any particular framework, there remain wider issues with the application of any framework at all. For the purposes of this study, I felt that any adherence to a pre-defined framework would hinder my commitment to exploring the ways in which young people themselves experienced the project. It would be a case of a researcher, in Chawla's (2015, 445) previously-cited words, "select(ing) the dependent variables that they deem important". This continued to lead me towards a grounded approach that did not begin with any pre-defined framework for assessing attitudes, behaviours or competencies, as further explored in the following chapter.

2.4.2. 'Nature' and 'connection to nature'

In order to further highlight the importance of focusing on the perspectives of young people themselves, it is insightful here to also explore critiques of the so-called "child in nature" movement. These critiques, in effect, call into question the basic assumptions of many of the studies cited in earlier sections, and indeed, of the Polli:Nation project (see 2.1). In demonstrating the potential for outdoor and environmental education initiatives to impact positively upon young people's attitudes and behaviours towards the environment, there is at least an implicit assumption in most of these articles that immersion in or direct contact with nature is the stand-out feature of these programmes. There is, however, a growing body of literature that questions whether the concept of nature (or "natural heritage", as it is referred to in key Polli:Nation documents) is a useful one at all.

The key argument put forward by a growing number of researchers is that the design of many educational initiatives, and the attempts to evaluate them cited here, rely heavily on "culturally myopic" views held by white, Western, middle-class adults about "children's loss of connection to nature", which are nonetheless treated as being "universalisms" (Malone 2016, 390-391). Malone (2016) and others (Arvidsen 2018; Clarke and McPhie 2014; Rautio et al. 2017) cite Richard Louv's popular book "Last

Child in the Woods" (2005) as being influential in promoting the need to re-instil this 'connection to nature' in young people. For Arvidsen (2018, 2), Louv's ideas, which include the claim that children are suffering from so-called "Nature Deficit Disorder", indicate an "idealised notion of nature" that "gives primacy to the natural environments that are most pristine and pure". Such an idealised vision of nature, he argues, is hugely problematic for environmental education initiatives, firstly because the vast majority of children live in cities with limited access to environments that fit this ideal, and secondly, because conceiving of child-nature relationships in this way "might run counter to what is going on between children and the material world" (2). In other words, focusing on children's "connection to nature" through such an idealised lens carries the danger of obscuring what children *actually* think and do when engaged in environmental education programmes (or indeed, any activity).

Building on such critiques, a small number of researchers focused primarily on early-years contexts have instead argued that focus is better placed on children's unique "common worlds" (Taylor 2013, 2017; Nxumalo and Pacini-Ketchabaw 2017) - a term borrowed from Latour (2004). Affrica Taylor (2013), a key proponent of "common world pedagogies", has critically examined the idea of a linear development trajectory from immersion in nature from a young age to the creation of "budding young environmental stewards" (117). There is, she contends, no definable 'nature' that is inherently valuable to a young person, and even the idea of a biophysical world that exists separately from humans is grounded in a culturally-specific nature-culture dichotomy that, crucially, young children have not yet 'learned' (see also Fletcher 2017, 228). Rather, for Taylor (2013), what emerges as significant or valuable to children is a result of a more complex and unique set of "enmeshed relations with others in their worlds" (121). Put simply, "things turn out differently in different places" (16). It is such sets of enmeshed relations that make up children's "common worlds".

Rautio et al. (2017, 1379), similarly, call for an "understanding of child-nature relations as continuing transformation of both 'child' ('human') and 'nature'" – that is, through their "enmeshed relations", these elements are continually acting upon each other and becoming something new. For these authors, most previous attempts to resolve concerns that children have lost their 'connection to nature' have only served to reinforce the perceived separation between humans and nature. This occurs either by

"initiatives of reinserting the 'child back to nature' or with evidence aiming to prove that the worry is unfounded to begin with" - including arguments such as "*there is nature* available for exploration: in the cracks and crevices of cement, in the footprints of foxes and city rabbits" (1379). Neither viewpoint, they argue, furthers our understanding of the unique ways in which children experience their environments. As Malone (2016, 390) asks, "(w)hat if children were viewed *as* nature, rather than outside of it?"

These studies by Rautio et al. (2017) and Malone (2016) are examples of the small number of studies that have sought to disrupt idealised images of child-nature relations. Based on empirical research in Northern Finland, Rautio et al. (2017) provide examples of how children and their environments are both "becoming" something new through children's experience of an environmental education initiative, in ways that can not be classified into a simple nature/non-nature dichotomy. These include a shop/café which becomes part of the 'nature' experience due to the necessity of entering it for warmth in the sub-zero temperatures, and a boy who comes to associate a seagull with negative feelings towards his recently-separated parents. Perhaps even more striking, however, is Malone's (2016) study, which involves children and street dogs in La Paz, Bolivia. The setting, in which children, who enjoy extensive freedom, play amongst heavy traffic, dirt, and piles of rubbish discarded in the streets, challenges the "sanitised boundaries and binaries" between children and nature, and contradicts "white, middle-class, natured childhoods seeking wild nature reconnection" (401-2). Dogs, in this neighbourhood, are not kept in houses, but are still fed, named, and "owned" by particular families. The children's descriptions of time spent with "their" dogs, for Malone, reveals the "intimacy of shared relations, multiple subjectivities of child and dog" that exist despite the impoverished and distinctly unsanitised urban setting (396). "Child-nature relations", Malone concludes, "are messy and complex, rather than simply restorative and idealistic" (404).

These examples, as well as Taylor's (2013) concept of "common worlds", further encouraged me to focus as much as possible on young people's own perspectives in this study, guarding against pre-conceived notions of child-nature relations. It also begins to demonstrate the links between these studies and the new materialist theories discussed

in Chapter 3.

2.4.3. "Empirical isolation"

In identifying the lack of studies focusing on the "nature and dynamics" of environmental education projects as experienced by participants, Stern, Powell, and Hill (2014, 602) call for "studies that enable the empirical isolation and/or verification of particular practices that tend to most consistently produce desired outcomes". The studies cited in the previous section, however, which highlight the complex relations between children and their environments, suggest that given the uniqueness of children's relations with their "common worlds", such "empirical isolation" is extremely challenging. Indeed, Mannion, Fenwick, and Lynch (2013), in a UK-based empirical study, highlight the complex factors interacting at any given time to influence the "educational value" of excursions outside the classroom. These included the support given to outdoor learning and environmental education by the school as a whole, the prior dispositions of pupils, teachers' personalities and attitudes, and the particular aesthetics of a given place. Green and Somerville (2015), meanwhile, find that the ways in which children respond to outdoor sustainability education initiatives depend on their interactions with the specific "materialities" available in particular school grounds, which, for Green and Duhn (2015), are often "uncontrolled, unexpected and unknown because they tend to happen outside of the pedagogical gaze" (69). For Winks (2018, 392), a related shift towards a more nuanced picture of the factors influencing environmental behaviour change suggests that "there can be no formulaic principle for shifting beliefs, attitudes, and values".

The studies cited above also raise wider questions around whether environmental education programmes as a whole can be 'isolated' from other influences on young people's lives. That is, can we really say with any certainty that engaging young people in a given environmental education project will be likely to achieve a certain result? Even in a survey-based study such as Bogner's (1998), the author accepts the difficulty of isolating this particular environmental education programme as causative to the reported increase in pro-environmental attitudes and intended behaviour, due to variation in students' existing attitudes before the study began. Biesta (2007), meanwhile, points to family life as the biggest influence on young people's values,

while Prince (2017) discusses the other "agendas" and "identities" that appeals to "pro-environmental behaviour" may overlap with, such as frugality, and health and well-being.

The difficulty of empirically isolating certain elements of environmental education projects, combined with a focus on the uniqueness of the ways in which young people experience particular "common worlds", further points towards the use of new materialist theories explored in Chapter 3. The following section, meanwhile, explores the insights that have already been provided into learners' experiences of environmental education initiatives.

2.5. Existing literature on learners' experiences

Having identified the need for a study that focuses on learners' lived experienced of the "nature and dynamics" of environmental education initiatives, I now explore the limited yet growing number of studies that *have* focused on these, and the remaining gaps. Since Polli:Nation's specific focus on practical conservation and citizen science provides an opportunity for research in previously under-explored areas, I will primarily focus on studies in these areas. These studies are covered in the following section. In this section, however, I draw upon studies from the wider field of environmental education that have provided insight into learner experiences and significant processes taking place within environmental education initiatives. Broadly speaking, I saw these as belonging to four types of study, as outlined in the following sub-sections.

2.5.1. Studies identifying key elements of a wide range of programmes:

The first type of study in this area is characterised by looking at a wide range of environmental education programmes, and identifying the programme elements that, across multiple projects, appear to be most effective in producing positive outcomes. These studies come from the same authors I initially cited as identifying the need for a focus on learner experiences. Having identified this need, Stern, Powell, and Hill (2014) go on to review sixty-six articles aiming to evaluate environmental education projects, and identify a number of common "themes that may drive positive outcomes" (581). Among these were "active and experiential engagement in real-world environmental problems", providing a "holistic experience", and programme content that is explicitly

linked to students' home lives. These authors build upon the work of Rickinson (2001), who similarly identified programme characteristics that appeared to most effectively facilitate positive learning outcomes. Echoing the findings of several studies already cited, these characteristics included direct experiences in the outdoors, longer duration of these experiences, and the inclusion of "preparation and/or follow-up work" (274) – that is, projects that did not simply take place in isolation, but enabled subsequent related learning to take place.

2.5.2. Observations of children's interactions with more-than-human elements:

The second type of study in this area are those that attempt to gain qualitative insights into how young people conceive of their relationship with 'nature', and/or how this is enacted through their participation in environmental education initiatives. These include two studies cited in the previous section: Rautio et al.'s (2017) study attempting to disrupt child/nature binaries in Northern Finland, and Malone's (2016) study of child-dog encounters in La Paz, which counters idealised images of "white, middle-class, natured childhoods seeking wild nature reconnection" (402). Other studies in this vein include those by Gannon (2015), Green and Duhn (2015), Arvidsen (2018), and Winks (2018), all of which focus on unexpected outcomes and contingent events that can produce outcomes other than the stated aims of the particular environmental education and outdoor learning programmes within which they occur. For Gannon (2015, 1), these insights suggest that effective pedagogical spaces "require recognition of the co-implication, interdependence and necessary entanglement of 'human' and 'non-human' worlds". Arvidsen (2018), meanwhile, reflecting on the process of children building dens, draws on new materialist theory to contend that the building of a den is a process (a "becoming"), rather than ever being a completed object or outcome. All of these studies, in keeping with Taylor's (2013) concept of "common worlds", suggest a complex and nuanced relationship between engaging young people in particular learning experiences, and the 'outcomes' that can be predicted.

2.5.3. Interviews with young people about their conceptions of 'nature':

Also within this category are two studies involving interviews with young people about their conceptions of 'nature' as a whole. Rios and Menezes (2017) asked primary school-aged pupils in Portuguese schools to imagine "a place in nature", then to describe the place they had imagined both verbally and through drawings. The authors

found that the drawings/discussions showed a "protective disposition towards nature", suggesting that "(c)aring for and taking care of nature appears clearly as a moral imperative" among these children (1408). Sjoblomm and Wolff's (2017) Finnish study focuses instead on secondary-aged pupils, and found that regardless of the students' professed interest in nature, all of their interviewees considered "protecting nature" to be important. The authors then explore the variety of standpoints from which the students justified this view, including "recreational", "aesthetic", "biodiversity", "future", and a "holistic view of nature" (326), hinting at a combination of "anthropocentric" and "biocentric" values influencing students.

2.5.4. Asking participants about key elements of a particular activity/programme:

The fourth type of study focused on the "nature and dynamics" of learners' experiences are those that gather participants' views on the key elements of a particular learning experience, then arrange their responses into themes. These include Gordon and Thomas's (2018) study of first-year undergraduate students on an environmental studies/environmental science programme engaged in role-play. According to these authors, stand-out elements of this learning experience for students included its potential to help them appreciate the "complexity of the issue", and to connect to aspects of their lives that were of relevance to the issue being debated (182-184). Other key studies of this type include those by Ballard, Dixon, and Harris (2017), and Iversen and Jonsdottir (2018), which focus on citizen science projects in the USA and Norway respectively. These studies both highlight the importance of science learning that is relevant to young people's own lives, and has potential to lead to action being taken as a result of data that students have gathered. These studies are explored in more detail in section 2.6.2 below.

2.5.5. Retrospective studies on adults' memories of childhood nature experiences:

Finally, studies in this area include those involving interviews with adults about their childhood experiences in nature. These build upon earlier studies cited in section 2.2.2 that draw links between childhood nature experiences and the development of pro-environmental behaviours in adulthood, and seek more in-depth insights into the significant elements of those childhood experiences. For Beery and Jorgensen (2018), stand-out themes in terms of adults' memories of childhood nature experiences included sensory experiences such as vivid memories of certain smells, and "ecological ideas and

environmental understanding" (20) – that is, the sense that their direct experience progressed to them seeking and gaining knowledge about what they had experienced. A similar study by Beery and Lekies (2018) looks specifically at adults' memories of childhood experience of "collecting" in nature – for example, picking up sticks, or foraging for berries. Again, sensory engagement stands out as being significant to these adults, as well as the importance of places in nature that were close to their homes, and memories of particular family members with whom they participated in collecting. For Beery and Jorgensen (2018, 16), these insights, when combined with observation on the ways in which children approach and interpret their environment, reinforce the importance of "embodied" and "sensory" experiences within environmental education programmes.

In environmental and outdoor education as a whole, the studies cited in this section indicate significant progress with regard to paying attention to the "nature and dynamics" of participants' experience of these programmes. The following section, however, explores the literature around the activities of greatest relevance to the Polli:Nation project, and highlights significant remaining gaps.

2.6. Practical conservation and citizen science

While the studies cited in the previous section indicate significant progress in research that focuses on the "nature and dynamics" of learners' experiences of environmental education and outdoor learning programmes, there remains a distinct lack of studies focused specifically on young people's experience of the type of activities central to the Polli:Nation project: practical conservation and citizen science. This section explores the existing literature in these areas, and the remaining gaps that informed the key questions addressed by this study.

2.6.1. Practical conservation

Primarily, the Polli:Nation project was an environmental education initiative built around practical conservation activities - specifically, young people making changes to their school grounds in order to encourage greater numbers of pollinators. The project represents an opportunity to explore an important gap in the literature, given the relative

lack of studies focused on young people's engagement with practical conservation activities, and its potential educational outcomes and processes.

Up to now, studies in this area have in large part focused on those taking part in conservation activities on a voluntary basis, the vast majority of whom are adults (Hine, Peacock, and Pretty 2008) who already display strong pro-environmental values (Halpenny and Caissie 2003; Guiney and Oberhauser 2009). When applied to young people, attention has been paid to motivations for overseas, "Gap Year" volunteering (Emmons 1997; Lorimer 2010; Jones 2011), and - in local and school-based contexts - to learning *about* conservation rather than physically taking part in it (Schusler and Krasny 2010; Zint et al. 2002). While the literature explored in the previous section cited the importance of direct, hands-on experiences, little attention appears to have been paid specifically to young people engaged in the practical transformation of landscapes.

Findings from limited studies in this area do, however, appear to mirror those of the wider fields of outdoor learning and environmental education, indicating that "direct" experiences lead to greater changes in knowledge and attitudes than "indirect" learning (Kruse and Card 2004; Burnett et al. 2016; Glaab and Heyne 2018), and that stated attitudes towards the environment improve with increased duration of conservation education programmes (Zint et al. 2002). Tompkins (2005), meanwhile, reporting on a practical watershed restoration project involving university students, pointed to an increased "sense of purpose" in participants, and that the resultant enthusiasm had positive knock-on effects on regular classes.

Although the literature around participation in practical conservation activities is limited, parallels might be drawn with the related field of "civic ecology" – a growing body of literature centred around a team of US-based researchers. Krasny and Tidball (2012, 267) define civic ecology practices as those that "generally begin as small, self-organized efforts after a prolonged period of economic and environmental decline or more sudden major disruptions, such as earthquakes, hurricanes, and conflict", and usually involve the physical restoration of a certain locale. The authors, in this paper and elsewhere, draw upon examples such as the restoration of areas of New Orleans following Hurricane Katrina in 2005. Parallels can be drawn here with the Polli:Nation

project, which represents a practical response to the long-term decline of pollinator habitats and populations. There are, however, important differences: for example, the project is taking place in formal educational contexts beginning on a nationwide scale, rather than being a "self-organised" grass-roots effort beginning in response to a locally specific issue.

Nonetheless, findings from studies in this area point to the educational potential of engaging young people in practical responses to an environmental issue whose effects can be witnessed on a local scale. Krasny and Tidball (2009), for example, point to cooperation with organized groups and governmental bodies as a key benefit of civic ecology practices, as well as the potential for the competencies of local residents as well as those of "experts" from outside of the community, to be utilised (Krasny et al. 2015). Such approaches, the authors argue, have great potential to result in feelings of empowerment among participants with regard to working towards the resolution of environmental issues. In one of the few studies in this area focused specifically on young people, Smith, DuBois, and Krasny (2015, 451-452) make a similar point, arguing that participation in civic ecology practices shifts the emphasis from the negative impacts of environmental decline or disaster towards a "solutions-based framing". They report that young people felt "loss, fear and powerlessness" at the start of three such projects cited in their study, but these had "all but disappeared" by the end of the projects.

The potential for such empowerment through engaging young people in practical conservation is further hinted at in literature that focuses more generally on human/nature relations and their implications for environmental education programmes. Cooke, West, and Boonstra (2016), for example, call for activities in environmental education that encourage a "transactional/relational perspective"– an embodied human/environment relationship in which "(c)onnections are not solely produced in the mind but through the ongoing interactivity of mind, body and environment through time" (831). This view would appear to point to the potential of practical conservation, involving young people in the active and ongoing transformation of a particular environment, as a suitably "transactional" means of engagement.

There are, however, potential caveats when it comes to the sort of perspective encouraged through young people's participation in practical conservation activities. Elsewhere in their article, Cooke, West, and Boonstra (2016, 832) criticise "interactional" perspectives that characterise humans as acting *upon* the world, arguing that this risks reinforcing the "separateness" of social and ecological (or human and non-human) elements. Taylor (2017), similarly, positions her proposed "common world" pedagogies in relation to the "stewardship pedagogies" that, for her, dominate environmental education – that is, approaches that position humans as the central and dominant species, who hold the answers to solving environmental problems. Although well-meaning, she contends, these approaches carry the danger of reinforcing human "heroism" and the perceived separation between humans and nature, rather than the paradigm shift required to truly bring about the requisite shift in this relationship. The perspectives highlighted here, and their potential pitfalls, immediately bring to mind practical conservation, with its positioning of humans in a position of "mastery" (Bonnett 2007) over the landscape to which they are making changes. Indeed, for Fletcher (2017, 230), the perceived physical separation of humans and nature is "most commonly expressed in the realm of biodiversity conservation". The Polli:Nation Activity Plan (LTL 2014) is clearly indicative of a "stewardship" perspective underlying the project, with its description of young people as "the future custodians of our natural heritage" (3), who "will lead the changes to the school grounds and local walk-to spaces" (28). The apparent promotion of a "stewardship" perspective through practical conservation, and the potential challenge this poses to its use in formal education contexts, is a major theme of discussion in Chapter 9.

2.6.2. Citizen science

Citizen science – the involvement of members of the public in the collection of scientific data – has undergone a surge in popularity and importance over the past decade, with many new projects emerging, especially in the USA and Europe (Silvertown 2009; Dickinson and Bonney 2012). Alongside the physical changes being made to school grounds, another key area of activity within Polli:Nation was the project's contribution towards a survey designed by staff from the project's partner organisations including the Open Air Laboratories (OPAL) network, who maintained the large-scale database to which survey data contributed. The project can therefore be

classed as what Wiggins and Crowston (2011) call a "contributory" citizen science project – that is, one "established by professionals, and inviting people to contribute data" (Roy et al. 2012, 6), and the most common type of project, according to their typology. As this section shows, there is an emergent but still-limited body of literature around the links between citizen science and education.

Up to now, the literature around citizen science has focused largely on the benefits and implications for scientific research of involving non-professionals in data collection (Bonney et al. 2009; McKinley et al. 2015). There is, however, also a limited body of literature focusing on the potential benefits of citizen science to its "non-professional" participants, including its potential to "increase environmental stewardship exercised by environmentally motivated citizens through their active participation in research" (Cooper et al. 2007, 5). Similarly to practical conservation, it is clear that participants in citizen science have primarily been adults participating voluntarily, and accordingly, most research has concentrated on this demographic. Studies involving adult participants have explored the likelihood of participants becoming involved in conservation activities due to their involvement in citizen science (e.g, Haywood 2016; Haywood, Parrish, and Dolliver 2016; Lewandowski and Oberhauser 2017), as well as their ability to "think scientifically" (Trumbull et al. 2000). The behavioural and attitudinal changes shown by these participants have, however, tended to be fairly minor, probably because, as voluntary participants, they already have strong interests in science and the environment (Drushke and Seltzer 2012). School-based projects, however, potentially have even greater potential for making a difference to such attitudes because as Bonney et al. (2015, 11) remind us, pupils "often have no choice but to participate if their teacher or school district chooses to adopt such projects". Whilst the lack of voluntary engagement may mean that some participants are *less* engaged than those cited in studies such as Drushke and Seltzer's (2012), participation in school-based projects also has potential to capture the interest of those who were previously unaware of these activities and the issues they seek to address. Dillon, Stevenson, and Wals (2016) therefore point to the continuing potential of participation in citizen science for equipping young people with the competencies required to address complex environmental problems.

The synergies and tensions between participation in citizen science, and its educational potential for young people, is a limited but now fast-growing area of academic research. A key question posed in this literature concerns how citizen science ought to be carried out in educational contexts in order for it to have the greatest potential for developing the sort of "environmental stewardship" Cooper et al. (2007) refer to (which already indicates potential tensions with the critiques of "stewardship" perspectives cited in the previous sub-section). From the small number of articles in this area, the themes emerging in response to this question largely relate to ways of ensuring young people are sufficiently *engaged* in citizen science practices, particularly in comparison to their usual engagement in classroom-based "cookbook science" (Overholt and MacKenzie 2005).

The arguments with regard to young people's sufficient engagement in citizen science activities can be split into three points, which to a large extent echo the wider conclusions from the fields of environmental education and outdoor learning. Firstly, researchers point to the importance of *regular* engagement in a particular study over an extended period of time (Falk et al. 2012; Ballard, Dixon, and Harris 2017). Secondly, citizen science projects have a greater potential of engaging young people when there is an immediate *relevance* to them, and this is best achieved when the project occurs in a place with which young people have a pre-existing relationship – usually their own local community (Ballard, Dixon, and Harris 2017; Fazio 2016; Iversen and Jonsdottir 2018). Thirdly, of similar importance is the perceived 'realness' of a given citizen science project. For both Ballard, Dixon and Harris (2017) and Silva et al. (2016), however, the most important aspect of this 'realness' for young people is not necessarily the contribution towards genuine scientific research. Others point instead to the importance of participation in the entire process of scientific inquiry, including setting the initial questions, analysing data, and sharing their findings with audiences beyond the classroom (Kontoupes and Oberhauser 2008; Falk et al. 2012). Related to this point on 'realness' is an important implication for this study. Ballard, Dixon, and Harris (2017) reported that for young people, definitions of 'realness' of a citizen science project could include seeing changes take place as a result of data they had collected. These changes included shifts in overall behaviour in their school or community, and visible changes to their local landscape as a result of restoration efforts. Polli:Nation, then, represents an important opportunity to investigate a citizen

science project taking place alongside related landscape changes (although admittedly participation in the OPAL survey comprised only a small part of the project).

While the studies above all focus on engaging young people in science in particular, it is important to keep in mind the earlier points regarding cross-curricular application of environmental education (see 2.2). The previously-cited study by Karrow and Fazio (2010) casts a critical eye over a Canadian citizen science initiative applied in educational contexts, and argues that the programme is limited in the extent to which it fosters a "sense of place". Pupils, they observe, "assume the position of a detached, objective, and impartial 'scientist'", and have "little or no opportunity to develop a sustainable and meaningful relationship with their local environment" (203). They argue that many other things are "marginalised" by this exclusive scientific focus, and recommend a more holistic approach involving opportunities for creative activities as well as scientific ones. Adding further support to this is Iversen and Jonsdottir's (2018) study of pupils in Norway engaged in a study into the effects of a new development on a local ecosystem, whose discovery of lapwings (an endangered species) nesting on the site then led to their engagement with decision-making processes at municipality level. This leads the authors to highlight "socioscientific issues" as holding the most potential for engaging young people (this also relates to the earlier point about 'relevance').

2.7. Summary

This chapter has detailed the literature reviewed in relation to the aims and questions pursued at the outset of this research, before any empirical research had been carried out. Given the assumptions underlying the Polli:Nation project and my own evaluative role within it, I began this literature review with a focus on the relationship between young people's participation in environmental education and outdoor learning, and positive behavioural change towards the environment. I aimed to put the Polli:Nation project in a historical context, tracing recent developments in outdoor and environmental education, and how these came to be associated with behaviour change. It became apparent, however, that the relationship between environmental education and behaviour change is an extremely complex one, with many questioning young people's linear progression towards being "budding young environmental stewards" (Taylor 2013, 117), and others pointing to complex, context-specific factors combining

to determine the 'outcomes' of environmental education projects (Mannion, Fenwick, and Lynch 2013). Following Rickinson, Lundholm, and Hopwood (2009) and Stern, Powell, and Hill (2014), I decided that emphasis was better placed on young people's *lived experience* of the Polli:Nation project, rather than any measurement of 'outcomes' at a given moment. I then explored the complexities and ambiguities around terms such as nature, pro-environmental behaviour and empirical isolation - that is, of particular elements within environmental education projects – and the methodological implications of these.

In the remainder of this literature review, I went on to examine the (limited) existing literature focusing on young people's lived experience of environmental education projects, and on their participation in practical conservation and citizen science. This led to the identification of the key gaps that this study aims to address. These can be broadly summarised as follows:

- A need for further studies that focus on participants' lived experience of environmental education projects.
- A (closely related) need to focus on young people's *own* perspectives, rather than pursuing a study that uses pre-defined concepts and categories that are defined by researchers.
- A lack of studies focusing on young people's participation in citizen science and practical conservation activities, especially within formal education contexts.

With these gaps in mind, as well as the methodological implications identified so far, I began to develop the research questions that would be central to this study. These questions, however, would continue to be iteratively developed through exploration of new materialist theories and the ontological shifts necessitated by these. These are explored in detail in the following chapter, and accordingly, the final research questions addressed by this study are listed and explained there (section 3.9). Following reporting of this study's key findings in Chapters 7 and 8, Chapter 9 then adds to the literature cited in this chapter by drawing upon studies whose relevance became apparent in light of these findings.

3. Methodological Context and Research Questions

3.1. Introduction

Building upon conclusions and questions drawn from the Literature Review, this chapter details the methodological considerations that laid the foundations for the methods described in Chapters 4 and 5. I begin by exploring the ethnographic approach devised from the outset, before introducing the new materialist theories and associated "post-qualitative" methodologies (St. Pierre 2011, 2014, 2018, 2019) that were identified as being particularly well-suited to this study. I then highlight the methodological and ontological tensions that characterised this study, which arose principally through the use of new materialist theories alongside the structured, time-bound nature of PhD study in general, and the evaluative requirements of this PhD project in particular. I also explore the series of small methodological shifts I made in order to navigate these tensions. I finish this chapter by identifying the final research questions addressed in this study. The following two chapters then outline the methods used in addressing these research questions.

Before exploring the methodological considerations in more depth, a brief outline of the study as it looked at the end of data collection and analysis is presented here. Definitions and further exploration of all methods listed here, as well as rationales for their use, are provided in later sections. Initially, I took a purely ethnographic approach to this study, carrying out participant-observation in twelve different schools across Scotland (see section 3.2). Influenced by new materialist theories and post-qualitative methodologies (section 3.3 – 3.5), I further refined this approach, drawing upon literature on "relational" and "multi-species" ethnography (section 3.6). For the ongoing analysis of fieldnotes written during and after participant-observation sessions, I created "situational maps" - a key method drawn from Situational Analysis (section 3.7). Later, I carried out twenty focus groups in eighteen different Polli:Nation-participating schools, this time across England, Wales and Northern Ireland, as well as the majority of schools in Scotland that I had previously visited. In these focus groups, I used a series of flashcards and photographs informed by the processes and features identified in my fieldnotes and through the creation of situational maps, in order to elicit responses from young people (see Chapter 5). I also carried out interviews with

eighteen teachers who had taken a leading role in facilitating the project in their school, as well as four of the LTL facilitators who had made regular visits to schools. I then analysed all focus group, interview and participant-observation data together, again using methods drawn from Situational Analysis (specifically, "relational maps", and "social worlds/arenas maps" – see 3.7, and Chapter 5).

This description, however, hides a series of methodological tensions experienced during the research process, principally concerning my use of new materialist theories and associated "post-qualitative" methodologies (see 3.3 – 3.5). These methodologies rest on a number of key ontological shifts which, for their key proponents, render them incompatible with many of the "normalising humanist concepts" (St. Pierre 2014, 10) central to qualitative research. In this chapter, I identify a key overarching debate around the use of new materialist theories in research: namely, should these theories and their methodological implications be adhered to comprehensively, eschewing all such "normalising humanist concepts", or can existing methods be re-oriented using new materialist theories to create "micro transformations" in educational research (Strom 2018)? With these tensions in mind, I chose to characterise this research as a "site of experimentation" (Bridges-Rhoads 2015, 704) that enabled me to learn and begin to enact new materialist theories whilst in the midst of doctoral study, and through which existing qualitative research methods came to be re-oriented, creating a new and unique "research assemblage" (Fox and Alldred 2015, 2017, 2018 – see 3.8). The specific tensions contributing to this overarching debate are explored in the following two chapters, but this chapter gives detailed context to the debate as a whole.

3.2. An ethnographic approach

3.2.1. Introduction

From the early stages of this study, I had conceived of it as one that would take an ethnographic approach. In this section, I first provide a brief introduction to the tradition of ethnography, before outlining the ways in which an ethnographic approach was apt for this study.

Ethnography is a research tradition characterised by the researcher being present in "naturally occurring settings" (Hammersley 2018, 8) – that is, when events and

activities are taking place that would occur regardless of the ethnographer's presence. As Brewer (2000, 10) further explains, ethnography is typified by the "researcher participating directly in the setting, if not also the activities, in order to collect data in a systematic manner but without meaning being imposed on them externally". Methods used tend to be unstructured and inductive, with the most common being participant-observation – the involvement of the researcher in "working with and living alongside one's 'informants'" (Mills and Morton 2013, 13). The researcher's experiences and observations during participant-observation are then typically recorded in the form of fieldnotes (Emerson, Fretz, and Shaw 1995) – detailed accounts comprising what Geertz (1973) notably called "thick description".

Importantly, I conceived of this study as one that took an *ethnographic approach,* rather than being "an ethnography". Early works in the ethnographic genre (e.g, Boas 1901; Malinowski 1922; Mead 1928) typically involved a lone researcher spending periods of a year or more living among distant communities belonging to cultures vastly different from their own, fully immersing themselves in all aspects of that community's day to day life (Parker-Jenkins 2018). There would be no rigidly defined focus at the start of fieldwork, with the research design and questions being allowed to emerge iteratively. Whilst such immersive approaches are still encouraged for PhDs undertaken in Anthropology departments, researchers such as Pink (2009) accept that long-term, place-bound ethnographies are increasingly impractical, owing to time constraints and the spread of events across multiple geographical locations. Parker-Jenkins (2018, 24), meanwhile, points out that in the field of education, ethnographic studies often begin with a narrowly-defined "set of specified questions pertaining to school life", restricting the study to these rather than requiring the researcher to immerse themselves in all aspects of participants' lives. Clearly this study was a case in point, with Polli:Nation activities already defined as my focus, and these activities amounting to just one element of already-crowded school timetables. In seeking to define ethnography, Hammersley (2018, 4) quotes Lutz's (1981) assertion that these types of qualitative intervention, involving more sporadic participation by the researcher, "are ethnographic but *not ethnography!*"

3.2.2. Why an ethnographic approach?

My decision to take an ethnographic approach was informed by one overarching consideration: the need for the researcher's sustained presence in settings where Polli:Nation activities were taking place. This perceived need was, in turn, informed by four key conclusions drawn early on from the related literature, which can be summarised as follows: the need for a grounded approach to studying young people's experiences of environmental education initiatives that was not informed by pre-existing frameworks; the need to understand young people's own lived experience and understanding of 'nature'; the need to understand experiences that may go unvoiced in more structured research interventions; and my own need to gain embodied experience of the relevant activities and settings. These reasons for adopting an ethnographic approach are explored in more detail below.

Firstly, the lack of a clear and accepted framework for assessing the development of young people's capacity to respond to environmental issues (Sauve and Berryman 2005; Jickling and Wals 2008) pointed to the need for an 'open' or 'grounded' approach to this research. That is, rather than applying a pre-existing framework to identifying the pro-environmental dispositions they may possess at a given moment, I would instead seek to evidence what young people themselves found significant within a project that sought to develop these dispositions. This would only be possible through attendance to young people's own experiences of the activities comprising the Polli:Nation project.

Secondly, critiques of the problematic human/nature dichotomy (see 2.4.2) added to the need to focus on how young people themselves experienced the Polli:Nation project, as well as to pay attention to more-than-human elements within it. The key point here is that for authors such as Taylor (2013, 2017), Malone (2016), and Fletcher (2017), the dichotomous view of 'nature' and 'non-nature' has not yet been 'learned' by children. Rather, Taylor argues, young people's relationship with their environment is a result of a more complex and unique set of "enmeshed relations with others in their worlds" (Taylor 2013, 121). These "common worlds", crucially, include more-than-human elements, a notion which led me to explore new materialist theory – detailed further in 3.3 below. It was clear from the early stages, however, that exploring these "common worlds" and the more-than-human elements comprising them, as well as observing

young people's context-specific interactions with the elements making up the Polli:Nation project, could only be achieved through my continued presence in these interactions.

Thirdly, whilst I had committed to exploring young people's own perspectives, I also suspected that such perspectives may not be easily verbalised by young people in a structured research intervention. I considered this to be a project that fit with Hammersley's (2018, 8) criterion for the suitability of an ethnographic approach – a case where "observation in naturally occurring settings will be more informative than elicitation of data in situations that are strongly structured by the researcher". At the very least, I determined that if I *was* to carry out more structured interventions, then my own knowledge and direct experience of the project would be key in eliciting responses to particular elements (this proved to be the case in my later focus groups – see Chapter 5).

Finally, I felt that an ethnographic approach was the only way to gain what has variously been called "embodied knowing" (Pink 2009) and "correspondence" (Mannion, Adey, and Lynch 2010) – insights and understanding that are only possible through participation alongside young people in the sorts of processes relevant to the study. For Pink (2009, 40), "embodied knowing" is the sort of knowledge gained through "aligning our bodies, rhythms, tastes, ways of seeing and more with (the participants')", allowing the researcher to "access ... areas of embodied emplaced knowing and to use these as a basis from which to understand human perception, experience, action, and meaning and to situate this culturally and biographically" (Pink 2009, 44). Mannion, Adey, and Lynch (2010), meanwhile, argue that participation in a shared activity allows the researcher "to gain some 'correspondence' with the participants' emplacements in the scene" (16).

3.3. New materialist theories and post-qualitative research
3.3.1. Introduction
Early on in this research, I was drawn to new materialist theories for sensitisation to the research topic. Exploration of these theories led to questions of *how* to carry out a study within such a framing, which in turn led to an exploration of the "post-qualitative"

methodologies deemed particularly sensitive to these theories (see 3.5). As the project progressed, however, a number of methodological tensions developed between attempts to adhere comprehensively to new materialist theories, and a study that was – through reasons explored in this chapter - already grounded in what St. Pierre (2014, 2) labels "conventional humanist qualitative inquiry". This section first introduces new materialist theories and a rationale for their use in this study.

3.3.2. New materialisms

Broadly speaking, the term "new materialisms" refers to developments, cross-cutting the social and natural sciences, that place strong renewed emphasis on "matter" or "materials" (Bennett 2010), and view humans as "thoroughly immersed within materiality's productive contingencies" (Coole and Frost 2010, 7). Within the social sciences, contemporary new materialist theorists are influenced by the work of Gilles Deleuze and Felix Guattari (e.g, 1983, 1987), as well as Haraway (2008), Barad (2007), Braidotti (2013) and others.

This materialism, for Coole and Frost (2010), is often defined as an alternative to the prevailing Cartesian understanding of matter, which has been dominant in forming current mainstream ideas of materiality. In the seventeenth century, they explain, Descartes defined "matter" as being made up of length, breadth and thickness. This laid the foundations for the idea of "nature as quantifiable and measurable", and of material objects that "move only upon an encounter with an external force or agent, and… do so according to a linear logic of cause and effect" (7). Further, with the phrase "cogito ergo sum" ("I think, therefore I am"), Descartes ascribed a "sense of mastery… to the thinking subject", thereby positioning humans as "ontologically other than matter" (8). For Jackson (2013), the privileging of human experience in conventional qualitative methodologies is rooted in this Cartesian dualist thought. In new materialist theory, however, materials and humans are inseparable: "The material is not purely produced by human intention, nor does human agency pre-exist or transcend the material: *they mutually constitute one another*" (744). In instead seeking to re-think humanity as being inextricably bound up with matter, new materialist theorists are seeking to re-frame the relationship between humans and our environments. This, for Coole and Frost (2010), is especially important in light of current environmental challenges, and for them, the

phrase "*new materialisms*" is used "because unprecedented things are currently being done with and to matter, nature, life, production and reproduction" (4).

3.3.3. Why new materialist theories?

This section details the aspects of new materialist theories that initially stood out to me as being well-suited to this study.

The first of these aspects was the strong focus on, and ascribing of agency, to materials - or what Tsing (2013) calls the "more-than-human". For Arvidsen (2018, 3), central in new materialist thinking is a constant attempt to "challenge the conventional ideas of agency as an exclusively human trait by rendering matter vibrant", and as having the "capacity to act in the world". This was of particular interest given that the focus of this study was a project built around a particular inter-species relationship – namely, young people interacting with pollinators by making changes to their habitats.

Secondly, the notion of "assemblage" - absolutely central to new materialist theories drawn in particular from Deleuze and Guattari (1987) – stood out due to the multiple elements I saw as playing a part in the Polli:Nation project. "Assemblages", for Deleuze and Guattari, are unique webs of relations between elements in a given situation (Fox and Alldred 2015), and as Arvidsen (2018) explains, are useful as a way to "bridge the gap between prevailing binaries" and describe "the middle" or "the in-between" (3). Rather than consisting of fixed points and connecting lines in a "network", as in Actor Network Theory (Latour 1992; Ingold 2008), assemblages consist of elements that are constantly enmeshing with one another and moving in "lines of becoming" (see below for further discussion of "becoming") (Ingold 2011; Arvidsen 2018). Assemblages can be seen as cutting across what might be considered "human and non-human, animate and inanimate, material and abstract", as well as "what are traditionally considered 'micro' and 'macro' levels" (Fox and Alldred 2015, 406-8). Consideration of these 'levels' is also central to Situational Analysis (Clarke, Friese, and Washburn 2017), which is further explored in section 3.7. An approach that enabled me to consider multiple elements and processes at once seemed particularly apt for this study, given that young people's experience of the Polli:Nation project would extend beyond the

school system to include encounters with various external people and organisations, as well as with more-than-human elements in their school grounds.

Thirdly, of similar importance was the new materialist shift to thinking in terms of "becoming", rather than static entities (Clarke and McPhie 2014). From a natural sciences perspective, explain Coole and Frost (2010), matter in this view is recognised as "indeterminate, constantly forming and reforming in unexpected ways. One could conclude, accordingly, that 'matter becomes' rather than 'matter is'" (10). This is transferable to the social sciences, where sociomaterialists "accept the fundamental *uncertainty* of everyday life", and may view a given situation as one in which "unpredictable novel possibilities and patterns are always *emerging*" (Fenwick et al. 2015, 124). As Fox and Alldred (2015) note, a study conducted in a new materialist framing must therefore be oriented "towards processes and flows rather than structures and stable forms" (407). This seemed particularly important for this study, given the focus on processes taking place *during* the Polli:Nation project, rather than its aims or outcomes (Stern, Powell, and Hill 2014).

Finally, I was drawn to Deleuze and Guattari's (1987) metaphor of the "rhizome", which seemed to fit with conclusions drawn from the literature regarding the complex interplay of factors determining the 'success' or outcomes of environmental education projects (Mannion, Fenwick, and Lynch 2013) (see 2.4.3, previous chapter). A rhizome, in botany, refers to a subterranean network of roots that grows horizontally, and from which new roots and shoots can grow from any of its "nodes". As Deleuze and Guattari (1987, 21) explained, "unlike trees or their roots, the rhizome connects any point to any other point, and its traits are not necessarily linked to traits of the same nature". By this metaphor, key to the notion of "becoming" within a new materialist framing is that these "becomings" or "emergences" do not necessarily occur along a linear development trajectory. Following Aoki (1993a, 1993b) and Gough (2006), an "arborescent" model of an environmental education project such as Polli:Nation would depict the project as a tree, with outcomes such as environment-related behaviour change branching from it. Instead, following Taylor (2013), I rejected the notion of a linear development trajectory from children's immersion in 'nature' (or 'the outdoors') to the development of "budding young environmental stewards" (117). I instead took the rhizome metaphor as a useful way of thinking about the complex interactions

influencing young people's lived experience of the project, recognising that the associated "becomings" could move in a number of directions, or indeed, several directions at once (Youdell 2015). The rhizome metaphor is also key to the following section, which explores the implications of the use of new materialist theories for the ways in which key educational concepts are understood in this thesis.

3.4. Key educational concepts and new materialist theories

This section explores the implications that the use of new materialist theories has on understandings of the key educational concepts of 'curriculum', 'learning' and 'pedagogy', and identifies the ideas emerging from these understandings that are useful to this study. In particular, I identify Aoki's (1993a, 1993b) idea of a "curricular landscape" existing between "lived curricula" and the "curriculum-as-plan" as a key concept, given its strong links to new materialist theories, and to this study's focus on the lived experiences of pupils.

3.4.1. Curriculum

As numerous authors point out, the term 'curriculum' is often viewed in a somewhat simplified and instrumental manner by practitioners and policy-makers – a standardised body of knowledge and objectives that is designed at national level, and "delivered" by classroom teachers (Leat and Thomas 2016a). In a UK context, Leat and Thomas (2016a) equate this simplified definition firstly with the introduction of the National Curriculum, and secondly, with concern over the "attainment gap" between disadvantaged students and their peers and a subsequent emphasis on holding schools accountable for the achievement of targets and measurable outcomes. This trend, for these authors, has created a situation in which there is little consideration of the wider meaning of the term 'curriculum', and where "teachers and schools… are no longer significant agents of curriculum development" (380).

Aoki (1993b) puts forward similar arguments in a North American context, contending that the word 'curriculum' entered into the language of formal education as a management category set up by school administrators, meaning that from the outset, "curriculum designing has been textured often with the language of input and output within a production system" (271). Importantly in relation to new materialist theories,

Aoki (1993b) critiques the "arboreal" model of curricula brought about by such orientations - that is, "one master curriculum standing tall (tree-like) above the ones surrounding it, with aspects of it such as "implementation" and "assessment" all flowing derivatively from it" (271). For Gough (2013), this instrumental understanding of 'curriculum' has its roots in the understanding of "simple systems" that had been the focus of early Western science. Gough refers to influential curriculum theorists Bobbitt (1918, 1928), Tyler (1949) and Biggs (1996), all of whom followed this orientation to "represent curriculum as a simple, tightly coupled system in which it is both possible and desirable to closely align what students do in order to learn with intended learning outcomes and how they are assessed" (Gough 2013, 1216).

Past decades have, however, also seen the introduction of concepts aimed at furthering the understanding of 'curriculum' beyond a simple input/output model. Illyich (1971), for example, used the term "hidden curriculum" to refer to the norms, values and implicit messages underlying sets of prescribed learning outcomes. Portelli (1993) also includes unexpected learning outcomes, as well as elements of the curriculum that are created by the students, within this term. The term "enacted curriculum", meanwhile, has been used to refer to the actual content of what is "delivered" by an individual teacher, as compared to the "intended" curriculum (Rowan et al 2004; Kurz et al 2010).

Key to this study, however, is the rejection of the idea of curriculum as, in Ross and Mannion's (2012, 309) words, "a body of propositional knowledge that can represent lived experience". Ross and Mannion (2012) instead take a position based on Ingold's (2000) "dwelling" perspective, which, they argue, requires a recognition that "we live in and through the world, rather than through representing it" (311). Following this, they argue that the enactment of education ought instead to be viewed as a process of curriculum *making* that "begins with a concern with the material context of learning and/or the *lived experience of participants*" (304, emphasis added). The notion of curriculum making as a process, as opposed to curriculum as a static entity, has strong resonances with the new materialist concept of "becoming", explored in section 3.3.

Central to understanding the process of curriculum making is Aoki's (1993a, 1993b) notion of a "curricular landscape" that is characterised by both the "curriculum-as-plan" and multiple "lived curricula", and the tensions and entanglements between these. In

Aoki's work, a "lived curriculum" refers to a particular student's lived experience of a given educational process, while the "curriculum-as-plan" is the formal body of content and outcomes that is designated as "the curriculum". Aoki (1993a) introduces the concept of lived curriculum with reference to a study in which students told stories of their experiences of science classes within a formal education setting:

"In other words, the researchers sought out what may be called the lived curriculum of the students. This lived curriculum, of course, is not the curriculum as laid out in a plan, but a plan more or less lived out. It deserves the label 'curriculum' as much as the plan deserves the label 'curriculum-as-plan'" (Aoki 1993a, 257).

Elsewhere, Aoki (1993b) emphasises the extent to which lived curricula can differ between students:

"(The) sayings of students narratively told reflect lived experiences, what to them are lived curricula. So understood we can see that if there are 25 students in the class, there are apt to be 25 lived curricula" (Aoki 1993b, 272-3)".

Importantly, having established the existence of both lived curricula and the curriculum-as-plan, Aoki (1993a) stresses that these represent different discourses that "resist integration":

"On one hand is the prosaic discourse of the external curriculum planners, whose techni-scientific language of planning is the striated language of ends-means. Further, this prosaic language is abstract, written for faceless people in a homogeneous realm. On the other hand is the language of the lived curriculum, the more poetic, phenomenological and hermeneutic discourse in which life is embodied in the very stories and languages people speak and live. These two discourses are different in kind; they resist integration" (1993a, 261).

As a result, Aoki argues that teachers' and students' lived experiences of a given educational process, rather than being separated into "lived curricula" and "curriculum-as-plan", ought instead to be conceptualised as a "curricular landscape" that exists in the differences and tensions *between* these two discourses (1991, 7). Teachers and

students, he contends, "live in the middle between the language of the curriculum-as-plan and the language of lived curricula" (Aoki 1993a, 261). In considering the processes of curriculum making, then, it is important to consider both "lived curricula" and the "curriculum-as-plan", as well as what is produced by the tensions between these.

Following Aoki, processes of curriculum making can also be characterised according to the "rhizome" metaphor introduced in the previous section (Deleuze and Guattari 1987), which stands in contrasts to an "arboreal" understanding of curricular outcomes. Aoki (1993a) does not draw directly on this metaphor, instead using Deleuze's concept of "multiplicity" to refer to multiple curricula that are in the process of being produced in-between lived curricula and the curriculum-as-plan – he points here to Deleuze's contention that "multiplicity is not a noun" (Deleuze and Parnet 1987, vii) to emphasise the non-static nature of such multiplicities. Elsewhere, however, Deleuze and Guattari (1987) explained the nature of multiplicities using the rhizome metaphor, stating that "(e)very multiplicity grows in the middle, like the blade of grass or the rhizome" (viii). In keeping with this rhizome metaphor, for Aoki (1993a, 261), the curricular landscape that exists in the middle of the curriculum-as-plan and the lived curriculum "is textured by a multiplicity of lines moving from between to between, is ever open, knowing no beginning and no end, resisting enframing" (1993a, 261). This notion of "betweens" may also be extended to counter a number of binaries frequently expressed in educational contexts – for example, between nature and culture, home and school, and formal and informal learning processes. Drawing links between the rhizome metaphor and Aoki's use of the concept of multiplicity, Waterhouse and Masny (2017, 115) point to Aoki's work as influential to their concept of "rhizocurriculum". Within a rhizocurriculum, curriculum making is characterised by the "unpredictable wanderings and lines of escape" and "horizontal, non-hierarchical relations" that are key to the rhizome metaphor (Waterhouse and Masny 2017, 115). In practice, this amounts to "complex processes and outcomes" that are not easily assessed by conventional measures (Gough 2015, 1).

So far, then, I have characterised curriculum as a process of curriculum *making*, and this process both as rhizomic, and as taking place in-between the curriculum-as-plan and a multiplicity of lived curricula. Additionally, for the purposes of this study, it is

important to consider the elements that come together to shape this curriculum making process. Importantly given the focus of this study, critics of instrumentalist, arboreal conceptions of curriculum argue that the resultant approaches to curriculum design lead to the structural reinforcement of the separation between learners and the communities in which they live (Greunewald 2003; Anderson-Butcher et al. 2008; Leat and Thomas 2016a), as well as learners of different ages, and the more-than-human world (Ross and Mannion 2012). Ross and Mannion (2012), however, instead characterise curriculum making as "the process of the coming together of teachers, learners, generations, materials and places" (312). As will become apparent in Chapters 6-9, this view of curriculum making has strong resonances with the Polli:Nation project, which represents exactly such a coming-together – of pupils, teachers, experts from outside of school, and importantly, more-than-human elements.

In this study, then, my final research questions, which will be stated in section 3.9, aim to understand the process of curriculum making that occurred through the Polli:Nation project, considering the ways in which this was shaped by the coming-together of lived curricula, the curriculum-as-plan, and the assemblage of human and more-than-human elements comprising it. Having outlined the implications of drawing upon new materialist theories for an understanding of 'curriculum', I next briefly discuss these implications in relation two other key educational concepts – 'learning' and 'pedagogy'.

3.4.2. Learning

While this study is mostly concerned with processes of curriculum making, learning remains a key concept in any study focused on processes of education. This section therefore outlines how learning is conceptualised in this study. The overarching point to make here is that in my reading of new materialist theories, whilst there are clearly differences between the terms, there is considerable overlap between how 'learning' and "curriculum making" come to be understood. I therefore structure this section in relation to the similarities between understandings of these concepts.

The first similarity between conceptions of learning and curriculum making from a new materialist perspective is the conception of learning as *relational,* "within the material

world" (Hardman 2016, 3), and as co-*emergent* through the interaction of humans and materials. For Lenz Taguchi (2011, 39), "the indispensable force and importance of the material in learning" has been neglected in more conventional perspectives on learning that uphold the Cartesian dualist separation of humans from matter, giving humans a "self-evident higher position above matter in the process of learning". From such perspectives, she says, the student, or learner, is conceived of as a "separate organism from the concepts to be learnt and the things, such as books and learning environments, involved". This, for Sørensen (2009), demonstrates a prioritization of *representational* knowledge - that is, an existing body of knowledge that is "out there" for students to find, and internalize. There are, she argues, other forms of knowledge that emerge through particular ways in which learning can occur, but which are not easily measured or evaluated (Sørensen 2009, 131). Van Poeck, Ostman and Block (2018), taking a Deweyan perspective on learning in the context of responses to environmental issues, contend similarly that such learning should not be viewed exclusively as the acquisition of facts, information and ideas. Learning, they contend, "is not a merely cognitive activity but also involves value judgement, emotions, practical skills, commitment, (and) identity" (2018, 8).

As a result of the dominance of representational perspectives, learning tends to be evaluated in terms of "what an individual child is able to conceptualise linguistically, emerging from within the child" (Lenz Taguchi 2011, 39). This overlaps with the perspective that would characterise 'curriculum' as an external body of knowledge, and young people's engagement with it according to a simple input/output model (Gough 2013). By contrast, from a relational perspective, learning does not take place inside a human mind that is separated from the material world, but rather *in between* heterogeneous elements. This draws upon the key new materialist notion of the inseparability of humans and materials (Jackson 2013; Taylor 2016) explored in the previous section. Additionally, it echoes Ross and Mannion's (2012) conception of curriculum making as a "coming together" of various human and more-than-human elements.

There are two further similarities between new materialist perspectives on 'learning', and understandings of "curriculum making" outlined in the previous section. Firstly, the shift to thinking in terms of "becoming", rather than static entities (Coole and Frost

2010). This shift necessitates an approach to research that leans "towards processes and flows rather than structures and stable forms" (Fox and Alldred 2015, 407), and has implications for the way learning is understood in this study. In section 7.3.1, I outline how I drew upon the new materialist notion of "concepts" (Colebrook 2002) to explore the emergence of young people's lived curricula through Polli:Nation activities. In keeping with the notion of becoming, these are ideas that are "invented in practice" (Semetsky 2015) rather than pre-existing participants' involvement in these activities. Secondly, learning, like curriculum making, can be characterised as "rhizomic", following the rhizome metaphor applied to Aoki's (1993a) work by Waterhouse and Masny (2017), as discussed in the previous section. A rhizomic perspective on learning/curriculum-making would pay greater attention to the "complex processes and outcomes" cited by Gough (2015, 1), rather than those stemming directly from the curriculum-as-plan, as per Aoki's (1993a) "arboreal" metaphor.

I have chosen to use curriculum making as the educational concept most central to this study, for reasons explored in the previous section. It is important to stress, however, that from a new materialist perspective, I consider learning to be very close in meaning to curriculum making. The conceptions of learning outlined above, meanwhile, give further justification to two of the orientations already outlined for this study. These are, firstly, the focus on education processes rather than attempting to determine *what* pupils have learned, which stemmed initially from the shortage of studies focusing on learners' lived experience of environmental education initiatives (Rickinson, Lundholm, and Hopwood 2009; Stern, Powell, and Hill 2014 - see section 2.3). Secondly, the understanding of learning as rhizomic, involving "complex processes and outcomes" (Gough 2015, 1), gives further justification to the use of an ethnographic approach, which aims to capture the "invention in practice" of concepts that are perhaps not easily verbalised by young people. Nonetheless, the term 'learning' does inform one of this study's key research questions - see section 3.9 for an explanation and rationale for this.

3.4.3. Pedagogy
'Pedagogy' is another key educational concept, and is of particular relevance to Chapter 9 of this thesis, which explores a number of pedagogical orientations that are signposted by this study's key overarching findings. Traditionally, pedagogy is defined as simply

"the practice of teaching" (Alexander 2004, 9) - it is the 'how' by which the 'what' of curriculum is delivered. The key consideration for pedagogy in light of the new materialist understandings of curriculum and learning already discussed, however, is that pedagogy does not pre-exist the key elements that shape it. Instead, as Alexander (2004) explains, a pedagogy *emerges* through the relations among pupils, learning, teaching and curriculum making. Following this thinking, and in keeping with critiques of input/output models of curriculum, one cannot simply employ a particular type of pedagogy (I will refer to "stewardship", "common world" and "posthuman" pedagogies in this thesis, for example) to guarantee a certain type of 'learning'. Instead, a pedagogy may begin with certain orientations, but in reality, is in a constant process of emergence - of "becoming".

3.5. Post-qualitative methodologies and challenges

3.5.1. Fundamental shifts

Following the theoretical orientations outlined in section 3.3, I planned to characterise the processes under investigation in this project as arising from all the elements making up unique, context-specific "assemblages" that enabled multiple, unpredictable "becomings". To one accustomed to the norms of qualitative research, what then seemed to me to be the next logical step was to ask "*how* do I carry out research using these theories?" This led me to an initial exploration of the methodologies used in studies that drew upon new materialist theories. Perhaps most prominent among these are "post-qualitative" methodologies (St. Pierre 2011, 2014). Post-qualitative research, I realised through a slow process of familiarisation, seemed to me to be something of a "gold standard" for carrying out research in a manner sensitive to new materialist theories - a logical conclusion in terms of methodology when thinking with new materialist theories. It was, however, challenging to fully adhere to in practice, and this section explores the tensions created by attempts to carry out research that was entirely "post-qualitative". The following sections then outline the methodological shifts I made with the intention of mitigating these tensions, and explore the tensions that nonetheless remained.

St. Pierre (2014, 3) explains that the term "post-qualitative" is a "large and ambiguous" one, and that her use of it began largely in response to "positivist" qualitative research

methodologies that had persisted despite the influence of postmodernism, poststructuralism and posthumanism during the 1990s and early 2000s. These approaches have been collectively referred to as "the posts" (St. Pierre 2014), and have concerned themselves principally with the deconstruction of concepts central to humanist qualitative methodology, including 'validity', 'voice', and 'authenticity' (Lather 1993, 2000). For St. Pierre (2014, 2), the resultant ontological shifts render thinking in "the posts" incompatible with what she labels "conventional humanist qualitative methodology". This incompatibility has, in turn, led to her adoption of the term "post-qualitative".

Lather (2016, 125) has written of a "re-turn or second coming of postmodernism", and draws upon a hugely heterogenous range of theories and methodological shifts (including post-qualitative methodologies) to summarise the "learnings" from this ontological turn. To me, several such fundamental shifts from "conventional humanist qualitative methodology" stood out as being key to adopting a methodology sensitive to new materialist theories for the study in question. The first is to resist the positivist tendency to focus on identifying order, regularity, and a linear relationship between cause and effect. This, for Fox and Alldred (2015, 406), is in response to the tendency for qualitative studies to aim to "produce simplicity where there was complexity, definition in place of indeterminacy, and evenness where there was variability". Researchers working within a new materialist framing would instead point to multiple ongoing, unpredictable "becomings" in which new possibilities are constantly emerging (Fenwick et al. 2015). Secondly, considering the inseparability of humans and materials that is central to new materialist thought, post-qualitative and related approaches demand a de-centring of the researcher to enable an increased emphasis on materials, or the "more-than-human" (Hultman and Lenz-Taguchi 2010; Pacini-Ketchabaw, Taylor, and Blaise 2016).

The third fundamental shift is towards viewing data as "presentation" (Arvidsen 2018), or "*creata*" (Brinkmann 2014), rather than 'representation'. This follows the new materialist shift to thinking in terms of "becoming" rather than "being". Arvidsen (2018, 6) explains the key difference: "Research as representation implies a world comprised of detached static objects that can be observed from a privileged position at the 'edge' of the world. Research as presentation, on the other hand, implies an

entangled world in constant becoming through constant and continuous assembling, disassembling and reassembling". Following this distinction, research itself ought to be considered a "research assemblage" – comprising, for example, the researcher, their theoretical persuasions, the context of the research and the methods used in a particular study (Fox and Alldred 2015). 'data', then, are contextually rich aspects of what is "produced" by a particular research assemblage, rather than necessarily allowing empirical generalisations (Winks 2018). For Brinkmann (2014, 721), data are not simply 'givens' that researchers objectively collect and code, but are instead "*creata*" – that which is "taken, constructed, and selected" from a particular research encounter (721).

The fourth fundamental shift - perhaps the most important, and problematic, for this study - concerns the incompatibility between new materialist theories and the drawing-up in advance of a 'research design'. For Taylor (2016, 18), accepting the co-constitution of humans and materials means that research can no longer be thought of as an "individualized cognitive act of knowledge production", and is instead "an enactment of knowing-in-being that *emerges in the event of doing research itself"* (emphasis added). Crucially, then, planning such research in advance is highly problematic, and this key ontological shift accounts for the lack of prescriptive guidance on how such research ought to be carried out. For St. Pierre (2014), rather than following a pre-determined process, one needs to engage in an ongoing familiarisation with a particular research context, before deciding how particular theoretical insights might be applied in that context. In a later paper, St. Pierre (2019, 10) remains insistent that "*a study cannot be made post qualitative after the fact.* To repeat, one begins post qualitative inquiry without a methodology" (emphasis in original).

3.5.2. "The rush to application"
Despite its sound ontological basis, carrying out research that was truly "post-qualitative" presented a number of methodological challenges and tensions in this particular research context. These tensions formed the basis of an article of which I am first author (Ruck and Mannion 2019b), and are explored in this section. The challenge of employing a methodology that adhered comprehensively to new materialist theories

stemmed, in the first instance, from my relative lack of familiarity with these theories when commencing my doctoral studies. By the time I had gained a fuller understanding of the ontological shifts described in earlier sections, I had already been caught up in what St. Pierre (2018, 604) calls "the *rush to application*, to methodology" (emphasis in original). This includes a perceived need among doctoral students to quickly decide upon a 'research design' before they have fully considered how a given theory might be applied to their specific research context.

In this study, the temptation of this "rush to application" was compounded by both the structured, time-bound nature of doctoral research in general, and the instrumental requirements of this funded project in particular. This was a typical PhD in terms of the systematic and formal assessment processes required of doctoral students in UK universities. The first year, for example, was largely structured around the ten-month Progress Review – a written and oral assessment that required a clear outline of my *research design* and proposed *methods* to facilitate *data collection*. Furthermore, of significance to this study in particular was the parallel requirement to provide an evaluation of Polli:Nation as a whole for its funders and partner organisations. This created a restriction in terms of time and scope: the research had to take place in schools that were part of Polli:Nation, and had to be completed during the 2016-17 academic year. Moreover, as already acknowledged, the stated purpose of the University of Stirling's involvement in the project was to "ensure evaluation of behavioural change outcomes as well as natural heritage outcomes" (LTL 2014, 3), implying a need to somehow 'evidence' this within the available timeframe. This is perhaps indicative of a wider trend in academia towards what Denzin and Giardina (2017, 1) call a "contemporary audit culture" – one that increasingly demands "demonstrable impact" within a limited timeframe (Hammersley 2018). This trend, I would argue, extends to environmental education research, which has long been linked to "program evaluation", and the gathering of evidence to determine "best practice" (Carleton-Hug and Hug 2010; Stern, Powell, and Hill 2014). These factors combined to create a strong felt need for early clarity around data collection and analysis, and a subsequent unwillingness to simply wait for "situations of breakdown, surprise, bewilderment, or wonder" (Brinkmann 2014, 722) to occur.

For my ten-month Progress Review, I proposed a study that employed mainly participant-observation, followed by more structured methods such as focus groups and walking or "go-along interviews" (Carpiano 2009; Lynch and Mannion 2016) that would be informed by observations I had made during participant-observation. In practical terms, then, by the time my engagement with new materialist theories and post-qualitative methodologies had sufficiently progressed, I had already, for both internal and external reasons (respectively, my initial lack of familiarity with new materialist theories, and the project's inextricable link to the Polli:Nation project), designed a study that employed a somewhat conventional overarching methodology. Nonetheless, I was very aware of a tension that had not been fully resolved between new materialist/post-qualitative thinking and the apparently "humanist qualitative study" (St. Pierre 2014, 2) I was embarking upon. Before beginning participant-observation, then, I drew upon two approaches to the writing and analysis of fieldnotes that, I felt, would increase the study's sensitivity to new materialist theories (as well as being particularly apt given the nature of the Polli:Nation project). Firstly, I would draw upon multi-species ethnography (Pacini-Ketchabaw, Taylor, and Blaise 2016; Taylor and Pacini-Ketchabaw 2015) – a form of relational ethnography (Desmond 2014) - for orientations on the writing of fieldnotes. Secondly, I would create situational and relational maps, both drawn from Situational Analysis (Clarke, Friese, and Washburn 2017), throughout the research process. In the following sections I outline these approaches, their links to new materialist theories, and the tensions that nonetheless arose when employing them within the research context described here.

3.6. Multi-species (relational) ethnography

3.6.1. Relational ethnography

A key adaptation I made during the course of this study was to characterise it as one that employed not only an "ethnographic approach", but a *relational* ethnographic approach (Desmond 2014; Simon 2013) that took specific steps to consider the more-than-human elements present within research encounters (Tsing 2013). Relational ethnography, explains Desmond (2014, 554), is distinctive from "substantialist ethnography" in that it does not treat particular groups of people as being static entities, instead taking as its unit of analysis "configurations of relations" across multiple groups and spaces. For this study, relational ethnography enabled a multi-sited approach

(Hannerz 2003) focused on relations between multiple schools and organisations bound together by the Polli:Nation project. In practical terms, this meant continuing to engage regularly with all schools to which I had made initial visits, rather than picking two or three 'case studies' as originally intended (see 4.3.4).

In engaging with Desmond's (2014) key article on relational ethnography, several aspects of this approach struck me as being particularly well-suited to this study in particular. Firstly, participation in the Polli:Nation project was a thread running through multiple schools and conservation charities across a large geographical area. It was this participation that provided this study's "unit of analysis", rather than a particular group of people in a given setting. Secondly, a relational approach allowed me to keep in mind the wider "assemblage". That is, through Polli:Nation, young people were making connections beyond the school system, with the charity sector, the world of conservation, and large-scale efforts to restore pollinator populations. In other words, schools clearly are not bounded entities, but bound up in an assemblage of (what are traditionally considered) micro, meso and macro elements, and this was made especially clear by the Polli:Nation project. Thirdly, and most practically, the tendency for Polli:Nation activities to be squeezed into crowded school timetables, and therefore to occur fairly sporadically, became apparent during the course of participant-observation. The highest number of participant-observation sessions I carried out in any one school was six. Practically, then, it would have been impossible to conduct research that was sufficiently 'ethnographic' in one, or even two or three, schools.

It is important here to note the difference between a relational ethnographic approach, and one that is merely "multi-sited" (e.g, Pink 2009; Hannerz 2003), and how the first of these is more suited to this study. I take the view of Desmond (2014), who argues that to use the term "multi-sited" further legitimates the idea of a bounded 'place' or 'group' by setting itself out as a 'comparison' of two or more such entities. "Relational ethnography", he says, "is not propelled by the logic of comparison, as is … multi-sited ethnography .... It does not seek to understand if a certain group or community is peculiar vis-à-vis their counterparts in other contexts" (554). To illustrate this point further, adopting a relational approach does not necessarily require fieldworkers to conduct a multi-sited ethnography. That is, even if the ethnographic research *does* take place in a single location or with a single group of people, a fieldworker can still

conceive of that group or location as being part of an ongoing process of relations with, or *vis-à-vis,* other groups or locations (Desmond 2014, 562). I later introduce Situational Analysis as a way of operationalising relational approaches to qualitative research for analysis in particular (see 3.7).

A potential critique of relational ethnography is its lack of sufficient 'depth'. That is, a study that consists of sporadic visits to multiple locations and multiple groups of people, may lack the 'depth' of interaction enabled by a study bounded by one group of people. In such cases, the ethnographer, having spent months in the company of one group of people, would gain their trust and build considerable rapport through repeated interaction with these people. Critiques of relational ethnography would maintain that it lacks this depth, and therefore offers fewer opportunities for 'meaningful' insights. It may provide a 'thin' understanding of a large number of people, rather than a 'thicker', more nuanced, understanding of a small number. Desmond (2014) does accept that when employing a relational-ethnographic approach, there is something of a trade-off with regard to this 'depth'. His response, though, is that whilst relational ethnography "necessarily sacrifices some ethnographic depth in order to investigate connections, transactions, and processes", it "replaces substantive depth (intimacy with a single group or place) with *relational depth* (intimacy with the dynamics of a network of relations)" (571). Following this argument, this study never enabled a particularly in-depth understanding of one group of people, but attempted to provide this relational depth when investigating the relations between the elements making up the Polli:Nation project.

3.6.2. Multi-species ethnography

In further adapting this study's methodology, I drew upon the limited but expanding body of literature around "multi-species ethnography" (Pacini-Ketchabaw, Taylor, and Blaise 2016; Taylor and Pacini-Ketchabaw 2015; Ogden, Hall, and Tanita 2013; Tsing 2013). This allowed me to complement Desmond's (2014) relational approach by expanding the definition of "relational" to place greater emphasis on more-than-human elements.

Multi-species ethnography is an emergent form of relational ethnography that has been applied principally in early-years contexts, and has grown out of the notion of "common worlds" (Taylor 2013) outlined in the Literature Review. Its central feature, for Pacini-Ketchabaw, Taylor, and Blaise (2016, 151), is to avoid being human-centric in data collection, instead "tracing how our lives, children's lives and the lives of other animals in our common worlds are entangled, interconnected (and) mutually dependent". As well as a focus on the relations between different places and flows of ideas and discourses between them, it therefore also encourages a focus on the minutiae of a particular place/context, such as interactions between young people and other species. This approach strongly resonates with post-qualitative methodologies, with the authors describing it as a "radically open methodological experiment" (165) that emphasises "learning how not to be in charge" (156) and does not strive for "grandiose research findings" (165). As discussed in the previous section, this lack of specific direction for *how* to carry out multi-species ethnography would prove problematic in the context of this study. I did, however, make two key changes to the way I wrote fieldnotes based on general orientations outlined by Pacini-Ketchabaw, Taylor, and Blaise (2016) and Taylor and Pacini-Ketchabaw (2015): shifting to writing fieldnotes *after* participant-observation sessions, rather than taking notes during them, and directing my fieldnote-writing with a series of questions drawn in-part from multi-species ethnography. These are outlined in more detail in the following chapter (section 4.3.5).

3.7. Situational Analysis

3.7.1. Introduction – Situational analysis and situational maps

Situational Analysis (SA) is an emergent approach to qualitative data analysis that has grown out of Straussian grounded theory (Strauss and Corbin 1990), and whose principal aims are to redress the "positivist tendencies" of grounded theory approaches in order to "understand the dense complexities of a particular situation broadly conceived" (Clarke, Friese, and Washburn 2017, xxiv). Three books principally authored by Adele Clarke (Clarke 2005; Clarke, Friese, and Washburn 2015; Clarke, Friese, and Washburn 2017) provide practical and theoretical orientations for the use of SA. Practically, SA is characterised by the extensive use of maps throughout the research process. These are divided into three main types of map: Situational and relational maps, social worlds/arenas maps, and positional maps. It should be noted that

for the authors, all three types of map should be used during the research process in order to engage as fully as possible with the "situation broadly conceived" (Clarke, Friese, and Washburn 2017, 361). For this study, however, I found situational and relational maps to be by far the most useful, owing largely to their direct links with new materialist theories, as explored in the following sub-section. I nonetheless also drew upon social worlds/arenas maps in order to illustrate the elements shaping the curriculum making process during Polli:Nation (see Chapter 7).

Situational maps are usually the first to be carried out in SA. These are usually created from the very start of the research process, and can therefore be based on early fieldnotes. Situational maps consist of simply laying out "all the major human, non-human, discursive, historical, symbolic, cultural, political and other elements in the research situation of concern" (Clarke, Friese, and Washburn 2015, 100). The process of making these maps is simple, with the researcher plotting on the page any "elements" of the situation that come to mind (section 4.4.4 in the following chapter explores the tensions surrounding the term "elements"). At this early stage, there is no specified way to position these elements on the page.

Relational maps are then created based on these existing situational maps, with the researcher drawing lines between elements on the map in order to explore the nature of the relations between them. The researcher takes one element of the map, and beginning with this element as a starting point, then traces its relationship with each other element in turn (Clarke, Friese, and Washburn 2017, 140). The process is then begun again with another element as the starting point, and repeated with each element. For Clarke, Friese, and Washburn (2017, 197), simultaneous "memoing" is also key in the process of creating situational and relational maps – that is, making notes detailing one's thoughts provoked through creation of the maps. Examples of the maps I produced are included in the following chapters (sections 4.4.2 and 6.2).

Clarke, Friese and Washburn (2017) distinguish between "messy" situational maps (the type explained here) and "ordered" versions of these maps created later in the research process. These "ordered" maps, as well as social worlds/arenas maps and positional maps, are explained further in the following chapter. At this stage, however, "messy" situational maps, and the relational maps created from them, are most important as a

means of illustrating the links between SA and new materialist theories. I further demonstrate these links below.

3.7.2. Situational Analysis and new materialist theories

The stand-out link between new materialist theories and SA is the direct influence of Deleuze and Guattari's (1987) concepts of rhizomes and assemblages on situational and relational maps in particular. Clarke, Friese, and Washburn (2017, 96) see the maps as "provid(ing) a direct means of operationalising these concepts", and as fitting with Deleuze and Guattari's (1987, 21) description of a rhizome as "pertain(ing) to a map that must be produced, constructed; a map that is always detachable, connectable, reversible, modifiable, and has multiple entryways and exits and its own lines of flight". In the horizontal, non-hierarchical positioning of elements on situational maps, and tracing of the relations between elements through relational maps, these can together be seen as a pictorial representation of a rhizome (Clarke, Friese, and Washburn 2017, 92). Adding to this, Clarke, Friese, and Washburn (2017, 95) explain that they see both SA itself, and "the situation broadly conceived" that it seeks to explore, as "assemblages". Relational maps, they argue, address the key question "how is (the assemblage) working?" (95). In summary, the authors state that since "situational and relational maps were inspired in part by Deleuze and Guattari's (1987) rhizomic assemblages, we see SA as fairly compatible with those approaches" (366).

Broader links can also be made between new materialist theories and the theoretical orientations of SA as a whole. In the remainder of this section, I outline five key, inter-related theoretical orientations underpinning Situational Analysis, that serve to bring it closely into line with new materialist theories, and with the multi-species, relational ethnographic approach taken in this study.

Firstly, Situational Analysis aims principally to engage with the *complexities* of a situation. This, for me, is the most general and most important aspect of SA, and encompasses all of the subsequent orientations outlined here. Clarke, Friese, and Washburn (2017, 23) position SA as "simultaneously based in pragmatism, interactionism, and grounded theory while *also* addressing demands for *empirical* understandings of the heterogenous worlds emerging from fractured, multicentred new

world orderings" (2017, 23). Given strong criticisms of "'grounded theory' analysis that privileges coherence and structure in data over divergence and randomness" (Fox and Alldred 2015, 406), this engagement with the complexities of a given situation positions SA as an important attempt to move qualitative research into closer alignment with new materialist theories and post-qualitative methodologies. This engagement with the richness and complexities of a given situation also finds parallels with ethnographic approaches in general. For example, the authors invoke Geertz's (1973) notion of "thick description" in describing the creation of maps as a form of "thick analysis" that "takes into account the full array of elements in the situation" (Clarke, Friese, and Washburn 2017, xxv - xxvi).

Secondly, Situational Analysis encourages "taking the non-human explicitly into account", which, argue Clarke, Friese, and Washburn (2017, xxv), "positions SA as posthumanist – going beyond the idea that only humans 'really' matter or 'matter most' in a given situation". The way that situational maps are created is illustrative of how this focus on paying greater attention to non-human elements is operationalised. In situational maps, all elements present within a situation are laid out on the page in a non-hierarchical manner. There is, for example, no central process or element with others depicted as branching off it. There is, in fact, no specified way to lay out these elements on the page. In positioning all elements in this way, non-human elements are given equal 'status' to all other elements in the situation. Once the Situational Map is sufficiently 'complete', the researcher draws lines between each element in order to map the relations between them, thereby creating relational maps (whilst simultaneously creating "memos" that reflect upon these relations). Clarke, Friese, and Washburn (2017) recommend that each element is taken in turn as the starting point of a relational map – the element from which relations to other elements are then traced. In this way, the researcher is encouraged to consider more-than-human elements as being prominent within the research situation. This attention given to more-than-human elements acts as an important response to the human tendency, in Coole and Frost's (2010, 3) eyes, to talk about "matter" in a "naturalistic" or "representational" way, which they attribute to a privileging of language that distances us from matter through "immaterial" concepts such as "meaning", "mind" and "agency" (2).

Thirdly, Situational Analysis encourages researcher reflexivity. For Clarke, Friese, and Washburn (2017, 35), this is a key way in which SA differs from Grounded Theory, which "has long been burdened with the assumption that researchers should be tabula rasa" – that is, to enter a research situation with no pre-conceived ideas, opinions, or knowledge (be it substantive or theoretical). Glaser (1992, 31) even suggested that having such knowledge risked "contamination" of one's data. Clarke, Friese, and Washburn (2017, 56), however, instead accept the importance of "reflexively analysing what 'we' do as well as what 'they' do". Practically, this includes making sure we include ourselves, as researchers, in the maps we are producing. This serves to bring SA into closer alignment with ethnographic approaches, which have long accepted the lack of objectivity on the part of researcher (Erickson 2011), and post-qualitative approaches that go even further, suggesting there is in fact "no hard and fast line between life, research, theory, and methods" (Brinkmann 2014, 722).

A fourth key orientation of Situational Analysis is the rejection of a "tripartite framework" that upholds the perceived separation between 'micro', 'meso' and 'macro' elements in social research, and instead, a focus on *relations* between elements that were traditionally considered to belong at one or another of these levels. In this distinction, 'micro' refers to elements or events occurring on an interpersonal level (in the Polli:Nation project, this might include the particular task young people are carrying out, or a spontaneous close-up encounter with a pollinating insect); 'meso' refers to "social", "organisational" or "institutional" factors (e.g, the attitude of a school towards outdoor learning); and 'macro' refers to wider elements such as the broad historical context that has given rise to a situation, or the unquestioned discourses operating within it (e.g, the historical relationship between humans and the environment that has contributed to the decline in pollinator populations, or the discourse of "environmental stewardship"). Historically, explain Clarke, Friese, and Washburn (2017), qualitative research was seen as largely dealing with the micro level, while quantitative survey research dealt with meso and macro levels (62).

Clarke, Friese, and Washburn (2017), however, consider SA to be part of a wider turn towards the "*re-configuration of relationality* in social theory across the social sciences and humanities" (62). They consider this turn to have been reflected in both qualitative and quantitative methods since around 1975, and especially in theories including

Foucauldian discourse analysis, Bourdieusian field theory, Actor-network theory, and importantly for studies in a new materialist framing, assemblage theory and rhizomatic analysis (Deleuze and Guattari 1983, 1987). A key characteristic shared by these approaches, they argue, is a dissolving of the distinction between micro, meso and macro levels. In SA, then, these authors recognise that in fact, "social relations *cut across* all kevels, making social phenomena nonfungibly *all of the above*" (Clarke, Friese, and Washburn 2017, 62-63, emphasis in original). This is again reflected in the way situational maps are produced – where all elements are presented on the page, in no specified position, whether they relate to broad historical context, or the minutiae of a particular activity. This provided a way to operationalise Fox and Alldred's (2015) call for an exploration of assemblages that cut across "what are traditionally considered 'micro' and 'macro' levels" (Fox and Alldred 2015, 408).

Finally, the simple process of map-making itself offers the potential to analyse qualitative data in a manner more sensitive to new materialist theories, through re-assembling the "creata" taken from participant-observation and producing something new. For Clarke (2005, 29), they do this in two ways. Firstly, creating maps can "helpfully rupture (some/most of) our normal ways of working and may provoke us to see things afresh". Creating maps right from the start of the research process ensures that this "rupture" is more than just the superficial display of 'findings' or conclusions that have that have already been arrived at. Secondly, such maps are helpful in analysis because "one can move around on/in maps much more quickly and easily than in narrative text", which makes them good "devices for handling multiplicity, heterogeneity, and messiness in ways that can travel" (29).

3.8. "Micro transformations" and the "research assemblage"

As Bridges-Rhoads (2015, 705) notes, when attempting to conduct research in a manner sensitive to new materialist theories, there is "no guarantee that such experimentation will produce a qualitative research... that can claim to 'do something different'", and every risk of it collapsing back into the "conventional humanist" approach critiqued by St. Pierre (2014) and others. Indeed, the approach taken to this study, despite the clear synergies outlined above, continued to create constant tensions when used in combination with new materialist theories. Among these are the continuing use of

"language practices" such as fieldnotes (MacLure 2013a), the somewhat "essentialising" (that is, reductive) nature of Situational Analysis (Mathar 2008), and later, the use of structured methods such as focus groups. I provide examples of these tensions throughout the following two chapters.

At this stage, the key, overarching ontological debate provoked by the tensions described above surrounds the extent to which one must *comprehensively* engage with new materialist theories in order to carry out research that is sensitive to them. For some, the ongoing tensions highlighted in the following chapters will be enough to render the approach used in this study "unthinkable" within new materialist ontologies (St. Pierre and Jackson 2014, 716). Indeed, by St. Pierre's (2019) definition, the presence of an existing 'research design' already disqualifies this study from being "post-qualitative".

Strom (2018, 109), however, takes an opposing view to post-qualitative researchers such as St. Pierre. She argues that whilst the "strategic use of selective concepts" from new materialist theory within qualitative research might be criticised for "failing to holistically employ rhizomatic language or engage in discourse that completely breaks with Western academic writing and research norms", such an approach may nonetheless result in "micro transformations" that serve to bring these concepts towards "mainstream" educational research. This, she suggests, might also serve to "translate" Deleuzian concepts in a manner more accessible to wider audiences, thus working against the "exclusionary" nature of "high theory". This argument gives significant support to the approach taken in this study.

Keeping in mind the tensions highlighted in this chapter (and further explored in Chapters 4 and 5), I chose to characterise my methodology as a "site of experimentation" (Bridges-Rhoads 2015, 704) that arose through attempts to learn and enact new materialist theories whilst in the midst of doctoral study, through which existing qualitative research methods came to be re-oriented, and a new "research assemblage" created (Fox and Alldred 2015, 2017, 2018). Fox and Alldred's work is key here. Although I had been previously familiar with their notion of the "research assemblage", its usefulness for this study only became truly apparent in response to this wider debate. Rather than thinking about what research *is* (for example, whether it is

really "post-qualitative", or "sensitive to new materialist theories"), to me it seemed more useful to think about what a certain approach *does* – that is, to acknowledge the affects produced by particular methods and orientations, and the "research assemblage" thereby created.

For Fox and Alldred (2015), the elements in a given situation identified by a researcher form what they call the "event assemblage" - in this study, these elements might include the activities, features and materials making up the Polli:Nation project. Fox and Alldred also, however, contend that all research is in fact the product of a "hybrid assemblage" comprising both this "event assemblage", and a "research assemblage" – that is, the ways in which the research process itself influences the ways in which 'data' are collected, analysed and reported. Research, they contend, "territorialises events in all sorts of ways" (2015, 210). In recognising the existence of this research assemblage, the authors then make two key methodological contributions.

The first of these contributions is, instead of arguing *against* research design, to provide orientations for the ways in which a "research assemblage", working with a materialist ontology, ought to operate at each stage of the research process (Fox and Alldred 2015, 2017). I have already drawn upon Fox and Alldred's (2015) work as a key source within this chapter, in introducing the concept of "assemblages" (section 3.3.3), and in providing general orientations for research within a materialist ontology that has strong resonances with situational analysis (3.7.2). It was only after engaging fully with the debate outlined above, however, that I realised the uniqueness of this contribution, as well as its importance both for justification of the approach taken by this study, and for providing orientations to be kept in mind throughout the research process. The second key contribution offered by Fox and Alldred (2017) is their call for researchers, when *reporting* on research, to "(a)cknowledge and account for the effects that aggregations and specifications of events produced by the research process have upon *accounts of events"* (173). This, to me, had strong resonances with Clarke, Friese, and Washburn's (2017) emphasis on "researcher reflexivity", and the importance of including ourselves, as researchers, in the situational maps we produce.

Table 3a provides a summary of some of Fox and Alldred's (2015, 2017) key orientations, and the ways in which these resonate with the approach taken by this study.

Phase	Orientations	Synergies
Research design	*"Attend not to individual bodies, subjects, experiences or sensations, but to assemblages of human and non-human, animate and inanimate, material and abstract, and the affective flows within these assemblages"* (2015, 406).	- Situational Analysis has strong resonances with new materialist theories. Situational maps, with their non-hierarchical layout, enable inclusivity (i.e, taking into account all types of elements cited here). - Participant-observation enables the researcher to attend to relations in a given situation. - Directing fieldnote-writing with theoretically-sensitive questions enables a greater focus on the "affective flows" cited here.
	"Explore how affects draw the material and the cultural, and the 'micro', 'meso' and 'macro' into assembly together" (2015, 406).	- Situational Analysis eschews the "tripartite framework" that separates "micro", "meso" and "macro" elements, and emphasises a non-hierarchical position of elements.
Data collection	*"Identify assemblages of human and non-human, animate and inanimate, material and abstract, cutting across what are traditionally considered 'micro' and 'macro' levels"* (2015, 408).	- Situational Analysis acts as a representation of a "rhizome". Presenting all elements in a non-hierarchical manner ensures inclusivity, and eschews the distinction between micro, meso and macro levels. - Drawing upon multi-species ethnography helps ensure a focus on both "human and non-human" elements.
	"Explore how elements in assemblage affect and are affected, and assess what bodies and other things do: the capacities these affective flows produce" (2015, 408).	- The theoretically-sensitive questions with which I directed my fieldnote-writing encouraged a greater focus on "affect" and the "capacities" produced by affective flows.
Data analysis	*"Take the assemblage as the primary focus for analysis, incorporating both nonhuman elements and human relations"* (2015, 408).	- Relational maps, my primary method of analysis, are directly influenced by the concept of the rhizome. They provide a means of tracing relations between elements comprising the

		assemblage identified through the creation of situational maps. - The maps include more-than-human elements, and elements altered through the use of theoretically-sensitive questions.
	"Acknowledge the affective relations within the research-assemblage itself" (2015, 409).	- "Researcher reflexivity" is a key aspect of situational analysis, with the researcher including themselves in the maps they produce, and reflecting via memos on the affects produced by the research assemblage.
Reporting research	*"Acknowledge and account for the effects that aggregations and specifications of events produced by the research process have upon accounts of events"* (2017, 173).	- Discussions of methodological tensions when using each research method throughout chapters 4 and 5, and accounting for my influence on what was reported (e.g, my identification of the elements in situational maps. - Chapter 6, which details the key elements making up my final situational map, outlines various elements that account for the researcher's influence on events. - Question 5 below, addressed in section 8.5, looks at how the research assemblage influenced young people's focus group responses.

Table 3a: Table summarising Fox and Alldred's (2015, 2017) orientations for how a "research assemblage", operating within a materialist ontology, should operate at each stage of the research process.

3.9. Final research questions

The research questions identified as central to this study were developed iteratively, first taking into account the gaps identified in the literature (see Chapter 2), then being refined according to the theoretical orientations outlined in this chapter. The questions are listed and explained below:

1. What are the common activities and features within the Polli:Nation project?

This question aims simply to set the scene for the more analysis-oriented questions below, and is addressed in Chapter 6. Drawing primarily on participant-observation and the 'final' situational map created once all data collection was complete, the question is intended to highlight the activities and features within the project that felt evidenceable through the use of these methods. The word "activities" here refers to all activities comprising the Polli:Nation project – such as practical conservation tasks, carrying out a biodiversity survey, and learning about the science of pollination through presentations by the visiting LTL facilitator. "Features", meanwhile, refers to the overall characteristics of the project that cut across all of these activities, including the presence of visiting experts from outside of school, the tendency for the project to be carried out by small groups of pupils, as well as the key discourses and ideas underlying and running throughout the project.

2. How are curricula produced through the common activities and features within the Polli:Nation project?

This question – again addressed through participant-observation – is aimed at exploring the *processes* by which curricula were *produced* or *enabled* by the combination of features and activities identified by the previous question. Importantly, these are processes that cut across any number of the features and activities identified in the previous chapter, rather than being produced by any one of them individually. The phrasing of this question is influenced by the concept of curriculum *making* (Ross and Mannion 2012)*,* and Aoki's (1993a) concept of "lived curricula", discussed in section 3.4. This question is addressed primarily in Chapter 7.

3. What do young people see as the significant activities and features within the Polli:Nation project?

Following on from the first question outlined above, this question aims to capture young people's own perspectives on the common activities and features or processes within the Polli:Nation project – in particular, which of these they consider to be of particular significance within the project. As will be explained in Chapter 5, addressing this question proved difficult during participant-observation, leading me to address it more directly through focus groups. In these focus groups, young people were asked to select what they considered to be significant activities or features from a series of

flashcards based on observations I had made in response to the previous two questions. This question is addressed primarily in Chapter 8.

4. What is the nature of the relations between these significant features and processes?

The previous questions have sought to identify the elements making up the unique assemblage comprising young people's lived experience of the Polli:Nation project. However, given the influence of new materialist theories, and the related commitment within Situational Analysis to engage with the complexities of a given situation, it is essential not to view these elements in isolation. In their key text on Situational Analysis, Clarke, Friese, and Washburn (2017, 95) state that "analysing that an assemblage is operating should not signal the end of analysis, but rather be a trigger to go further analytically and try to specify *how it is working* in the specific situation under analysis" (emphasis in original). This question was initially addressed through the "thick description" (Geertz 1973) provided through fieldnotes and memos (extracts from which are included in Chapters 6 and 7). It is, however, addressed more explicitly in Chapter 8, which draws upon the relational maps produced in relation to the significant activities and features identified most commonly by young people during focus groups. The wording of this question is taken from Clarke, Friese, and Washburn's (2017, 138) description of the process of creating relational maps: "focus on one element and draw or create lines between it and the others, and *specify the nature of the relationship by describing the nature of that line*" (emphasis in original).

5. How do young people describe the learning that is produced by the Polli:Nation project?

This chapter has highlighted this study's focus on processes rather than outcomes, as well as a recognition that definitions of learning ought to extend beyond the representational or cognitive (Sørensen 2009; Van Poeck, Ostman and Block 2018, see section 3.4.2). The evaluative element of this research, however, reflected a somewhat representational conception of learning that obliged me to ask young people what they had 'learned' during Polli:Nation. This stemmed from a need to evidence the Heritage Lottery Fund's desired "outcomes for people", which include "people will have learned about heritage" (LTL 2014, 37). This additional research question nonetheless proved insightful for this thesis, since it enabled me to examine young people's *responses* to

the evaluative question around learning. This is turn enabled me to consider the ways in which the "hybrid assemblage" (Fox and Alldred 2018) created here may have influenced these responses. I respond to this question in section 8.5, as well as in Chapter 9.

6. What are the implications of these findings for school-linked environmental education initiatives, in particular the use of practical conservation and citizen science within these? Having addressed the above questions, I turn to this question in Chapter 9, which explores the key discussions provoked by this study's overarching findings, with regard to practical conservation, citizen science, and environmental education more generally.

3.10. Summary

In this chapter, I have detailed the methodological considerations that give context to the final research questions addressed in this study, as well as the specific methods used to address these. I began by outlining the ethnographic approach devised at the outset, then identified the ways in which new materialist theories initially stood out being well-suited to this study. I then, however, describe the tensions between employing a "post-qualitative" methodology sensitive to these new materialist theories, and the internal and external pressures to nonetheless operate within the norms of "conventional humanist qualitative inquiry" (St. Pierre 2014). Next, I describe the methodological adjustments I made in order to (to some extent) mitigate this tension, including a re-defining of my approach as one adhering to "relational" and "multi-species" ethnography, and adopting Situational Analysis as a way of framing my data collection and analysis. Tensions were, however, ongoing, and in this chapter, I have summarised these as one overarching debate: the extent to which new materialist theories must be applied comprehensively when carrying out research.

Whilst accepting that the approach taken to this study may not be strictly "post-qualitative", I position it as a "site of experimentation" (Bridges-Rhoads 2018, 704) that enabled me to learn and begin to enact new materialist theories whilst in the midst of doctoral research, whilst re-orienting existing qualitative methods to create a new and unique "research assemblage" (Fox and Alldred 2015, 2017, 2018). With these

orientations in mind, I then outlined the final research questions central to this study. The following chapter describes in more detail the practical ways in which I drew upon the methodological considerations outlined here, and looked to address these research questions. It also gives specific examples of remaining tensions relating to the overarching debate identified above.

4. Methods 1: Participant-observation and Situational Maps

4.1. Introduction

Having outlined the methodological context and final research questions devised for this study, Chapters 4 and 5 now detail the methods used to address these key questions. As acknowledged in the previous chapter, devising these methods was an iterative process through which a number of adaptations were made as research progressed. Running through this section is the tension discussed in the previous chapter between approaches drawing upon new materialist theories, and the use of apparently "conventional humanist" qualitative methods. As I describe each method used, I also discuss the specific ongoing tensions, the steps I took in order to mitigate these, and what was produced by the unique "research assemblage" (Fox and Alldred 2018) thereby created. This chapter focuses on the methods used during the first phase of this research: mainly, participant-observation, and the situational maps created alongside this. The following chapter then explores the focus groups and relational maps used to build upon these initial methods in the second phase of this research. Firstly, however, the sub-sections below provide a summary of the research process as a whole.

4.1.1. Summary research questions and methods

Before going into greater detail, it is beneficial to re-cap the methods used throughout this study. Table 4a re-states my key research questions, and lists the methods primarily used to address each of these.

	Question	Primarily addressed by…
1	What are the common activities and features within the Polli:Nation project?	Participant-observation Situational maps/memos
2	How are curricula produced through the common activities and features within the Polli:Nation project?	Participant-observation Situational maps/memos Relational maps Social worlds/arenas map

3	What do young people see as the significant activities and features within the Polli:Nation project?	Focus groups
4	What is the nature of the relations between these significant features and processes?	Relational maps
5	How do young people describe the learning that is produced by the Polli:Nation project?	Focus groups
6	What are the implications of these findings for school-linked environmental education initiatives, in particular the use of practical conservation and citizen science within these?	Teacher/facilitator interviews Participant-observation Memos

Table 4a: Table summarising research/analysis methods used to address each of the questions identified in the previous chapter.

Table 4b now summarises the number of participant-observation sessions, focus groups, and teacher/facilitator interviews I carried out during the course of this research.

Method	Number
Participant-observation (sessions)	30
Focus groups	20
Teacher interviews	18
Project Officer interviews	4

Table 4b: Table summarising number of sessions for which each research method was used.

4.1.2. Timescale

Research took place mainly between August 2016 and June 2017. Up until December 2016, visits to schools consisted entirely of participant-observation. The use of more structured methods of data collection, such as focus groups, began in March 2017 and lasted until the end of the school term in June 2017. Table 4c summarises the timetable of methods used during this period of data collection.

	2016					2017					
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Participant-observation											
Focus groups											
Teacher interviews											
Facilitator interviews											

Table 4c: Timetable of methods used and time period in which each were used.

4.1.3. Summary of participating schools (and codes used in this research)

In total, I visited twenty-three schools as part of this research, all of which were
participating in Polli:Nation. Some of these I visited only once, in order to carry out
focus groups and teacher interviews. Others I visited more frequently, for multiple
participant-observation sessions, followed by focus groups at the end of the school year.
This was determined both by schools' frequency of engagement with the project, and by
their geographical proximity (time and resources allowed only one-off visits to schools
in England, Wales and Northern Ireland). The schools covered all four regions of the
UK, and reflected the mix of primary and secondary schools taking part in the project.
The process of selecting schools for participant-observation and focus groups are
discussed in sections 4.2.2 and 5.3.1 respectively. Table 4d, however, provides an initial
summary of the schools visited, the number of visits to each, and the methods employed
in each.

In all fieldnotes and written presentation of data collected, I gave each school a unique
code – 1a, 3b, 7a, and so on. The number here referred to the Polli:Nation "cluster", or
local area, that each school belonged to (these "clusters" are further explained in
Chapter 6), which in turn were numbered based on the order in which I first visited
them. Each school I had visited within that cluster was then given a letter – again, based

on the order in which I visited them. Hence, "School 1b" was the second school I visited, within the first cluster I visited.

School	Nation	School type	Number of visits	Participant-observation sessions	Focus groups	Teacher interviews
1a	Scotland	Primary	2	2	0	0
1b	Scotland	Primary	7	6	1	1
1c	Scotland	Secondary	4	3	1	1
2a	Scotland	Primary	3	2	1	1
2b	Scotland	Primary	3	2	3	1
3a	Scotland	Primary	1	1	0	0
3b	Scotland	Secondary	1	1	0	0
4a	Scotland	Secondary	1	1	0	0
4b	Scotland	Primary	1	1	0	0
5a	Scotland	Secondary	5	4	1	1
6a	Scotland	Primary	2	1	1	1
7a	Scotland	Secondary	7	6	1	1
8a	England	Secondary	1	0	1	1
8b	England	Primary	1	0	1	1
8c	England	Middle	1	0	1	1
9a	N.Ireland	Primary	1	0	1	1
9b	N.Ireland	Secondary	1	0	1	1
10a	England	Secondary	1	0	1	1
11a	Wales	Primary	1	0	1	1
11b	Wales	Primary	1	0	1	1
12a	England	Primary	1	0	1	1
12b	England	Primary	1	0	1	1
13a	Scotland	Primary	1	0	1	1
		Total:	48	30	20	18

Table 4d: Table summarising schools visited, number of visits to each, and methods employed in each.

4.2. Participant-observation – before school visits

This section outlines the processes leading up to carrying out participant-observation. I introduce the method of participant-observation, before describing the processes by which I selected schools and gained consent to carry out research in them.

4.2.1. Introduction to participant-observation

As outlined in the previous chapter, participant-observation is the principal method of data collection in studies taking an ethnographic approach. In essence, participant-observation is characterised by the direct presence of the researcher in "naturally occurring settings" (Hammersley 2018, 8), as opposed to conducting structured research interventions. Typically, fieldnotes are the principal form of data gathered through participant-observation (Emerson, Fretz, and Shaw 1995). Within participant-observation, approaches vary in the extent to which researchers play an active role in the activities taking place, or play more of a marginal, 'observer' role, with Wilkinson (2018) distinguishing between participant-observation and "observant participation". I discuss this distinction further in section 4.3.1. In section 4.3.5, I discuss iterative developments in my approach to writing fieldnotes, which enabled me to be better attuned to more-than-human elements and inter-species encounters, and to better develop what Pink (2009) calls "embodied knowing". In essence, however, participant-observation consisted of my participation *with* young people in practical elements of Polli:Nation (such as carrying out surveys, planting trees and flowers, and building "bug hotels"), asking spontaneous questions and engaging in informal conversation. In total, this took place in twelve schools across Scotland. In the following section, I start from the beginning, outlining the process by which I selected these schools.

4.2.2. Selection (not sampling) of schools

My principal aims in the early stages of participant-observation were firstly, to make initial visits to a wide variety of schools to gain an understanding of how the Polli:Nation project actually looked "on the ground", and secondly, to review the viability of my initial research design in light of what emerged. The plan at the outset, laid out in my first-year Progress Review, had been to begin with a wide sample of schools to which I would make these initial visits, then from these, to choose just two or three to continue visiting regularly, that would act as in-depth, ethnographically-

informed case studies. Ultimately, as detailed in section 4.3.4, I would come to see these "cases" as nested "units" within the wider "case" of the Polli:Nation project (Thomas 2011). If we consider the Polli:Nation project as the "case" in question, then following Stake (1995, 3), we can consider "the choice of case to be no 'choice' at all". This, for Stake, is a common occurrence in educational research, and this study clearly resonates with the examples he gives:

"Sometimes, we are given (the case), even obligated to take it as the object to study. It happens when a teacher decides to study a student having difficulty, when we get curious about a particular agency, or when we take the responsibility of evaluating a program*"* (Stake 1995, 3, emphasis added).

In other words, owing to the evaluative requirements of this funded study, Polli:Nation had already been chosen as my "case" for me.

It is also important to note that the initial twelve schools in which I carried out participant-observation were intended as a "selection" rather than a "sample" that attempted to be in any way 'representative' of 'typical' schools within the project. The first reason for this was entirely practical. Put simply, there was no way of knowing in advance what a 'typical' example of a school's participation in Polli:Nation would look like, because the project only began shortly before I commenced participant-observation. I did not know details such as how many pupils would be participating, the age of those pupils, and the types of activities the schools would be engaging in. More importantly, however, I took the position of Stake (1995, 4), that "a sample of just a few is unlikely to be a strong representation of others. Case study research is not sampling research… Our first obligation is to understand this one case". In other words, in the context of this study, two or three or even twelve schools, even if I had known in advance how exactly they planned to engage with the Polli:Nation project, were unlikely to in any way 'represent' the project as a whole. For Thomas (2011, 63), then, "the point of a case study is *not* to find a portion that shows the quality of the whole…. So, it's not a sample; it's a choice, a selection".

It is still important, however, to account for how I selected the initial twelve schools in which I carried out participant-observation. My criteria for doing so are outlined below.

Criterion 1: Participation in Phase 1 of the Polli:Nation project:

The first, overarching criterion for my selection of schools was that, owing to the funded nature of this study, participating schools had to be part of the Polli:Nation project. This may be obvious, but is worth noting for two key reasons. Firstly, it had a strong influence on the level of ethnographic engagement enabled by this study. This study's connection to the Polli:Nation project was very useful in facilitating access to a large number of schools, but Polli:Nation activities often turned out to be fairly sporadic, and not (yet) 'embedded' into wider school cultures. Without participation in Polli:Nation as a pre-requisite for inclusion in this study, I may have had access to a smaller number of schools, but may also have been able to target schools in which practical conservation was already a regular and more 'embedded' activity, and therefore, with potential for more regular ethnographic involvement. Polli:Nation*,* as it emerged "on the ground", instead led me to the relational ethnographic approach outlined in the previous chapter (and further explored in section 4.3.4). Secondly, the practical need for my school visits to take place during the 2016-17 academic year reduced my pool of potential participating schools by fifty percent. As will be further explained in Chapter 6, schools participating in Polli:Nation were split into two "phases", during which they received the majority of LTL staff support (and thus, in practice, carried out most of their Polli:Nation activities). Those in "Phase 1" were most active in the 2016-17 school year. Owing to my PhD funding running from October 2015 until October 2018, and the subsequent need to be "writing up" by the summer of 2017, it was necessary that all school visits were completed during this phase.

Criterion 2: Relative ease of travel/access:

While one-off visits to conduct focus groups were carried out in schools across a wider geographical area (see Chapter 5), employing an ethnographic approach through participant-observation required regular visits to schools, often carried out at fairly late notice. Relative convenience of travel to schools was therefore a pre-requisite, enabling a flexible fieldwork schedule that maximised the amount of time I could spend in school grounds when Polli:Nation activities were taking place. My criterion, then, was that schools must be located within 1.5 hours' travel of my home. As with the previous criterion, this effectively eliminated a large number of schools from the selection process.

Criterion 3: Willingness to accommodate a researcher:

On the whole, the Polli:Nation project was useful in facilitating initial contact with a large number of potential participating schools (see 4.2.3), and there was a general willingness to accommodate me among the schools I initially contacted. In a few, however, there were complications that led to a pragmatic decision to eliminate them from the selection process. The following example provides illustration: the safeguarding policy in one local authority area required that anyone visiting their schools, whether or not they have a recently updated record with the Protection of Vulnerable Groups (PVG) scheme, go through the required checks *again* specifically on behalf of that local authority. This would have required an extra payment, and up to two months waiting for a new record update, at a time when numerous schools in other local authority areas had already agreed willingly to my visiting. This effectively eliminated the schools in this area from my selection.

Criterion 4: Being 'active' within the project:

Simply being part of Polli:Nation did not guarantee that schools would provide many opportunities for participant-observation, owing to time pressures that led in many cases to schools' fairly sporadic involvement with the project. Given the ethnographic approach taken by this study, I wanted to engage with schools that were particularly 'active' with the project, knowing that these would offer the most potential for insights to be gained. I therefore kept in regular contact with LTL facilitators in order to stay informed of which schools appeared to still be 'active', and targeted these schools as potential units within the wider case.

Criteria 5+: "Balance and variety"

As Stake (1995, 6) reminds us, "(e)ven for collective case studies, selection by sampling of attributes should not be the highest priority. Balance and variety are important; opportunity to learn is of primary importance". The previous criteria, then, were intended to maximise the "opportunity to learn" from the schools selected - for example, by being active with the project, and/or relatively easy to travel to, both of which provided opportunities for multiple participant-observation sessions. I also, however, ensured that I considered the "balance and variety" also referred to in the

quote above, and in the schools I was visiting, ensured variation across the following areas:

i) Primary and secondary schools: the project involved both, so I ensured (not least for the purposes of evaluation) that I engaged with a roughly even spread across these.

ii) Types of place (rural-urban): I initially used the Scottish Government's Six-Fold Urban Rural Classification (Scottish Government, n.d) for guidance with this. Although this classification provided an initial overall structure to my selection of schools, it proved impossible to find a selection of schools that conformed to the criteria listed above, *and* to each of the six categories. The schools, however, still reflected a diversity of locations, ranging from small primary schools in "Accessible Rural" locations, to a large secondary school in a "Large Urban Area".

iii) Size and distinctive features of the school grounds: Clearly, the nature of the school grounds would influence the sort of activities that could take place as part of Polli:Nation. During participant-observation, for example, I visited one school that had a large area of woodland as part of its school grounds, as well as a "sensory garden", and a protected, species-rich wildflower meadow (School 7a). By contrast, I also visited a city-centre school whose school grounds consisted entirely of tarmac, meaning that the only possible landscape changes involved installing planters in which pollinator-friendly flowers were planted (School 4b).

iv) How Polli:Nation fit within participating schools: There turned out to be considerable variation in the ways in which schools chose to engage with Polli:Nation, and therefore, the ways in which pupils were selected to take part. Among the schools selected, there were examples where a whole class in a single year group were involved in the project (1a, 2b, 4b, 6a), where the whole school were involved in some capacity (2a), and most commonly, where the project was an activity outside of core curricular subjects that involved a small number of pupils (1b, 1c, 3a, 4a, 5a, 7a).

4.2.3. Ethics: Gaining access and consent, ongoing vigilance

Being part of the Polli:Nation project enabled relatively easy initial contact with a considerable number of schools, and gaining approval for my research from teachers and headteachers was undoubtedly aided by my position as "evaluator" of the project. For my first participant-observation sessions in each school, I aimed to join the LTL facilitators as they ran their sessions during the Autumn term, dates for which had already been arranged well in advance. Having obtained contact details for each school's "lead teacher" from the facilitators, I emailed them, introducing myself and my research, and asking if I could join the facilitator on those days. In most cases, the facilitators had made one previous visit to these schools by the time I joined them for these visits, and had met and/or spoken to the teachers on numerous occasions. Accompanying them for my first visits, I felt, therefore lent me further "credibility" as being part of the project. In any case, teachers and headteachers invariably agreed to my involvement.

Once these visits had been agreed to by these lead teachers, I then sent out information sheets, and consent forms to be filled in by the teachers, headteachers, pupils who would be participating in the activities, and their parents/guardians (examples of these are provided in Appendix 4). The letters preceding these consent forms made clear that I would follow the commitments made in my approved application to the Faculty of Social Sciences Research Ethics Committee (see Appendix 5). The letters specified that any writing about or quotes collected from pupils would be kept anonymous; that photos used in writing and presentations would be as "non-traceable" as possible (i.e, the school could not be identified) and would not display pupils' faces; that they had the option to opt out of the research process at any time (they would still be able to participate in activities, but I would ensure that nothing they said or did would be included in my reporting of research); and that "raw data" would be stored on password-protected computers or in locked filing cabinets. All consent forms except those sent to parents/guardians were presented on an "opt in" basis. For parents/guardians, however, I decided to instead give them the chance to opt out – that is, return the form if they did *not* want their child to participate. My reasoning was that with the number of pupils involved in participant-observation sessions, it would be

difficult to ensure that forms for every one of these pupils were received in time for my visits.

As research progressed, I ensured that I stayed vigilant to any further ethical issues. This included being attentive to any visual and verbal signs that participants were no longer comfortable taking part in the research, following Gallagher's (2008, 505) assertion that children may sometimes participate in research "out of habit rather than on the basis of a deliberate decision". Other potential issues included adults, such as parent helpers or visiting experts, taking part in the project on an ad-hoc basis. I always ensured that I verbally explained to these adults about the research, and that informed consent was gained, before using anything written about them in this thesis. In the event, these adults always expressed a willingness to participate, and I detected no signs of reluctance from pupils.

Having joined the LTL facilitator for a first visit, and established contact with the lead teacher at each school, I asked these teachers to keep me informed of any further Polli:Nation activities, and maintained email contact. Further participant-observation sessions, then, were either the subsequent sessions run by the facilitators, or school-led grounds development activities that the lead teachers had invited me to.

4.3. Doing participant-observation: Methodological shifts and ongoing tensions

This section describes everything that took place *during* participant-observation: considerations surrounding introductions and positioning, the process(es) by which I wrote fieldnotes, the methodological shifts I made in regard to this, and the ontological tensions that remained in relation to new materialist theories.

4.3.1. Introductions/positioning

On first meeting the pupils at each school, the facilitator would usually say a few (re)introductory words about Polli:Nation, then introduce me. I would then briefly explain the purpose of my task of 'evaluating' the Polli:Nation project, as well as the PhD element of my research. I was always careful to point out that if I asked them questions, there were no right or wrong answers – that I was not 'testing' them.

As research progressed, it quickly became apparent that my fundamental difference from my participants, as well as my low level of immersion in their wider day-to-day life, prevented me from fully participating 'as' a young person. Wilkinson (2017, 614), in arguing for the use of the term "observant participation" in order to celebrate the "embeddedness of the researcher", describes a study taking place at a youth-led radio station, in which her immersion was such that she hosted her own show on the station, as well as helped with fundraising activities. At the time of commencing research, she explains, she was a similar age to most of the volunteers at the station, and its target audience (that is, young people aged under 25). By contrast, in this study it was clear from my age and size that I was - to the young people at least – closer to being a teacher or facilitator than to being a young person. Similarly, teachers and facilitators would frequently view me as a 'helper' - for example, when pupils were split into groups to carry out a survey or build bug hotels, I would often be asked to supervise one group. Given the limited time I had in schools, it was difficult to cultivate an image beyond these initial impressions. This may therefore be seen as a limitation of this research – that I could never fully 'gain the perspective' of young people due to this fundamental difference between us. I felt, however, that the changes I made to the way I collected fieldnotes, as described in the following section, nonetheless helped to bring me closer to the role of 'participant' than 'observer', and to enable me to gain a degree of "embodied knowing" (Pink 2009).

4.3.2. Early fieldnotes

Fieldnotes, when combined with participant-observation, have long comprised the core form of 'data' produced by ethnographic research, and traditionally consist of the researcher "writ(ing) down in regular, systematic ways what she learns while participating in the daily rounds of life of others" (Emerson, Fretz, and Shaw 1995, 1). This study was perhaps typical, generating over one hundred typed A4 pages of fieldnotes across thirty sessions of participant-observation. Following discussion in the previous chapter around the impossibility of researchers being "tabula rasae", what the researcher chooses to write down during participant-observation is of course similarly shaped by the same assemblage of "life, research, theory, methods", as well as simply by what the researcher notices at a given moment. This adds further weight to Mills and Morton's (2013, 85) assertion that there is "no right way to write a fieldnote", and in

essence, the key is just to "write and write and write" (86). I nonetheless began this study by following a well-known formula for taking fieldnotes. These initially took the form of shorthand "scratchnotes" (Mills and Morton 2013) or "jottings" (Emerson, Fretz, and Shaw 1995) – quick notes taken *while* participating, that serve to later jog the memory. These were then expanded into a detailed descriptive narrative as soon as possible after these notes were made (Mack et al. 2005). Extracts from these fieldnotes are drawn upon throughout Chapters 6 and 7. An example of a longer extract from fieldnotes written using this approach, however, is included in Appendix 1.

4.3.3. Research journal

Following the advice of researchers such as Mills and Morton (2013) and Punch (2012), I began keeping a "research journal" from my first participant-observation session. For researchers like Punch (2012), carrying out immersive ethnographies in an unfamiliar country such as Bolivia, research journals are important for recording the strong emotions that one might feel, and she argues that these are due greater attention in the research process than they are typically afforded. Given that I was carrying out fieldwork in my home country, in situations that were fairly familiar to me, and that I went home after every session of participant-observation, my own journal turned out not to be particularly helpful in this respect. Maintaining it did, however, turn into a useful exercise in reflecting on and identifying any methodological shifts taking place within the research process. These included the decision to carry out focus groups outlined in the following chapter, as well as the shift towards "relational ethnography" (Desmond 2014), and changes to my approach to writing fieldnotes, outlined in the following sections.

4.3.4. Shift to relational ethnography and a single "ethno-case-study"

As previously discussed, during the course of research I came to characterise this study as one employing a "relational ethnographic" approach (Desmond 2014; Simon 2013). A fuller introduction to the methodological considerations behind this shift is given in the previous chapter (3.6.1). The important practical implications are, however, discussed here. Firstly, I remained open to further participation in Polli:Nation activities at most of the schools I had already visited (with the exception of schools 4a and 4b, which I deemed to be too far from home to visit with any regularity). This was a

departure from my original plan, which had been to select two or three schools as in-depth "ethnographically-informed case studies", from the initial range of schools visited. This was due mostly to practical considerations – namely, that in all schools, Polli:Nation activities turned out to be more sporadic than I had initially anticipated, meaning that a sufficiently 'ethnographic' study would be difficult to achieve. Secondly, this shift to a relational ethnographic approach meant that I no longer viewed each individual school as a 'case study'. For Desmond (2014, 554), we should recall, relational ethnography "is not propelled by the logic of comparison" between "groups" in different contexts. Instead, with Thomas (2011), I consider the Polli:Nation project as a whole to be a "case" (of a project seeking to engage young people in practical conservation and citizen science activities), and each schools as a "nested unit" within it. For Thomas (2011, 152), a "nested" case differs from merely "multiple" cases in that it "gains its integrity, its wholeness, from the wider case" (153). That is, in this study, each school is a site at which Polli:Nation activities are taking place, rather than not a separate, clearly bounded "case". I therefore refer to them simply as "schools", rather than "cases", throughout this thesis.

With hindsight, to complement this distinction, the wider "case" of the Polli:Nation project may also be considered what Parker-Jenkins (2018) labels an "ethno-case-study". The author suggests this new term after discussing debates around the difference between 'ethnography' and 'case study' research. She defines an "ethno-case-study" as something between the two - "an inquiry concerning people, which employs techniques associated with long-term and immersive ethnography, but which is limited in terms of scope and time spent in the field" (24). This includes instances such as this study, where there is a specific focus rather than a requirement of full immersion in the lives of participants.

4.3.5. Theoretically-sensitive fieldnotes

As participant-observation progressed, I made two key changes to the way I collected fieldnotes. These changes, I felt, served to focus my attention more fully on human/more-than-human interactions, and to encourage me to "think with and write with philosophical texts" (Bridges-Rhoads 2018, 647).

The first of these changes was to leave my pen and notebook behind. It felt to me that the perceived obligation to constantly take notes had taken me further away from the role of 'participant' than I had intended, and more towards being an 'observer'. No longer taking notes, I felt, enabled me to be better attuned to more-than-human elements and inter-species encounters, and to better develop what Pink (2009) calls "embodied knowing". I shifted instead to writing up notes as soon as possible after each session. This shift was inspired by a key article in the emergent field of multispecies ethnography (Pacini-Ketchabaw, Taylor, and Blaise's 2016, 155), which also provided orientations for the second key shift I made.

The second change I made with regard to fieldnote-writing was to develop a series of questions specific to this study that I would respond to after each session. These, I felt, served to connect the fieldnotes more clearly with new materialist theories and focus my attention on more-than-human elements. I drew upon a range of questions, drawn from two key sources. These were, firstly, the emergent literature on multi-species ethnography – a form of relational ethnography (Desmond 2014) that has been applied principally in early-years contexts (Ogden, Hall, and Tanita 2013; Taylor and Pacini-Ketchabaw 2015). The central feature of multi-species ethnography, for Pacini-Ketchabaw, Taylor, and Blaise (2016, 151), is to avoid being human-centric in research encounters, instead "tracing how our lives, children's lives and the lives of other animals in our common worlds are entangled, interconnected (and) mutually dependent". Secondly, I developed questions based on key ideas from new materialist theory. These drew most closely upon the idea of "concepts", "percepts" and "affects" (these are defined below). The idea of directing one's thinking through the selected use of particular theories has clear resonances with the "diffractive" approach to data analysis drawn from Barad (2007). Recent articles advocating this approach (Mazzei 2014; Lenz Taguchi 2012), however, are concerned with using theory to analyse *existing* data such as audio recordings of interviews. Here, I conceived instead of an approach that enabled me to explore those theories whilst in the midst of carrying out the research itself.

Devising questions based on new materialist concepts was accompanied by a slight sense of unease at using terms that I had only recently begun to engage with. Was my understanding of them 'correct'? I proceeded, however, with something like the

approach advocated by Strom (2018), who stresses that "it did not matter if I did not understand every single word of what I was reading. What mattered was if I found anything that *worked for me*" (106). This claim is based on Deleuze's own recommendation to avoid trying to read too deeply into his work, because "(t)here is nothing to explain, nothing to understand, nothing to interpret. It is like plugging in to an electric circuit' (1990, 8). I also kept in mind Springgay and Truman's (2017, 4) assertion that "(y)ou are not there to report on what you find or what you seek, but to *activate thought*" (emphasis added).

"Concepts,", "percepts" and "affects" were, in this case, ideas that "worked for me" (Strom 2018) as ways to think about how young people experienced and came to understand the activities making up the Polli:Nation project, and how these were bound up with the more-than-human elements present. In very brief terms, following Semetsky (2015), I understood "affect" to be a "force" that is present within an assemblage, potentially giving rise to feelings. This differs from a "percept", which is the perception of the feeling itself, after it has been "felt" (Colebrooke 2002). A concept, broadly speaking, is an idea. For Semetsky (2015), it is an idea that is "invented in practice" – that is, arising through a given situation and serving to facilitate understanding of the nature or purpose of that situation. They are, importantly, "becomings" rather than fixed entities. In Polli:Nation activities, I came to label the concepts in circulation as, for example, "young people as (becoming) conservationists", "young people as (becoming) community activists/active citizens", and "Polli:Nation as (citizen) science project".

An extract from fieldnotes taken using these theoretically-sensitive questions is shown in the sub-section below, and a fuller extract in Appendix 1. Extracts from these fieldnotes, meanwhile, appear throughout Chapters 7 and 8.

4.3.6. Tensions: "Language practices" and "performative privilege"
The changes outlined in the previous section represent small steps that aimed to encourage a focus on the more-than-human elements present, and to enable me to participate in activities to a greater extent. Clearly, however, there are ongoing tensions

when applying these orientations alongside new materialist theories, mainly owing to ontological concerns with an over-reliance on "language practices".

The first tension was simply the continued use of fieldnotes. As MacLure (2013a, 664) reminds us, any 'data' gathered from fieldnotes, interviews, focus groups and scholarly papers are inherently humanist, and have serious limitations when dealing with elements outside of "the ideational and cultural aspects of utterances (spoken or written)". Whilst I had stopped writing fieldnotes whilst actually *in* the research situation, I nonetheless continued to rely on notes written afterwards as key 'data' from these participant-observation sessions (although these sat alongside photos and situational maps). Furthermore, directing my note-taking with questions arguably exacerbated the separation between my own participation in Polli:Nation activities, and the "inner mental activities inside a separated human being" (Hultman and Lenz-Taguchi 2010, 536) when interpreting them afterwards. One could, then, experiment with not writing fieldnotes at all, or at least without the use of pre-conceived research questions to guide our 'analysis'. Yet we would, of course, still encounter a reliance on textual representation at some point – whether through writing for publication, or a PhD thesis. As Bridges-Rhoads (2015, 709) reflects, although she may write as a "situated speaker" (after Richardson and St. Pierre 2005), the expectation is still that "I am the researcher. I have to produce a text about that research. That is what qualitative research is".

A second, related tension is best demonstrated with reference to the fieldnote extract in Figure 4a, which was written using the theoretically-sensitive questions explained in the previous sub-section.

What human/more-than-human encounters were there?
- While gathering dry leaves from the ground, Liam finds a large woodlouse, and lets it crawl over his hand. He comes and shows it to me. He calls it a "slater" - I'd forgotten that's what people call them in this part of the country. Unlike some of the boys in the group, who display high levels of energy, Liam is quiet, thoughtful, and does his own thing within the group. He tells me how slaters are actually crustaceans, because they have a shell. I compliment him on his knowledge and ask him where he's learned it. "I just like animals and stuff", he shrugs. At this point, one of the other boys, Brian, quickly takes the slater off him and throws it towards one of the girls, who is scared of insects. She screams and runs away. Liam waits until the commotion dies down, then goes and finds the slater, and places it carefully at the side of the path, among the leaves.

How do human and more-than-human elements respond to these encounters? How might they have experienced them?
- What to say about the slater? It was clearly in its usual environment – damp, dark places. Being in amongst those dead leaves was exactly that sort of place. And having looked up a bit about slaters… They are indeed "isopod crustaceans" that feed on dead plant material (so probably searching for food when Liam found it?), and are usually active at night (so are they sort of drowsy this time of day?). They use their antenna to feel their way around. They still breathe through gills as their ancestors lived underwater. As for how it might have experienced today, though: Crawling over new surfaces (people's hands), being chucked through the air, then picked up again. Did any of that register beyond a brief sensation? Or does it feel pain? Or fear? The point is, I don't know…

Figure 4a: Extract from fieldnotes written using a series of theoretically-sensitive questions.

The tension demonstrated by the above fieldnote extract is an unease with what Petersen (2018, 11-12) describes as the danger of "speak(ing) on behalf" of someone or something. This is in the case of the example above, of the woodlouse. "The power to narrate somebody's (or in this case something's) story", she says, and re-producing it through "language practices" such as writing, is in danger of engendering "another form of oppression" on the part of humans over other species. Pacini-Ketchabaw, Taylor, and Blaise (2016, 157) stress that it is more a case of "sensing and following… rather than rushing in to interpret and represent them". In their paper, one of the authors, Mindy Blaise, recounts an experience of conducting multi-species ethnography with dogs. Here (similarly to my experience with the woodlouse), she admits that "I have no idea what dog knowledgeabilities might be or how they will emerge because I am not a dog", but stresses that the key is in "suspending my pull towards meaning making for

long enough to sense dog worlds and dog agencies on dog terms" (Pacini-Ketchabaw, Taylor, and Blaise 2016, 156).

As shown in the fieldnote extract, however, this "suspension of meaning-making" proved difficult in this particular study. To me, anything I wrote about the woodlouse felt at least like some kind of attempt to 'interpret', or to write 'about' the woodlouse from a human perspective. This rush to interpretation was, as previously discussed, undoubtedly encouraged by the questions I had set myself when writing fieldnotes. It was also, however, most likely exacerbated by the difficulty in "sensing" anything of the "knowledgeabilities" of woodlice (compared to, say, those of dogs), and the comparative ease in considering the significance of different pupil responses to the woodlouse: one throwing it, one voicing a care for its life. The fieldnotes therefore primarily focused on how relations between pupils and more-than-human elements were altered via these encounters, but crucially, placed their emphasis predominantly on the pupils.

It is possible that in these early attempts to think with more-than-human elements, I was only at the beginning of what Taylor (2017, 1455) describes as a "practice that requires a dedicated apprenticeship". Even so, I was persuaded by Petersen's (2018) argument that "(a)s long as researchers operate in the realm of the discursive and affective… we uphold a significant performative privilege, which cannot and should not be denied through rhetorical denouncements of privilege" (11). This claim is made with reference to another article of which Blaise is an author (Bannerjee and Blaise 2013). In this article, the authors describe a study in Hong Kong focused on air, in which "we did not set out to research air, rather Hong Kong air found us" (241). Petersen (2018), however, refutes this attempt to denounce the "privilege" of the researcher, suggesting that in fact, "participants were on the lookout for some non-human actor to walk and think with, and therefore were under particular conditions of openness to being found" (10). In other words, despite these attempts at openness, the identification of and decision to include air as the subject of the study was still, ultimately, a human one. This was my distinct sense with regard to any attempts to "think with" more-than-human elements during this study.

4.3.7. (But) What was produced?

Whilst the fieldnote extract above makes clear some of the tensions discussed in the previous section, this new approach to taking fieldnotes was one that had clearly activated thoughts relating to new materialist theories, thereby producing new ways of thinking in the midst of my research encounters. The following two points illustrate this with reference to the fieldnote extract above.

Firstly, before the Polli:Nation project began, I had identified some of the key discourses underlying it. These included what I had labelled a "utilitarian view of other species" and a somewhat anthropocentric "stewardship" perspective towards the conservation of pollinators (Taylor 2017). Drawing upon the idea of "concepts", however, and keeping in mind that these are "invented in practice" (Semetsky 2015), encouraged me to pay attention to new or other ideas that were in circulation, rather than simply looking for manifestations of these underlying discourses. This "invention in practice" of "concepts" is explored in Chapter 7.

Secondly, despite the challenges with "suspending meaning-making" highlighted in the previous section, these re-orientations ensured that my attention to the ongoing agencies and affective capacities of more-than-human elements was, to some degree, sustained through the practice of writing fieldnotes. My feeling is that this, in turn, served to reinforce my sense that other species "co-shape" (Taylor and Pacini-Ketchabaw 2015, 512) the processes by which these ideas were enacted or (re)produced. At this stage, there are perhaps no obvious ways in which this fundamentally shifted my thinking – it is, as I say, a feeling. The influence of multi-species ethnography on fieldnotes, however, is illustrated in the fuller example of those taken using theoretically-sensitive questions, included in Appendix 1. As well as the woodlouse/slater, that extract also contains references to the pungent smell of the stream, the rhododendron bushes and silver birches, the twigs and dry leaves on the woodland floor, the long spikey "strings" of re-rooted brambles. Despite my sense of the impossibility of denouncing my "performative privilege" (Petersen 2018) within the research assemblage outlined here, I am also persuaded by Bowden's (2015, 78) view that our "human intentional action" ought still to be viewed as inextricably bound up with the "nonhuman forces" making up a given assemblage. That is, while we cannot escape our human perspectives, acknowledging and exploring our co-constitution with other species and materials can

nonetheless serve to produce new ways of knowing, and of doing research (Childers 2013).

As will be demonstrated in the following sections, the new thoughts activated by this new way of taking fieldnotes also fed into the process of creating situational maps – a method central to the wider approach of Situational Analysis.

4.4. Situational analysis during participant-observation

4.4.1. "Messy" situational maps

As previously acknowledged, analysis ought not to be considered a separate process that begins only after data collection is complete, instead being "informally... embedded in the ethnographer's ides, hunches, and emergent concepts" (Hammersley and Atkinson 1983, 174). 'Formal' analysis, however, is often conceived of as beginning "when the fieldnotes are read and typed before the next visit to the field" (Brewer 2000, 107). This was the case in this study, with my use of Situational Analysis formally beginning after the first participant-observation session. Clarke, Friese, and Washburn (2017, 106) remind us of the maps' use as analytic exercises that simply "(get) the researcher moving into and then around in the data", stressing that "(t)here is nothing more important than making this happen as soon as possible in the research process". I therefore began to create "messy" situational maps from the beginning of participant-observation.

In outlining the process of creating situational maps, Clarke, Friese, and Washburn (2015, 2017) distinguish between two types of map: "messy" and "ordered". "Messy" maps are usually the first to be produced, and consist simply of laying out "all the major human, non-human, discursive, historical, symbolic, cultural, political and other elements in the research situation of concern" (Clarke, Friese, and Washburn 2015, 100). The process of making these maps is simple, with the researcher plotting on the page any "elements" of the situation that come to mind. At this early, "messy" stage, there is no specified way to position these elements on the page. The map can then be added to after each session of data collection. "Ordered" situational maps follow on from "messy" maps, with the researcher beginning to categorise the elements they have identified into groups. These might include, for example, broader categories of "more-

than-human elements (present)", "practical conservation tasks", or "external/visiting experts".

From the first session, I began creating a "messy" situational map of all elements that I could identify from the four or five pages of fieldnotes I would produce after each school visit (and/or that the fieldnotes prompted me to think of). I conceived of "the situation" broadly as "young people's lived experience of the Polli:Nation project". I initially created these maps by hand, simply jotting any elements that came to mind onto a large A3 sheet of paper. Figure 4b provides an early example of a situational map created using an early set of fieldnotes. For the purposes of presentation and secure data storage, I then created an electronic version of the map, using Word. I did this simply by creating a "text box" for each element. I kept this first map as the 'master' situational map, and after subsequent sessions, added to it any new elements I had noticed. In practice, it was often easier to create a new hand-written map for each set of fieldnotes, and then add the new elements to the electronic 'master' map. Through following Clarke, Friese, and Washburn's (2017, 130) recommendation to err on the side of "inclusivity", the result after all participant-observation sessions was a large and
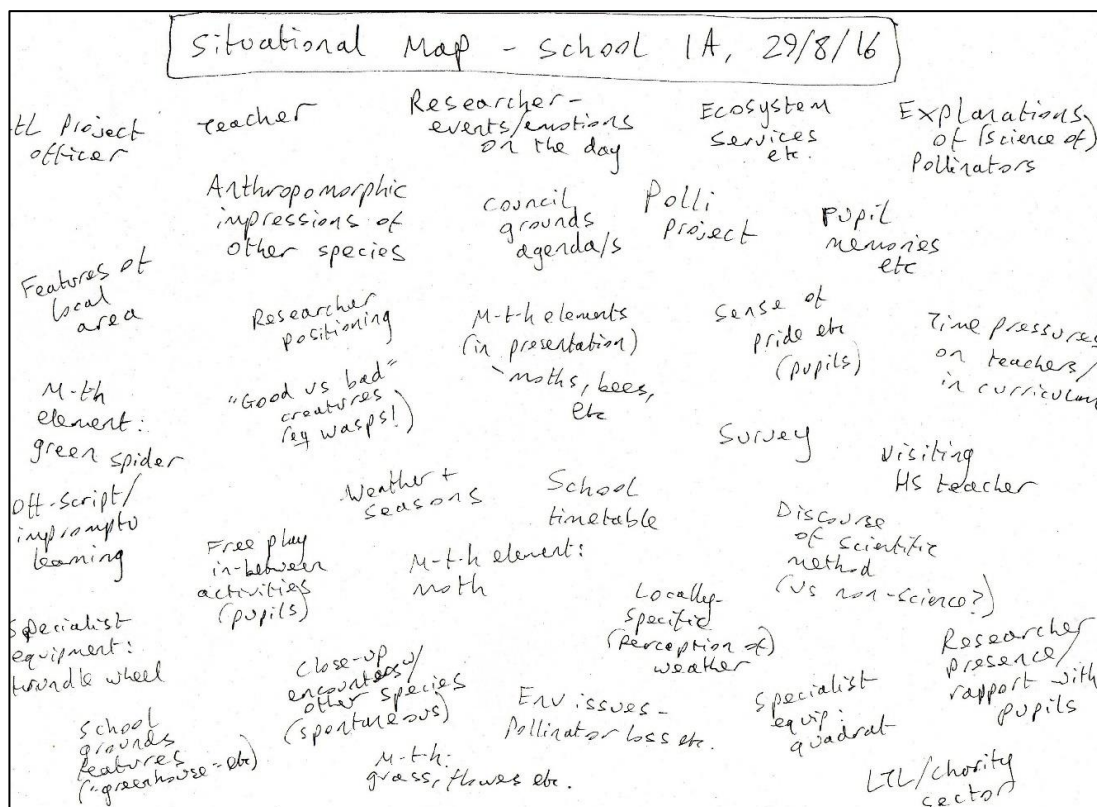
rather crowded A3 document. This map is shown at the beginning of Chapter 6 (Figure 6a).

4.4.2. Early relational maps

I also experimented with creating relational maps at this early stage of the research process, using the newly-created electronic version of the situational maps I had been producing. I felt that creating these maps while participant-observation was still ongoing helped to create a sense of entanglement - that is, of the close relations between the elements making up the situational maps. I return to this in sections 4.4.4 and 4.4.5, and argue that the early creation of relational maps helped to offset some of the tensions relating to the somewhat essentialising or reductive process of condensing matter into distinct "elements". Overall, however, relational maps were most useful when created using the 'final' situational maps produced once all participant-observation was complete. I therefore provide a more detailed description of the processes by which these were created in the following chapter (section 6.5.2).

4.4.3. Memos

As discussed earlier, I incorporated analytical reflections into my fieldnotes when writing them up, rather than keeping these separate. It was, however, useful to periodically look at all the fieldnotes and situational maps created up to that point, as well as to note any unwritten reflections I had made, in order to create memos. Clarke, Friese, and Washburn (2017) place great emphasis on the importance of memoing, stressing that it "should occur after every single analysis session" (353). These memos took the form of a new document that summarised what had emerged so far. Typically, I wrote these reflective notes after every four or five participant-observation sessions – or, for example, after a week in which I had spent multiple days in Polli:Nation-participating schools. In this study, these notes served the dual purpose of beginning to guide the process of analysis, and enabling me to make the required updates on my 'findings' to Polli:Nation's funders and partner organisations.

4.4.4. Tensions: "Elements" and "producing order"

Despite the clear links between situational maps and new materialist theories highlighted in the previous chapter, a key tension between these quickly emerged in the early stages of participant-observation. It was clear already that seeking to identify the "elements" present within a research encounter carried remnants of the desire, rooted in Cartesian dualist thought, to "produce order and regularity in the guise of categories that erase difference and privilege identity among seemingly similar things" (Jackson 2013, 742). For Jackson, it is from this deep-rooted, essentialist thinking that the practice of coding, so commonplace in qualitative research, stems. The focus on *patterns* inherent in the practice of coding, say St. Pierre and Jackson (2014, 716), is "unthinkable" in Deleuzian ontologies that "describe the world as unstable and becoming". Maclure (2013b), however, argues *for* coding in spite of this ontological mismatch, since it encourages a long, slow "immersion in, and entanglement with, the minutiae of 'the data'" (170). She encourages researchers to think of coding as "an experiment with order and disorder" that is "not a static representation or translation of a world laid out before us… but an open-ended and ongoing practice of *making* sense" (171).

Was Situational Analysis, however, representative of the sort of coding that encourages such "static representations"? Or was it sufficiently "open-ended" and "experimental"? Certainly, Clarke (2005) and Clarke, Friese, and Washburn (2015, 2017) do not explicitly address the difficulty in using the reductive term "elements", and use it in a fairly "commonsense" manner throughout their books. As Mathar (2008, 13) points out in a review of Clarke's first Situational Analysis book (2005), the method "does not ask… how these different elements are being produced and how they condense themselves into elements". Clearly, the categorisation required to create situational maps is bound up with the researcher's own pre-conceived impressions and prior experiences. In the example map in Chapter 6 (Figure 6A), this is perhaps most clearly illustrated by the element "relaxed atmosphere". By this, I reflected through memos, I meant the 'atmosphere' produced by some of the other elements I had included: a small group, the chance to ask spontaneous questions, the chance for spontaneous close-up encounters with other species, and the opportunities for what I labelled "free

play/exploration" in-between planned activities. Labelling this as "relaxed" was, of course, my own judgement, deep-rooted in my own experiences of school, and professional experience in outdoor learning contexts.

Further indicative of the potentially essentialising nature of Situational Analysis is Clarke, Friese, and Washburn's (2017, 182) provision of orientations for the creation of "ordered" situational maps, based on the researcher's existing "messy" maps. Here, the researcher begins to categorise the elements they have identified into broader categories – for example, "more-than-human elements", "discourses", or "key people". Clarke (2005, 89) notes that the creation of these ordered maps "isn't necessary", perhaps indicating her awareness of the potential tensions (Mathar 2008).

While Clarke, Friese, and Washburn (2017) do not directly address the issue of identifying elements, the key to their thinking is in their insistence on researcher reflexivity (see also previous chapter, 3.7.2) - a key way in which SA differs from Grounded Theory. Practically, this reflexivity involves making sure we include ourselves, as researchers, in the maps we are producing, thereby acknowledging (in accompanying memos, if not obviously in the maps themselves) how each element came to be defined as such. Following this, we might conceive of each "element" as an assemblage in itself - a unique entanglement of concepts, percepts and affects (Colebrooke 2002) arising both through the research encounter, and through the researcher's pre-existing "ideas, hunches, and emergent concepts" (Hammersley and Atkinson 1983, 174).

This leads us back to the debate previously discussed in relation to multi-species ethnography. For some, to create situational maps will be to jump to humanist interpretation too early in the research process, when we should instead be attempting to suspend our "pull towards meaning making". For proponents of Situational Analysis, however, researcher reflexivity is so important because suspension of the researcher's own thoughts, and humanist meaning-making, is *never* possible. The key, for them, is in acknowledging this, and instead using situational maps to explore and demonstrate when and how our thoughts and privileges are inextricably bound up with other human and non-human elements comprising the research situation. Clarke makes her position on this clear in the FAQ on her own website (Situational Analysis website, n.d). In

response to the suggestion that SA "still retains the voice of the analyst/researcher/author", she responds: "In my reading of the postmodern, there is no turning that can erase the situatedness of research and researchers. All we can offer is our best and most reflexive take to date in terms of understanding something". Similarly, with regard to coding, MacLure (2013b) contends that since "(a)ll language shares the fixative ambitions of coding", it is never entirely possible to abandon the human tendency towards classification.

4.4.5. (But) What was produced?

Importantly, the ways in which I conceived of the elements making up my situational maps was also strongly influenced by the new approach to fieldnote-writing outlined previously, in which I responded to questions drawn from new materialist theories and multi-species ethnography. This can be seen in the labelling of "concepts" that I had identified as being "invented in practice" (Semetsky 2015), such as "young people as (becoming) conservationists", and "young people as (becoming) community activists/active citizens". I also included the ever-present "affect(ive capacities)" within the map (see Chapter 7, section 7.3.1), as well as numerous elements emphasising relations between humans and more-than-human elements ("human/more-than-human encounters", "more-than-human responses", "pollinators (not present)"). When added to the orientations of SA outlined previously, these subtle shifts suggest that even if SA *does* encourage a greater degree of categorisation than is desirable when thinking with new materialist theories, this unique "research assemblage" has at least enabled this researcher to do so in ways that enabled greater consideration of ideas drawn from new materialist theories.

Returning to the links between SA and new materialist theories highlighted by Clarke, Friese, and Washburn (2017), the creation of relational maps also helped to bring new materialist thinking to the map-making process. The process of drawing links between elements making up my existing situational maps, I felt, furthered my sense of the complex relations between these elements. The limitation of relational maps, however, is that whilst they encourage researchers to visualise the complexities and entanglements within the research encounter, the maps themselves do not directly encourage us to consider what is *produced* by the assemblages they represent. Clarke,

Friese, and Washburn (2017, 69), with reference to Dewey (1938), do point to the idea of "the situation as itself having a *gestalt* that makes the whole greater than the sum of its parts", but aside from ongoing memoing, do not offer a prescribed way for the researcher to consider this. Again, however, I felt that this was enabled by the theoretically-sensitive fieldnotes outlined in the previous sections, which helped to further provoke new ways of thinking, and encourage me to consider what was produced by the unique assemblages under investigation.

4.5. Summary

In this chapter, I have detailed the use of participant-observation and creation of situational maps during this study. This included the considerations made before carrying out participant-observation (such as the process by which schools were selected), and the changes I made to my fieldnote-writing methods as research was ongoing. I have also reflected on the tensions that remained when using these methods in combination with new materialist theories, including the continued use of fieldnotes (MacLure 2013a), the difficulty in "speaking on behalf" of other species (Petersen 2018), and the somewhat essentialising practice of Situational Analysis (Mathar 2008). I have, however, highlighted the ways in which these methods came to be re-oriented through attending to ideas from the new materialist and post-qualitative literatures. The re-orientations enabled by the resultant "research assemblage" (Fox and Alldred 2018) included the following: Firstly, a new approach to taking fieldnotes that, through drawing on ideas from new materialist theories, activated new ways of thinking that went beyond Situational Analysis to consider what was produced by the assemblages under examination. Secondly, a greater focus on more-than-human elements through multi-species ethnography, including a greater sense of the ways in which these "co-shape" young people's learning experiences. Thirdly, a way of thinking in a more entangled, relational manner through the creation of situational and relational maps. And, finally, changes to the ways in which I conceived of the elements making up situational maps, owing to the ideas from new materialist theories with which I directed my fieldnote-taking.

The following chapter details the focus groups that followed on from the participant-observation described here, as well as the relational maps that were created once these were complete.

5. Methods 2: Focus Groups and Relational Maps

5.1. Introduction

This chapter details the focus groups I carried out with young people who had been participating in the Polli:Nation project, which followed on from the participant-observation described in the previous chapter. Between March and June 2017, I carried out twenty focus groups in eighteen different schools across Scotland, England, Wales and Northern Ireland. Importantly, the content and format of these focus groups were guided by observations that had been made, and themes that had emerged, during participant-observation and through the creation of situational maps. At the end of this chapter, I also detail the process of creating relational maps - my principal method of analysis once all participant-observation and focus groups were complete.

As highlighted at the beginning of the previous chapter, focus groups primarily addressed two of the questions central to this research: *What do young people see as the significant activities and features within the Polli:Nation project?,* and *How do young people describe the learning that is produced by the Polli:Nation project?* Relational maps are then used to address the question *What is the nature of the relations between these significant features and processes?*

This chapter is structured as follows. First, I introduce focus groups as a research method, and provide a rationale for their use in this study. I then account for the whole process of carrying out these focus groups: my selection of schools and participating pupils, the methodological tensions presented by carrying out focus groups and subsequent orientations that served to mitigate these, and the activities that were typically used *within* the focus groups. I then briefly describe the interviews with teachers and facilitators that were carried out in addition to these focus groups, before going on to outline the process of creating relational maps. In the section on relational maps, I also consider the other types of map that complete the process of Situational Analysis – social worlds/arenas maps (section 5.6.4), and positional maps (5.6.5).

5.2. Focus groups: Introduction and rationale

This section outlines my considerations leading up to carrying out focus groups, introducing the method of focus groups and my rationale for using them in this study.

5.2.1. Focus groups or group interviews?

When considering the use of this research method in this study, I considered alternatives to the term "focus groups", such as "group interviews". Fontana and Frey (1994) attribute the origin of the term "focus group" to marketing research, and specifically to Merton, Fiske and Kendall (1956), who used it to refer to situations in which participants were asked "very specific questions about a topic after considerable research has already been completed" (Fontana and Fey 1994, 364). They accept, however, that the term went on to become generically associated with any form of interview involving more than one person. Indeed, Punch and Oancea (2014, 186) describe the terms "focus group" and "group interview" as being used "more or less interchangeably", and associate both with approaches where the researcher is "facilitating, moderating, (and) monitoring", rather than simply conducting a straightforward question and answer session. Kamberelis and Dimitriadis (2011, 545) provide further evidence of this interchangeability, stating that "(b)asically, focus groups are collective conversations or group interviews". Gibbs (2012, 190) attempts to distinguish between the two, contending that in focus groups, there is greater emphasis on the views or opinions produced through the interactions of groups of people, rather than gathering the opinions of individuals *within* a group. I would, however, contend that any interview or discussion conducted in a group, regardless of whether it is labelled a "focus group" or a "group interview", has the potential to become representative of group rather than individual opinions (Bagnoli and Clark 2010, see also 5.2.2).

The choice to use the term "focus group" came down, ultimately, to personal preference. "Group interview", to me, implies a rather limited "question and answer" format. As will be detailed in this chapter, focus groups used in this study encompassed a variety of methods eschewing this traditional format, including guided tours of school grounds, photo elicitation techniques, and discussion facilitated by flashcards drawn

from participant-observation and situational maps. "Focus groups", for me, worked better as an all-encompassing term.

5.2.2. Why focus groups?

The use of focus groups can be seen as embodying the tension between post-qualitative methodologies, and the need to use structured methods to gather clearly-communicable 'findings', as discussed in Chapter 3. The very idea of using focus groups as a form of data collection is human-centric in that young peoples' experience of the project is placed at the centre of the enquiry. Focusing then on what those young people *say,* and what that might *mean,* is perhaps typical of the "language practices" that for MacLure (2013a), qualitative research remains overly reliant upon. In terms of Fox and Alldred's (2015, 406) orientations cited at the end of the Methodology chapter, focus groups appeared to me to be prioritising "individual bodies, subjects, experiences or sensations" over the "assemblages of human and non-human, animate and inanimate, material and abstract" favoured in a materialist ontology.

The use of focus groups, however, felt necessary in this study due primarily to the external factors outlined in Chapter 3 – namely, a perceived need to gather communicable 'findings', and the necessarily limited time spent in Polli:Nation schools. As participant-observation progressed and the end of the school year drew closer, I could see that the questions I wanted to ask young people would not simply arise spontaneously. The access I already had to Polli:Nation schools, to me, provided a great opportunity to ask those questions directly through focus groups. Also, on a purely practical level, it was a requirement of this funded research project that I visited schools in England, Wales and Northern Ireland, and limited time and budget meant that these would be one-off visits. Focus groups provided a structured but still flexible way to engage with young people in these schools, and to address my key questions.

In further justification of focus groups, given this study's emphasis on *young people's* perspectives, I considered it important to gain these directly, thereby at least de-centring my own perspective as researcher. This may not in itself address the need to give greater prominence to more-than-human elements, yet even if focus groups *did* remain human-centric, then at least the human understanding of the situation was not restricted

to my own perspective. As mentioned in the previous chapter, my own fundamental difference from the young people in this study meant that I could never fully gain 'their' perspective. Focus groups, I felt, at least gave young people the chance to talk about the project from their own perspective, through activities (outlined in section 5.4) that facilitated discussions that would almost certainly not have occurred had I only used less structured, more 'open' methods.

My choice to use focus groups rather than *individual* interviews with young people stemmed from a desire to involve as many as possible of the young people with whom I had already carried out participant-observation. In practice, given the small group sizes that were typical in the Polli:Nation project (see Chapter 6), focus groups did enable me to engage with almost all young people who had been a regular part of my participant-observation sessions. I also felt that, since these were often the groups in which young people had been carrying out Polli:Nation activities, they would be more comfortable speaking to me as part of those groups. In short, I had become used to engaging with them in these groups, and as a result, speaking to them in those groups felt like a logical course of action.

It was only later that I engaged more fully with the debates around the "collectivistic" nature of focus group data, as discussed by Bagnoli and Clark (2010, 103-4). Discussion surrounds whether focus group data represent a collection of individual attitudes and opinions, or whether interaction of participants results in emergent views not attributable to one individual. In any case, the authors contend that in focus groups, "(i)t is the interaction between participants, rather than between participant and researcher, that generates data", as participants are able to question one another (103). Punch and Oancea (2014, 186), similarly conclude that while individual views can be obscured in focus groups, discussions taking place in a group can also bring certain aspects of a situation to the fore that would not have emerged otherwise. I refer again to these considerations, and the "research assemblage" they helped create, when reporting on focus group data in Chapter 8 (section 8.5).

5.3. Before focus groups

This section firstly describes the processes by which I selected schools and pupils as focus group participants. It then explores the considerations that enabled me to mitigate some of the tensions that arose when using a structured method such as focus groups in combination with new materialist theories.

5.3.1. Selection of schools

The eighteen schools in which I carried out focus groups can be split into two "strands". The first of these strands consisted of the majority of the schools in Scotland in which I had already carried out participant-observation – hereafter referred to as "Strand A". The second strand consisted of schools to which I made one-off visits, mostly in England, Wales and Northern Ireland – referred to as "Strand B". The ways in which schools within each strand were selected are described in turn below. While the structured data collection methods employed were similar in both strands, I expected there to be noticeable differences in terms of my engagement with pupils in each, given that I had spent considerable time conducting participant-observation in the schools in Scotland, but had not met the pupils in England, Wales and Northern Ireland prior to carrying out focus groups. Nonetheless, responses of pupils in Strand B still proved insightful for this research.

Strand A – Schools previously visited in Scotland

Seven of the initial twelve schools in which I had already carried out participant-observation (see section 4.2.2 for selection of these) were selected. The five schools that were not selected were deemed unsuitable because three of them did not engage with the Polli:Nation project beyond initial visits by the LTL facilitator (1a, 3a and 3b), while the remaining two were too far away to justify the time and expense of travel (4a and 4b).

Strand B – One-off visits

A requirement of the evaluative element of the research was engagement in person with participating schools in each of England, Wales, Scotland and Northern Ireland, and my selection of these schools began with this in mind. Following this requirement would achieve geographical spread across the country in terms of engaging with schools.

Within the schools chosen, as with initial selection of the schools in Strand A, I aimed for "balance and variety" (Stake 1995) across a number of criteria. These criteria are explained below.

Criteria 1-2: Geographical spread, and spread across primary/secondary:

I began with the aim of selecting one Primary and one Secondary school in each of England, Wales and Northern Ireland.

Criterion 3: Being 'active'/of interest within the project:

I chose one of the schools in each UK region through recommendations from the relevant facilitator – each of whom had regular contact with a number of schools. On a practical level, since these were one-off meetings with pupils, it was important that there had been sufficient Polli:Nation activity in the school for them to talk about. I therefore needed to engage with schools that had been particularly 'keen' or 'active' within the project, and the facilitators could point me towards these. In essence, this was the same as the sampling strategy used in Strand A – schools whose involvement in the project was "assembled" in a stand-out manner. These stand-out features could be similar to those sought after for the Strand A schools.

Due to limited time and budget, the other school in each UK region would be chosen for its geographical proximity to the first (although in practice, it was often a whole "cluster" that was recommended by the facilitator, so these schools often had similar stand-out features to the other).

Criterion 4: Convenience/opportunism:

I also made opportunistic visits to three further schools that were additional to the criteria described above. Schools 12a and 12b were recommended to me by one of the LTL facilitators as being active within the project and willing to participate in focus groups, and were located such that I could visit them on my way home from visiting schools in Wales (11a and 11b). I also made a one-off visit to one further Scottish school – 13a. Through ongoing conversations with the relevant facilitator, this school had emerged at a later stage as having been uniquely active within the project, owing largely to a teacher who had been temporarily employed in a purely outdoor learning-focused role. It would also have been slightly too far from home to allow regular visits.

These unique characteristics led me to contact that teacher and arrange a one-off visit to carry out a focus group and teacher interview.

5.3.2. Selection of pupils for focus groups (and gaining consent)

In each school, I aimed for groups of around six pupils, following recommendations by Gibbs (2012) and others as to the most suitable numbers of young people with whom to carry out a focus group. I sent an email to teachers around a week in advance of my visit, asking them to select a group of pupils conforming to the criteria explained below.

Criterion 1: Active involvement in Polli:Nation:

Clearly, pupils needed to have participated in a significant number of activities relating to Polli:Nation in order to be able to talk about the project in a focus group. In reality, in most cases this proved to be the only selection criterion I needed. As will be further highlighted in Chapter 6, Polli:Nation activities tended involve small groups of pupils. These were, in most cases, the same group of pupils working repeatedly on the project. These small groups were often the only pupils who had been 'active' within the project, or at least by far the *most* active in their school. The selection was therefore nearly always done for me at this stage. In some cases, there were slightly more than six pupils making up this Polli:Nation "group". Group sizes, however, were always between four and eight pupils. In the one case where a whole class had been equally involved in the project (School 2b), I simply involved all of them, carrying out three focus groups in that school. I ensured a spread of boys and girls across all three groups (see Table 5a).

Criteria 2-3: Spread across age and gender:

In my emails to teachers in advance of the focus groups, I asked them to, if possible, ensure a spread of age and gender across each group. In reality, as discussed above, the selection in each school was simply "the Polli:Nation group". With gender, whether each school had done so consciously or not, these groups were usually made up of a roughly even spread of girls and boys. There was slightly less diversity in terms of age, however. From the outset, Polli:Nation had been mostly aimed at upper primary and lower secondary pupils, with aiding transition to secondary school being one of its secondary aims (LTL 2014). Most commonly, then, pupils were either in the top two years of primary school or the bottom two of secondary school (aged between 9 and

13). A spread of ages occurred where pupils were part of an after-school club or extra-curricular group (although usually only across two or three year groups).

Table 5a gives a summary of all focus groups: the schools in which they were carried out and their geographical spread, as well as the spread across gender and age among the participating pupils.

#	Date	School	Nation	School type	Girls	Boys	Total pupils	Year group/s*
1	30/3/17	8a	England	Secondary	4	4	8	S3
2	30/3/17	8b	England	Primary	4	3	7	P4
3	31/3/17	8c	England	Middle	2	7	9	P7
4	26/4/17	9a	N.Ireland	Primary	4	3	7	P6
5	27/4/17	9b	N.Ireland	Secondary	4	2	6	S3 – S6
6	3/5/17	10a	England	Secondary	4	2	6	S2
7	4/5/17	11a	Wales	Primary	6	5	11	P4 – P7
8	4/5/17	11b	Wales	Primary	2	4	6	P5 – P6
9	5/5/17	12a	England	Primary	3	3	6	P6 – P7
10	5/5/17	12b	England	Primary	5	1	6	P4 – P7
11	23/5/17	2a	Scotland	Primary	4	2	6	P4 – P7
12	24/5/17	2b	Scotland	Primary	6	2	8	P6
13	24/5/17	2b	Scotland	Primary	3	4	7	P6
14	24/5/17	2b	Scotland	Primary	2	5	7	P6
15	25/5/17	7a	Scotland	Secondary	2	5	7	S5
16	31/5/17	1c	Scotland	Secondary	1	9	10	S2
17	14/6/17	13a	Scotland	Primary	2	2	4	P4 – P5
18	14/6/17	1b	Scotland	Primary	2	5	7	P6 -P7
19	15/6/17	5a	Scotland	Secondary	4	4	8	S2
20	21/6/17	6a	Scotland	Primary	2	2	4	P6
				Totals:	66	74	140	

Table 5a (previous page): Table summarising all focus groups carried out for this study. *NB: For clarity, I use the Scottish system for numbering year groups. This ranges in primary schools from P1 ("Reception" in England and Wales) to P7 (Year 6), and in secondary schools from S1 (Year 7 in England and Wales, Year 8 in Northern Ireland) to S5 (Year 11 England/Wales, Year 12 N.Ireland).

Following the same ethical commitments as detailed in section 4.2.3, I had already gained teachers' and headteachers' consent by this point (as well as sent information sheets to parents with an "opt-out" option), and asked them to explain the purpose of my visit to pupils in advance. I then explained this myself on arrival, before gaining the necessary consent forms from pupils. Of course, I gave pupils the clear option to opt out, but this was never taken.

5.3.3. Tensions and orientations

As discussed above, I saw focus groups as a method that served to de-centre the researcher and give a 'voice' to young people, yet recognise the issues with using such a structured, human-centric method within a new materialist framing. This section outlines the steps I took in order to mitigate these tensions, whilst also maximising the extent to which the focus groups de-centred the researcher by being "participant-led". These orientations run throughout the methods I used within the focus groups, which are in turn outlined in the following section.

Iterative and flexible:

Across all twenty focus groups, there was an iterative development of effective methods. Before carrying out these focus groups, I completed two pilot focus groups in order to come up with the initial schedule. Once 'proper' focus groups were underway, however, I used my research journal after each session to reflect on any new ideas I had, or possible changes to the methodology, and made the relevant adjustments before the next focus group. Also, from a cache of possible questions and methods, I allowed for a flexible schedule that changed depending on, for example, the group, the school timetable, and the extent of my prior knowledge about their engagement with Polli:Nation.

As "participant-led" as possible:

As mentioned in the previous section, focus groups, while being an admittedly human-centric approach, nonetheless give young people a 'voice' *within* that approach. There was, however, a remaining tension between allowing the research to be "participant-led", and still keeping to the necessarily pre-determined scope of the research. Clark (2005), advocating a "Mosaic Approach" to the selection of research methods with young people, points to the importance of recognising "young children as competent meaning makers and explorers of their environment", and therefore listening to them more, letting *them* make meanings, rather than allowing adults' pre-conceived meanings to entirely determine the questions we use. She advocates "being relaxed about the focus of the study and not worrying if the children lead the study into unplanned areas" (2005, 25-26). I therefore tried to strike a balance between this approach, and my need (due to limited time with the pupils) to gather data based on certain questions. Again, the range of methods I adopted, and a flexible approach as to which of these I used, helped to achieve this balance.

Engaging with more-than-human elements:

Through the techniques described in the following section, I also sought to increase the "materiality" of the focus groups by enabling, as far as possible, an engagement with both "human and non-human" elements This served to mitigate the tension described in 5.2.2, concerning the over-emphasis in focus groups on "individual bodies, subjects, experiences or sensations" (Fox and Alldred 2015, 406). There are three key ways in which this engagement was enabled. Firstly, I often began focus groups with a "guided tour" of the school grounds and the changes that had been made to it through the Polli:Nation project. These necessarily took place outside, and as well as prompting young peoples' memories of their recent Polli:Nation experiences, also featured spontaneous encounters with other species (see following section for further rationale).

Secondly, in one activity central to the focus groups, I used photos I had taken during participant-observation sessions to elicit responses from young people. Most of these photos included more-than-human elements, and served to prompt pupils' memories of encounters with other species, and time spent in the school grounds. Thirdly, wherever possible, I remained outside after the "guided tours" to carry out the rest of the focus group, either sitting on the grass in a circle, or around a picnic bench. This was not

always possible, as it could often be cold, or raining, and any significant amount of wind would make it impossible to lay the photos and flashcards out on the ground/table. When it *was* possible, however, it enabled further openness to encounters with other species, and perhaps a less 'restrictive' feeling for young people in terms of structure and expression.

Relational maps:

As will be outlined in Section 5.5, my principal methods of analysis following data collection were firstly to identify the activities and features within the project that were commonly cited by young people during focus groups, and secondly, to create relational maps using each of these features as a starting point. These relational maps were based on the situational map produced from all participant-observation sessions. Creating relational maps of these processes/features enabled me to conceive of them not as elements existing in isolation, but as uniquely entangled with other elements within the unique assemblage comprising young people's lived experience of the Polli:Nation project.

5.4. Methods within focus groups

As outlined above, I took an iterative and flexible approach to the structure of these focus groups (a sample focus group schedule is included in Appendix 2). This section, however, describes the activities that typically comprised them. As focus groups progressed, the "flashcards" activity described in 5.4.3 emerged as the most useful in terms of eliciting insightful responses from young people, and in directly addressing the questions central to this study. In most cases, then, the order of activities within focus groups was designed in order to enable what Mannion et al. (2006, 38) call "hierarchical focusing" - that is, starting with less targeted prompts before focusing in more clearly on key questions. In this study, this meant beginning with a deliberately non-directed, pupil-led tour of the school grounds (see 5.4.1), followed by a photo elicitation activity (5.4.2), before employing more targeted questioning through the flashcards activity. These activities are now outlined in the sections below.

5.4.1. "Guided Tour" of the school grounds:

I would typically begin by inviting the pupils to give me a "guided tour" of the parts of the school grounds where they had worked on the Polli:Nation project, asking them to point out the "most important" changes they had made. These guided tours served several functions. Firstly, they simply refreshed pupils' memories, when they may not have been working on Polli:Nation-related activities for several weeks. Secondly (in Strand B schools especially), they were an "icebreaker", helping the pupils (and me) to "relax into" the focus group. Thirdly, they would enable spontaneous questions to arise – for example, pupils would point out a particular feature of the school grounds that would prompt me to ask specific questions about it. Fourthly, as mentioned in the previous section, they would enable encounters with more-than-human elements, or at least provoke memories of such encounters, thus increasing the "materiality" of the encounter. The decision to include these guided tours followed Lynch and Mannion (2016) who, albeit in reference to more structured "walking interviews" or "go-along interviews", similarly recognise the potential for such methods to attune both the researcher and participants to more-than-human elements. These encounters would, on several occasions, enable pupils to notice "responses" made by the more-than-human elements – for example, flowers growing that they had planted, or the presence of bees which were either unnoticed, or altogether absent, before. Finally, in Strand B schools, they enabled me to gain some context for what they would talk about for the rest of the session. This follows Carpiano (2009, 9), who argues that they allow for "some of the contextual insights of traditional ethnographic methods" where earlier participant-observation had not been possible.

In Strand A schools, I did not always use this method. It seemed unnecessary, for example, when I had been working with the pupils in the school grounds as recently as the previous week, or when there were time constraints. In such cases, the pupils and I already had shared experiences of the project, and I could use these to jog their memories, or provoke responses. In some cases, however, carrying out guided tours in Strand A schools proved useful in terms of jogging pupils' memories – for example, if it had been a few weeks or months since they had carried out any Polli:Nation activities.

In order to keep them as participant-led as possible, I decided not to have any particular

design or agenda for these guided tours, aside from a list of possible follow-up questions to ask when shown a significant element of the site/project. Instead, these interviews were at the initial, 'open' end of my hierarchical focusing strategy.

5.4.2. Researcher-taken photos (and follow-up questions):

Having been led around the school grounds by the pupils, we would then either go back inside to the room in which I had done my initial introduction, or in good weather, sit outside for the remainder of the focus group. Most commonly, the next stage in the hierarchical focusing process would be an activity involving photo-elicitation. This was a useful way to gain insights into pupils' experience of the project without direct questioning. It proved, however, to be more useful simply as a way of getting young people talking, therefore leading on to more focused questions.

I came to each session with a standard set of sixty printed photos that I had taken during participant-observation sessions between August 2016 and March 2017. I used the same photos in each school. I chose these photos based on trends that I saw emerging during participant-observation, and which could be captured in a photo with relative ease. I chose them roughly based on three criteria: pictures showing encounters with other species (such as close-up pictures of bees), distinctive aspects of the school grounds (such as a wildflower meadow or, conversely, an area of plant and grass-free tarmac), and common activities that had formed part of the project. Among the common activities depicted in the photos were blogging, building bug hotels, classroom learning, free exploration, planting flowers and weeding, tree planting, identifying and recording pollinators, and activities that involved planning the landscape changes to be made. I ensured that there was a spread of photos across these activities.

I would introduce this activity roughly as follows: "I have this set of photos here to help jog your memories. When I lay them all out on the table, I'd like you to pick one that reminds you of something you've done, or somewhere you've been, as part of the Polli:Nation project, that is important, special, or memorable, to you". Once pupils had selected a photo, I asked each of them in turn to describe the photo and why they had chosen it. I then had a list of potential follow-up questions that would enable me to "home in" on the central questions.

5.4.3. Flashcards activity

I introduced this method slightly later on in the iterative development of focus group (using it for the first time in focus group 4, on 26/4/2017), in response to my feeling that follow-up questions asked during the photo-elicitation activity were still not getting close enough to the central questions of this research. I laid out a collection of nineteen flashcards, each with an element that, through participant-observation and subsequent creation of situational maps, I had myself observed as being a stand-out feature of the project. Crucially, then, these were elements that had emerged through participant-observation, pertaining specifically to this project. The full list of elements listed on the flashcards are shown in Chapter 8, and the photo in Figure 5a gives an idea of what these flashcards looked like.

This activity was potentially the most researcher-centric of all the methods I used, and I did have some debate over whether or not to use it. In the photo-elicitation activity, while the photos themselves were researcher-taken, they were still open to considerable interpretation on the part of the young people. With this activity, the flashcards all came from my own observations and interpretation, and perhaps allowed for less flexibility in terms of how young people could interpret them. As will be seen in Chapter 8, however, this activity proved to be by far the most effective way of addressing the key question that the focus groups aimed to explore, and my analysis after focus groups focused entirely on young people's responses during this activity (as well as the relational maps that were produced based on these responses).

Figure 5a: Flashcards forming the key activity used in focus groups.

Before handing out the flashcards, I was careful to start this activity by asking an open question. I usually asked: "If you were in charge of a project similar to Polli:Nation, what would be the most important things to include in it?", or "What do you think are the key 'ingredients' of a project like this?" Such open questioning, however, as with the photo-elicitation method, tended not to draw particularly insightful responses. I would then introduce the flashcards, and ask participants if there were any of those elements that they considered particularly important. Using this method, the flashcards provided the prompt they needed, and pupils would then talk in far more depth about those elements. The element "working with experts from outside of school", for example, never arose as a response to my initial open question. As a flashcard, however, it was nearly always selected by at least one young person, and produced many interesting insights into why working with adults from outside the school system had been significant to them. Following the flashcard activity, I would then ask participants if - having been prompted to think of significant activities and features – they could think of any further key elements. As with the initial open question, this rarely provoked any responses.

I went on to use this method in all of my remaining focus groups, except in one case, where I thought pupils would have difficulty reading or understanding the text on the

flashcards. This was in School 5a, where the pupils had more extensive "additional support needs" than in other schools.

5.4.4. Other questions and unplanned comments

At some point during the course of each focus group (often during the questions that followed the photo elicitation activity), I ensured that a question surrounding pupils' 'learning' was also addressed. This mainly addressed the evaluation element of this research, but was also useful in addressing the research question *How do young people describe the learning that is produced by the Polli:Nation project?* (see sections 3.9 and 8.5). Additionally, there were also numerous unplanned yet insightful moments within focus groups, where a comment or response from a pupil would produce further questions or spontaneous conversations (these conversations are also discussed in section 8.5).

5.5. Teacher/facilitator interviews

As well as attempting to gain young people's own perspectives on their lived experience of the Polli:Nation project, I also interviewed the lead teacher at each of the schools in which I carried out focus groups. The "lead teacher" refers to the member of staff who had taken the most prominent role in applying to be part of the Polli:Nation project, and then facilitating it within their school. In all except three cases, it was easy to identify one teacher as being the key person to interview (over-reliance on one dedicated teacher turned out to be a key theme in the overall evaluation of the project). The exceptions were two primary schools (2a and 12a) where Teaching Assistants had taken the leading role, and a middle school (8c) in which the project had been primarily set up and facilitated by two parent volunteers with prior experience of running extra-curricular activities focused on pollinators. In these schools, I interviewed these people instead.

These interviews with teachers and facilitators were designed largely as a means of addressing the evaluative element of this research. Nonetheless, gaining their perspectives was also useful for the doctoral element of this research, for two primary reasons. Firstly, teachers, their motivations for applying to be part of Polli:Nation, and the attitude/outlook they brought to the project, were clearly key elements in any

assemblage making up young people's lived experience of it. Most commonly, they were teachers with a particular interest in outdoor learning, and/or conservation and environmental issues. In one notable case (School 1c), however, the lead teacher stated that his primary reason for applying to be part of the project was as a means of engaging his literacy-focused group of ASN pupils, rather than any particular concern for pollinators. In all Polli:Nation activities at that school, the focus was clearly on literacy, as well as teamwork and practical skills gained through making alterations to the school grounds, rather than on learning about pollinators. Secondly, asking teachers what *they* thought had been the significant elements of the project to young people helped to fill in gaps of anything important I might have missed during participant-observation. It also allowed me to confirm or check any trends I had observed.

Interviews were audio-recorded, tended to last around fifteen to twenty minutes, and covered the following areas:

- Profiling: I asked the teachers how many years of teaching experience they had, and how they had come to apply for the Polli:Nation project and be their school's "lead teacher" on it.
- Significance to young people: What, in their view, had been the most important elements of the project to the pupils?
- Challenges in facilitating the project.
- Suggested improvements for the running of the project (either in terms of small changes to be made ahead of Phase 2, or for a future, similar project).

Interviews with four project facilitators were also largely carried out with the evaluative element of the research in mind, with questions largely based around improvements that could be made, and challenges there had been in facilitating the project. They were a useful way of (usually) confirming that the trends I had observed applied across the project more widely. Again, however, facilitators, and the attitudes/perspectives they brought to the project, could be seen as part of any given assemblage. I therefore also, for the purposes of "profiling", asked them how they had come to be working in their current jobs. This usually gave an insight into their values and motivations for working in this sector. Finally, as with teachers, I asked what they thought the most significant

elements had been for young people. This, again, offered insights into what the project was "all about" for them.

I conducted four interviews with facilitators in different parts of the country. These were two in Scotland (in the same interview), one in Northern Ireland, and one in England (the facilitator covering schools in Wales was unavailable).

5.6. Analysis after data collection: Relational maps and memos

In analysing young people's focus group responses, I had three key aims. These were, firstly, simply to identify the activities and features within the project that were commonly cited by young people during focus groups, based on their selection of flashcards. Secondly, to identify the reasons pupils gave for selecting these flashcards, and any themes that cut across these. Thirdly, to analyse the relations between these key features and all other elements within the unique assemblage of the Polli:Nation project, using relational maps. The following sections outline the methods of analysis used in pursuit of these aims.

5.6.1. Key features and themes

With regard to the first of the two aims cited above, the process of analysis was simple. In order to identify the features and processes that were commonly cited by young people, I simply listened through each focus group, and noted down the flashcards that had been selected. The second aim cited above was the identification of pupils' reasons for selecting these flashcards, and of any themes that characterised their responses. This I did firstly by listening through the audio recordings of my focus groups and transcribing pupils' responses. I then arranged these responses under headings based on each of the flashcards - for example, all the responses relating to the flashcard "working with experts from outside school" were clustered together. I did this using NVivo 11. This would amount to only a small amount of written data to analyse. As Chapter 9 will highlight, the highest number of times a given flashcard was selected was thirteen (see table in section 8.3.1), and the reasons given by pupils would typically amount to no more than a few sentences. Picking out themes, then, was a simple thematic coding approach (Gibbs 2007; Robson 2011) based on small numbers of clustered responses.

My principal aim in the analysis of focus group data, however, is explored in the following sub-section.

5.6.2. Relational maps

When creating situational maps after participant-observation, I had made a few early relational maps as a means to provoke new thinking. It was once all focus groups and participant-observation was complete, however, that relational maps became most useful as a method of analysis. Relational maps do not constitute a new map as such – they are created by drawing lines between elements on an existing situational map in order to explore the relations between these elements. The researcher takes one element of the map, and beginning with this element, traces its relationship with each other element in turn (Clark, Friese, and Washburn, 140). The process is then begun again with another element as the starting point. In this case, then, I began with the final situational map displayed in the following chapter (Figure 6a), and from this, produced separate relational maps for - for example - "external/visiting experts", "practical conservation tasks", and "human/more-than-human encounters". I did this either by printing out the A3 situational map and hand-drawing lines between elements, or creating new Word documents and drawing these lines electronically. When "reporting research" (Fox and Alldred 2017), I chose to focus in particular on the elements that had been most commonly cited by young people during focus groups, as will be seen in Chapter 8. Figure 5b below displays one of the electronically-produced relational maps created during the analysis process.
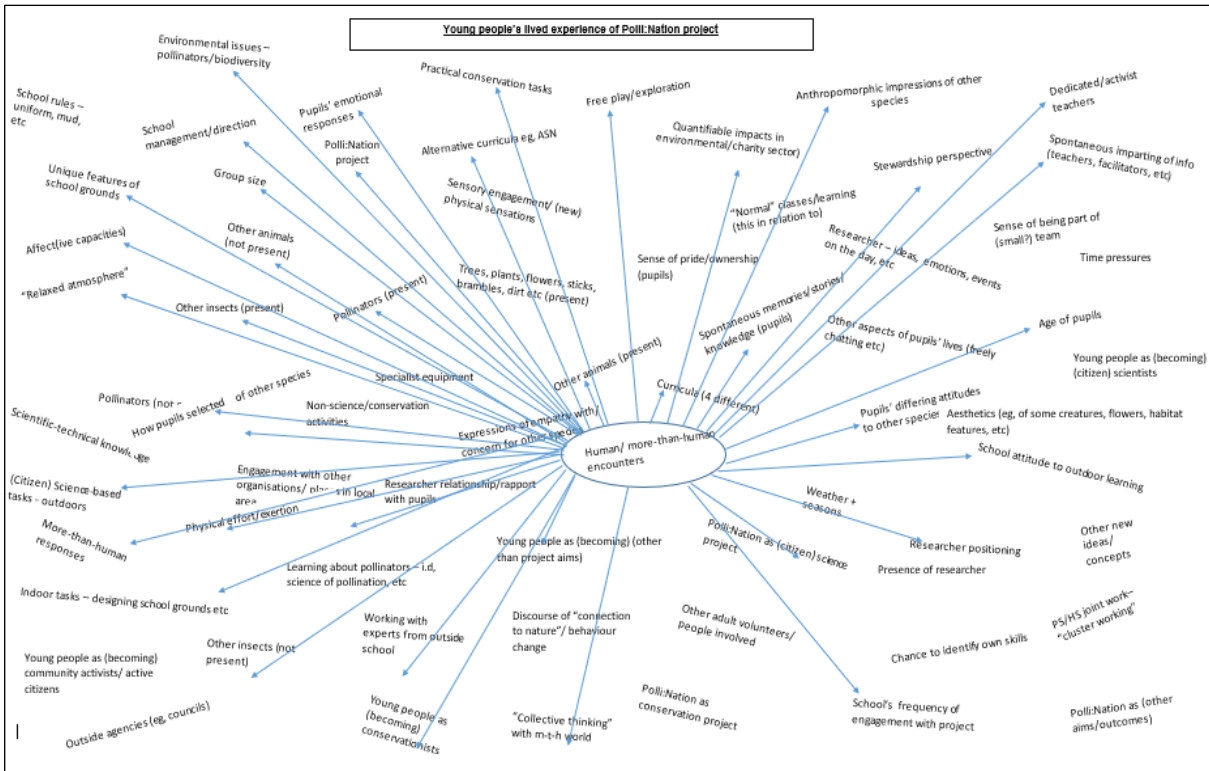
Figure 5b: Relational map beginning with "human/more-than-human encounters" and tracing their relations to other elements within the assemblage.

5.6.3. Memos

Following Clarke, Friese, and Washburn (2017), "memoing" was also key in the process of creating relational maps. I created memos simultaneously to the maps – that is, when drawing a line between two elements on the map, I simultaneously made notes detailing my thoughts on the relations between these elements. An extract from the memo produced simultaneously with the relational map in Figure 5b is included in Appendix 3.

Creating relational maps of each "significant process or feature" identified in my situational maps and by young people in focus groups (for example, "working with experts from outside of school", "close-up encounters with other species"), and simultaneously memoing about their relationships with other elements, enabled me to characterise each element not as a singular process occurring in isolation, but as part of a unique assemblage created through the Polli:Nation project. That is, one that also included (for example) a perceived "relaxed atmosphere", a small group with a specific

purpose, practical conservation tasks, and possibilities for close-up encounters with other species.

5.6.4. Social worlds/Arenas maps

Social worlds/arenas (SWA) maps build upon situational maps in laying out "all the major groups, organisations and other *collective* actors, and portray their relative sizes and key relations" (Clarke, Friese, and Washburn 2017, 104, emphasis in original). In short, they are a way of grouping the elements identified in situational maps into particular "social worlds", within an identified "arena". In the case of this study, the "arena" is the Polli:Nation project, which acts as an example of different "social worlds" coming together. These social worlds include what I labelled "formal education worlds", "charity worlds", and "more-than-human worlds". SWA maps have a different theoretical lineage to situational and relational maps, being influenced by theories of "social worlds" put forward by proponents of grounded theory such as Strauss (1978) and Becker (1982) (see Clarke, Friese, and Washburn 2017, 71-75), and therefore having fewer clear links with new materialist theories. Consequently, there are perhaps even greater tensions associated with categorising elements into certain "social worlds".

My principal reason for creating SWA maps was adherence to Clarke, Friese, and Washburn's (2017, 361) advice to use all three types of map in order to engage as fully as possible with the "situation broadly conceived". Creating the map, however, proved useful (if not essential) as a means of illustrating the different human and more-than-human elements that came together in the curriculum making process enabled by the Polli:Nation project. The final SWA map produced for this research is shown in Chapter 8, which explores this curriculum making process.

5.6.5. A note on positional maps

Positional maps are the third type of map created in the Situational Analysis process, and are used to "lay out the major positions taken on issues in the situation – topics of focus, concern, and often but not always contestation" (Clarke, Friese, and Washburn 2017, 165). These maps are presented as two axes, with positions taken on a particular issue placed in relation to these. An example provided by Clarke, Friese, and Washburn (2017, 169) has "importance of clinical efficiency in hospital nursing care" as one axis,

and "importance of emotion work in hospital nursing care" as the other. I did not find these maps useful for this study, primarily because I was not dealing with issues of "contestation", nor looking to identify particular "positions" or opinions that young people held at any one time.

5.7. Summary

This chapter has described the focus groups I carried out with young people participating in the Polli:Nation project, and the relational maps that served as my principal method of analysis once these focus groups (and participant-observation) were complete. The activities comprising these focus groups were closely informed by observations made during the participant-observation sessions preceding them. I began this chapter by introducing the term "focus group" and its origins, then outlining my rationale for using focus groups, and the process by which I selected participating schools and pupils. I also highlighted the tensions when using focus groups when attempting to carry out research in a manner sensitive to new materialist theories. These include their inherent tendency to centre on human experience and meaning-making, as opposed to using assemblages as a starting point for research (Fox and Alldred 2015). There is also a further tension *within* this human focus - the balance between attempting to be pupil-centred (Clark 2005) and addressing questions directly without being too researcher-centred. Having identified these tensions, I have also outlined the steps I took to mitigate them. These include using a "hierarchical focusing" strategy when designing the order of activities within focus groups (Mannion et al. 2006), as well as employing techniques that aim to increase the "materiality" of these focus groups. These include guided tours of the school grounds (Carpiano 2009; Lynch and Mannion 2016), as well as elicitation activities using photos of material elements of the project (Mannion et al. 2006).

Importantly, relational maps also serve as a means of mitigating these tensions, in that they enabled me to conceive of the significant activities and features identified by young people as being uniquely entangled with other elements within the assemblage that comprised young people's lived experience of the Polli:Nation project. In this chapter, I have also outlined the process by which these relational maps were created

based on young people's focus group responses, using the situational maps already created after participant-observation.

6. Setting the Scene: Activities and Features within Polli:Nation

6.1. Introduction

In this chapter, I provide an overview of what the Polli:Nation project looked like in practice, with reference to project resources such as the Polli:Nation Activity Plan (LTL 2014), and the early stages of my own participant-observation. This serves as an important contextualisation before the two 'findings' chapters that follow, and therefore addresses the first of this study's key research questions: ***What are the common activities and features within the Polli:Nation project?***

Throughout this and the remaining chapters, I will refer frequently to the situational map I had created in May 2017, having completed all participant-observation sessions. By way of introduction, this map (Figure 6a) is shown in the following sub-section (6.2), and can be referred back to as I describe the process by which I identified the elements comprising it. Having provided a reminder of the general structure of the project (section 6.3), the remainder of the chapter describes the project's common activities and features in three sections. The first of these (6.4) describes the key *activities* taking place within the project, such as carrying out practical conservation tasks and conducting biodiversity surveys. This is followed by sections highlighting the key discourses and ideas that appeared to be underlying the project (6.5), such as a "stewardship" perspective on human-environment relations (Taylor 2017); and outlining the stand-out features of the project in terms of its position in relation to school timetables and curricula (6.6), including the tendency for pupils to be working in small groups, often outside of the core subject-based curriculum.

Having identified and explored these common activities and features in this chapter, the following chapter then explores the processes by which curricula were produced during the Polli:Nation project. These processes can be seen as cross-cutting the activities and features outlined here.

6.2. Situational map

Figure 6a depicts the situational map I had produced by May 2017, once all participant-observation sessions were complete. In producing the map, I drew upon participant-observation sessions in Polli:Nation schools taking place over a seven-month period, and the fieldnotes thereby produced. This was an incremental process that took place over thirty participant-observation sessions in twelve Polli:Nation-participating schools in Scotland (as outlined in the Chapter 4). This map can be referred back to throughout this and the following chapter, as I account for the process by which I identified the elements comprising it. In order to clearly illustrate the ways in which these elements were identified, in the subsequent descriptive text and section sub-headings, each element appears in bold and italics. For example: ***Practical conservation tasks.***

Following new materialist theories, I conceive of this map as a depiction of the unique, situated assemblage comprising young people's lived experience of the Polli:Nation project. This and the following chapter are intended to provide a form of the "thick description" (Geertz 1973) that is intended to account for the processes by which I identified the elements making up this assemblage. Through this, I hope to produce a sense of entanglement that begins to highlight the relations between elements within this assemblage. This lays the foundations for Chapter 8, in which I take the significant processes and features most commonly identified by young people in focus groups, and through relational maps based on the map shown here, explore in greater detail the ways in which these are entangled with other elements within this unique assemblage.

Accounting for this process is in keeping with the position taken by Clarke, Friese, and Washburn (2017, 35), that the inescapable situatedness of the researcher lends a particular importance to researcher reflexivity. It also follows Fox and Alldred's (2017) advice to consider the affects produced by the "research assemblage" (see section 3.8).

Figure 6a (Overleaf): Situational map produced after thirty sessions of participant-observation in Polli:Nation-participating schools

Young people's lived experience of Polli:Nation project

Environmental issues – pollinators/biodiversity

Dedicated/activist teachers

Spontaneous imparting of info (teachers, facilitators, etc)

Anthropomorphic impressions of other species

Free play/ exploration

Quantifiable impacts in environmental/ charity sector

Stewardship perspective

Sense of being part of (small?) team

Time pressures

Age of pupils

Young people as (becoming) (citizen) scientists

Researcher – ideas, emotions, events on the day, etc

"Normal" classes/learning (this in relation to)

Other aspects of pupils' lives (freely chatting etc)

Pupils' differing attitudes to other species

School attitude to outdoor learning

Aesthetics (eg, of some creatures, flowers, habitat features, etc)

Other new ideas/ concepts

P5/HS joint work– "cluster working"

Chance to identify own skills

Polli:Nation as (other aims/outcomes)

Practical conservation tasks

Pupils' emotional responses

Polli:Nation project

Alternative curricula eg, ASN

Sensory engagement/ (new) physical sensations

School attitude to "outdoor learning"

Sense of pride/ownership (pupils)

Spontaneous memories/stories|

Spontaneous knowledge (pupils)

Scottish Curriculum for Excellence

Other animals (present)

Human/ more-than-human encounters

Other environmental issues (learning about/engaging with)

Polli:Nation as (citizen) science project

Presence of researcher

School's frequency of engagement with project

Trees, plants, flowers, sticks, brambles, dirt etc (present)

Specialist equipment

Telling others about the project (blog/, assembly etc)

Researcher positioning

Weather + seasons

Other adult volunteers/ people involved

Polli:Nation as conservation project

Researcher relationship/rapport with pupils

Expressions of empathy with/ concern for other species

Young people as (becoming) (other than project aims)

Discourse of "connection to nature"/ behaviour change

"Collective thinking" with m-t-h world

School rules – uniform, mud, etc

Unique features of school grounds

Affect(ive capacities)

School management/direction

Group size

Other animals (not present)

pollinators (present)

Parent helpers

Engagement with other organisations/ places in local area

"Relaxed atmosphere"

Other insects (present)

Scientific-technical knowledge

Utilitarian view of other species

Pollinators (not present)

(Citizen) Science-based tasks - outdoors

How pupils selected

Physical effort/exertion

More-than-human responses

Indoor tasks – designing school grounds etc

Learning about pollinators – i.d, science of pollination, etc

Other insects (not present)

External/visiting experts

Young people as (becoming) conservationists

Young people as (becoming) community activists/ active citizens

Outside agencies (eg, councils)

6.3. Project beginnings and overall structure

Before highlighting the common activities and features of Polli:Nation with reference to participant-observation, I provide a brief overview of the way the project was set up and organised. This is a re-cap of the background to the project given in Chapter 1, to which several other relevant details are added.

The twelve schools in which I carried out participant-observation were selected from a total of 260 schools from across the UK participating in the Polli:Nation project. These comprised 203 primary schools, 41 secondary schools, and 16 other establishments, including nurseries, special schools, and extra-curricular youth centres. The schools were spread across the four nations of the United Kingdom, with 33 in Wales, 136 in England, 59 in Scotland and 32 in Northern Ireland.

Schools had gone through an application process in order to be part of the project, during which they were treated not as individual applicants, but as part of "clusters". Clusters consisted of four schools, usually within the same town or local area. Each cluster had a "lead school", and each school had a "lead teacher" - often the teacher who had completed the initial application. Schools within clusters that were chosen to be part of the project gained a budget of £800 to spend on resources related to the project, and the support of a member of staff from Learning through Landscapes (LTL) or its "accredited network" (meaning either freelance staff approved by the organisation, or staff from other organisations who carried out occasional work for LTL). The staff delivering the majority of Polli:Nation sessions consisted of four "Project Officers" employed by LTL, who between them covered a large proportion of the schools across the country, and a number of part-time "facilitators" covering the rest. Of these facilitators, two were employed by LTL (with Polli:Nation being only part of their role), and the rest were part of LTL's accredited network. I refer to these staff members as "facilitators" or "LTL facilitators" throughout this and the following chapters.

LTL facilitators were each assigned a number of schools to work with, meaning that schools' and young people's engagement with LTL would be exclusively through this facilitator. Engagement with schools by LTL facilitators was split into two "phases" - Phase 1 taking place between June 2016 July 2017 (and during which this research was

carried out), and Phase 2 between August 2017 and July 2018. Within each cluster, the facilitator would engage principally with two of the four schools during Phase 1, and the other two during Phase 2.

During each of these phases, LTL facilitators were contracted to run a number of largely standardised activities with schools, as detailed in the following section. Hence, although this chapter only evidences activities that took place within the schools in which I carried out participant-observation, many of them were run in all 260 participating schools. Similarly, through interviews with LTL facilitators, as well as focus groups and teacher interviews carried out in a further eleven schools, I was able to confirm that many of the common features (such as small group sizes and the project's position on the fringes of the curriculum) pertained to a greater number of schools than those in which participant-observation was carried out.

6.4. Common activities

This section details the common activities making up the Polli:Nation project. As highlighted in the previous section, a number of these were standardised activities run by LTL facilitators, outside of which schools were then encouraged to carry out their own Polli:Nation-related activities. As this section will show, although there was considerable variation in activities later on in schools' participation in the project, there were also activities that took place across all or most schools. These activities are all accounted for in this section. The headings of the following sub-sections all refer to elements in the situational map in Figure 6a.

6.4.1. *(Citizen) science-based tasks – outdoors*

This element refers principally to the "baseline surveys" that were carried out in all schools as the first of the standard LTL-led activities during the project. Baseline surveys were the principal activity referred to in the Activity Plan as "identifying and recording the natural heritage", and as noted in the Literature Review, provided an example of a "contributory" citizen science project (Wiggins and Crowston 2011). The surveys took place between June and August 2016, and involved the collection of "baseline" data for the Polli:Nation survey designed by staff from the project's partner organisations. The baseline surveys worked as follows: Under the guidance of the LTL

facilitator, a group of young people conducted a survey of a small part of their school grounds (ten square metres), in order to record its suitability for pollinators at the beginning of the project. With the aid of resources produced by LTL and partner organisations – a survey booklet, and quick-reference identification guides for plants, flowers, pollinators and habitat types - the pupils initially produced a rough map of the chosen site setting out the different types of habitat present (for example, rough grassland, flower-rich meadow, and cut grass), and then identified the different pollinator-friendly plants within the site. Finally, in at least three different areas of the site, pupils placed a one-metre-squared quadrat on the ground, and counted the number of pollinators or other insects that landed within in, or passed over it, in a two-minute period. The aim was for this survey to be carried out again at the end of the project, in order to measure the benefits of the grounds development work that had been carried out. The data collected was entered into a database managed by OPAL at Imperial College London. In a few cases, pupils and lead teachers also carried out the same survey on several more occasions during the intervening two academic years.

6.4.2. *Learning about pollinators – i.d, science of pollination, etc.*

Baseline surveys were usually preceded by a general introduction to the project presented by the LTL facilitator. These took place indoors using a Powerpoint presentation, and usually covered the science of pollination and its importance for food growth and biodiversity, the issues facing pollinators and their causes, the identification of different types of pollinators (the "i.d" referred to here), and an introduction to suitable habitat types for pollinators. In a few cases, pupils also took part in further scientific learning about pollinators, usually facilitated by their school's lead teacher.

6.4.3. *Indoor tasks – designing school grounds etc.*

This refers to the next standard sessions to be run in schools once the baseline surveys were complete – referred to as "Making Changes" and "Explore Your Grounds" workshops. "Making Changes" workshops took place in one of the Phase 1 schools, but usually involved pupils from all four schools in each cluster *(PS/HS joint work – "cluster working")*. The LTL facilitator began each session by (re)introducing pupils to the different types of pollinators and their importance, the different types of habitat and their suitability to pollinators, and to some of the landscape changes that can be made to

encourage more pollinators - for example, installing grass roofs, building bug hotels, planting flowers to create wildflower meadows. The group would then walk around the school grounds, taking a more detailed look at the kind of habitats there, and think about ways they could transform them into more pollinator-friendly habitats. Back inside, the groups then created a plan of their "dream Polli:Nation school grounds", representing all the changes they hoped to make in this, or their own, schools. These sessions took place in both Phase 1 and 2 schools, in September and October 2016.

In "Explore Your Grounds" workshops, which took place in each individual school, pupils were helped to make more detailed plans as for making the desired changes to *their* school grounds specifically. The plans were usually made under the simple headings "What", "When", "How", "Who" and "How much?" These sessions took place in Phase 1 schools in October and November 2016, and in Phase 2 schools in October and November 2017.

6.4.4. *Practical conservation tasks*

This refers to the wide range of changes to school grounds that were carried out after the standard sessions described above. These changes comprised the "conserving and restoring the natural heritage" referred to in the Activity Plan (LTL 2014). The facilitator-led sessions described above were intended to provide schools with a starting point for the project, from which teachers could then build further activities into their school's curricular and extra-curricular activities. Having run all of the sessions described above, however, the facilitators were still contracted to assist each school with one "grounds development day". This would usually be scheduled for spring (between February and April), and the facilitator would come and help the group carry out some of the landscape changes that had been planned in the previous workshops. These, then, took place for at least one day in all participating schools. In many schools, however, practical conservation tasks would extend beyond this one day. Examples of tasks I encountered during participant-observation sessions included planting pollinator-friendly flowers in school grounds, planting fruit trees, digging and then filling a new pond, building and then filling "planters" made from wooden pallets, and creating "bug hotels" of various sizes and types – ranging from small ones made from plastic bottles, to large ones made from wooden pallets.

6.4.5. Other sessions run by *external/visiting experts*

I had included *external/visiting experts* in my situational maps from the first participant-observation session. Initially, this had referred only to the facilitators from LTL who had run the standardised sessions at the beginning of the project. Later, however, lead teachers in some schools arranged visits from other external experts as part of the project. These included a session on building small bug hotels from plastic bottles run by a member of staff from the conservation NGO Buglife, and a session on building wooden planters in which to plant flowers with a local woodworking/landscaping expert (both School 1b), as well as a visit from a local beekeeper (School 7a). Pupils in the schools in which I carried out focus groups (see Chapter 8) also referred to sessions run by visitors other than LTL staff. These included working with a local graffiti artist to create pollinator-themed artwork (School 10a), as well as sessions run by other local wildlife and conservation charities (various schools).

6.4.6. *Engagement with other organisations/places in local area*

While Polli:Nation activities took place primarily in school grounds, there were also schools in which the project was tied in with excursions to places both locally and further afield. These included a visit to a nearby orchard, in which pupils were told about fruit trees and the advantages of locally-grown fruit (School 1b), and a visit to Kew Gardens in London (School 8c). There were also occasions where existing partnerships with other organisations in the local area were incorporated into the Polli:Nation project. These included pupils planting flowers in their local railway station (School 1b), and continuing to use an allotment in the grounds of a local college (School 2b). Other examples of engagement with organisations outside of schools included pupils writing to local businesses asking for donations, such as car tyres (to plant flowers in) from a garage, and plants and flowers from a garden centre.

6.4.7. *Telling others about the project (blog, assembly, etc.)*

As will be discussed in Section 6.6.2, there was a tendency for Polli:Nation activities to involve small groups of pupils who had either elected, or been selected, to be part of a dedicated "Polli:Nation team". There were numerous examples of these pupils then reporting back to the rest of the school on the work they had been doing, usually in

Assembly. For the "Polli:Nation team" at School 1b and their lead teacher, speaking in front of a large number of other pupils and teachers was cited as a particularly important aspect of the project that served to increase these pupils' self-confidence. Another aspect of this was the blog space on the Polli:Nation website that each school was given. Lead teachers had administrative access to this, and pupils were invited to write about the Polli:Nation activities they had participated in. Across the project as a whole, this was a very under-used resource, but there were some schools in which the blog was seen as being central to certain schools' aims within the project. These included School 1c, whose lead teacher had conceived of the project largely as a means of working with a particular group of pupils to improve their literacy (explored further in section 7.3.2). In this case, the Polli:Nation project gave these pupils a topic to write about, as well as an audience for whom to write it (this included writing letters to local businesses as described in the previous section, as well as blog posts).

6.5. Underlying discourses/ideas – the "curriculum-as-plan"

For Clarke, Friese, and Washburn (2017, 17), situational maps are intended to account for the "situation broadly conceived", which may include any "human, nonhuman, discursive, historical, symbolic, cultural, political, and other elements in the research situation of concern". In the case of Polli:Nation, I took this to mean not only the project itself, but also the discourses and key ideas underlying it, the wider charity sector through which it was funded and administered, and the political-economic context in which that charity sector operated (Lloro-Bidart 2016). Before commencing participant-observation, I gained a sense of these through reading the Polli:Nation Activity Plan (Learning through Landscapes 2014) and some of the content on the Polli:Nation website, as well as through informal conversations with project staff.

It is important to distinguish the ideas identified here from those explored in the following chapter (sections 7.3.1 and 7.3.2). The discourses identified in this section can largely be seen as what Aoki (1993a) referred to as the "curriculum-as-plan" (see 3.4.1) – that is, the foundations on which the project, and its constituent activities, appeared to be designed. I did not perform any systematic discourse analysis in order to identify them – I was simply following the commitment in Situational Analysis to identify all elements "of concern" to the research situation. During participant-

observation, through responding to theoretically-sensitive questions that drew upon the Deleuzian notion of "concepts" (see 4.3.5), I continued to pay attention to the ways in which underlying ideas were manifested in project activities, as well as to identify other ideas that emerged through these activities. It is important to re-emphasise that these concepts were "invented in practice" (Semetsky 2015) – that is, always undergoing some form of "becoming". These concepts can be seen instead as elements of "lived curricula" (Aoki 1993a), and are explored in the following chapter. I recognise, then, that the discourses outlined below were not fixed, but nonetheless appeared identifiable at the beginning of the project.

6.5.1. *'Connection to nature'/behaviour change, Stewardship perspective,* and *Environmental issues – pollinators/biodiversity*

In the Literature Review, I explored research that had highlighted some of the key ideas and discourses commonly underlying outdoor learning and environmental education initiatives, and considered how these might be reflected in the aims and proposed activities of the Polli:Nation project. One notable discourse was a perspective that places humans in a position of "stewardship" over their environment (Taylor 2017). This perspective, in Taylor's (2017) strong critique, operates from the premise that "humans have exceptional capacities, not only to alter, damage or destroy, but also to manage, protect and save an exteriorized (non-social) environment" (1453). Accordingly, the environment is positioned as "the passive object of human knowledge/needing human care and protection" (1452). The curriculum-as-plan underlying Polli:Nation clearly reflected this premise, with young people initially collecting data through a biodiversity survey, which then steered them towards changes that they themselves would need to make to their school grounds in order to attract more pollinators.

Another key underlying discourse was the perception of children's loss of 'connection to nature' (Malone 2016; Fletcher 2017; Arvidsen 2018). Linking these is the idea of a linear development trajectory from immersion in nature from a young age to the (re)creation of "budding young environmental stewards" (Taylor 2013, 117). In the midst of reading this literature, I was reminded of the following quote from the Polli:Nation Activity Plan, previously cited in the Literature Review chapter. In

summing up the overall aims of the project, the quote seemed to me to encapsulate the two related discourses discussed here.

"As the future custodians of our natural heritage there is a need to change the attitudes and/or behaviour of children and young people. This can be achieved by engaging them in their natural heritage and by developing the skills of those supporting them. The Polli:Nation project is a response to the decline in the abundance and diversity of pollinating insects in the UK…" (LTL 2014, 3).

6.5.2. *Utilitarian view of other species*

Related to the "stewardship" perspective cited above was the utilitarian view of other species underlying the project. With Polli:Nation, this perspective was most clearly expressed through the presentation of pollinators (in the Activity Plan and elsewhere) as performing an ecological function that is 'useful' to humans. In further indication of the socio-economic context in which the project has gained its funding, there is even quantification of the value of pollinators to the UK economy. The very first paragraph in the Activity Plan justifies the project thus:

"'Free' pollination by bees and other insects is worth over £400m to UK agriculture each year (UK National Ecosystem Assessment, 2011) and is crucial to the maintenance of our natural heritage, but pollinating insects are in severe decline" (LTL 2014, 1).

6.5.3. *Quantifiable impacts in environmental/charity sector*

As also highlighted in the Literature Review, there was a clear belief underlying the project that behaviour change and the success or otherwise of the project could be measured. When reading through the Activity Plan, I was struck by the quantifiable and measurable nature of many of the project's other proposed outcomes, which included "5,000 children, volunteers and community members will have participated in survey activities and improved their identification skills", and "1,040 teaching and non-teaching school staff report overcoming barriers to teaching outside and in the natural environment" (LTL 2014, 39). This reminded me of my previous experience working in the charity sector, and my impression that charity funding was becoming increasingly

characterised by short-term "project funding" for which charities competed, and which required the evidencing of quantifiable 'impacts' within limited timeframes.

6.5.4. *Scientific-technical knowledge*

"Scientific-technical knowledge" is a term used by Karrow and Fazio (2010, 203) to describe the form of knowledge that was most valued within a particular citizen science project – enacted through activities requiring correct identification of specimens, and following standardised procedures to count them. In Polli:Nation, the prevalence of this form of knowledge was demonstrated by the standardised process by which the survey was carried out – for example, filling in standardised forms including a grid-patterned plan of the site, and counting pollinators within a set one-metre-squared area for a set amount of time. This emphasis on standard procedures was also notable in that it seemed to stand in contrast to the opportunities for free exploration and spontaneous encounters with other species that were enabled while the survey was being carried out.

6.5.5. *Anthropomorphic impressions of other species*

Explaining the science of pollination using anthropomorphic characterisations of other species (particularly bees) was especially notable in the introductions given by project facilitators. Much of this also reinforced the utilitarian view of other species already mentioned. During introductory talks before these baseline surveys, for example, pupils were told bees are "doing a job for us for free... If we had to pay people to do it, it would cost Scotland £4.5 million", and that "it's their lifestyle, they're happy doing it" (Fieldnotes, 30/8/16). There were also frequent references to the animated film *Bee Movie* as a means of explaining the science of pollination.

6.6. Position in relation to school timetables/curricula

With reference to short fieldnote and memo extracts, this section outlines how the project appeared to fit within, or alongside, school timetables and curricula. As the following chapter will highlight, this clearly influenced the ways in which young people were able to engage with the project, and in turn, the processes by which curricula were produced.

6.6.1 Time pressures and dedicated teachers

From the very start of participant-observation, it became clear that in most schools, *Time pressures* on teachers, and an already "crowded" *Scottish Curriculum for Excellence,* meant that the project appeared somewhat "squeezed in" amongst other commitments**.** As the academic year progressed, despite the thorough application process, facilitators reported that many schools were becoming difficult to engage, as other priorities took over, or their original lead teachers took on new responsibilities or moved on to new positions. Schools that engaged with the project most regularly seemed to rely heavily on one particularly passionate teacher. I labelled these *Dedicated/activist teachers*. My emerging thoughts on this, which were clearly inclined towards the evaluative element of this research, are demonstrated in the following memo extracts:

This (School 1a) seems like an extreme example of that "squeezed in" nature of the project. It perhaps further illustrates how dedicated Mrs S at School 1b is. Here, they have recent funding for an initiative around "raising attainment", which they're under pressure to show the results of very soon. That means they're under all sorts of pressure to prioritise numeracy and literacy. "I'm trying to do millions of things in a short space of time", says Mrs D. "I'll do what I can (Polli:Nation-wise, that is), but...". She talks about the xmas fair and nativity coming up "before we know it", too. "I'm having to juggle 50 million plates", she says - a good quote to sum up the challenges these teachers face?
Memo 8, 27/10/16, School 1a[2]

Speaking with C and Mrs S afterwards, it's clear how keen and enthusiastic Mrs S is. An "activist" for outdoor learning and conservation, you could say. This school's level of engagement with the project is all down to her. And that's surely a point for the evaluation – this perhaps over-reliance on one teacher. I mean, all *teachers were keen and dedicated at the start, I guess – that's why they applied to be part of the project in*

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[2] Here and throughout the rest of this thesis, fieldnote extracts are labelled according to the date of the participant-observation session from which they were taken. Memos were not taken after every participant-observation session, and sometimes comprised reflections from several school visits. They are therefore labelled according to the date on which the memo was written, and the school/s to which I am referring in them.

the first place. But the fact she seems to be the only one in Scotland at the moment with this level of commitment to it shows how easy it is for that enthusiasm to drop off in the face of other priorities... For Mrs S, it just happens that this is her personal priority.
Memo 8, 27/10/16, School 1b

It should be noted that infrequent Polli:Nation activities did not necessarily indicate a lack of enthusiasm for the project. One primary school (2a), for example, did not have any days working on the project during the academic year 2016-17 beyond those led by the facilitator. They did, however, turn their one allotted "grounds development day" into a large-scale event involving the whole school, a significant number of parents, grandparents and other local volunteers, and a variety of different changes being made to the school grounds.

This stood in contrast to School 1b (another primary school), where only a small group of seven pupils acted as their school's "Polli:Nation team", but their involvement was regular, with most Wednesday afternoons during the autumn term spent carrying out Polli:Nation-related activities. Similarly, School 7a (a secondary school) chose to work with a small group of pupils with additional support needs, and beginning in February 2017, dedicated two periods per week to the Polli:Nation project. Whilst these were typical cases in terms of the number of young people engaged regularly in the project, the regularity of their engagement was atypical. A school's **frequency of engagement with the project** would**,** I reflected, surely be a major influence on how young people experienced it in that particular school. In both schools discussed here, however, the project took place on the fringes of the prescribed curriculum rather than being embedded in it – as further explored in the following sub-section.

6.6.2. Small groups on the fringes of the curriculum

Alongside these time pressures was a clear perception, across most schools, of Polli:Nation activities being better-suited to small groups of pupils, as well as difficult to fit within the core, subject-based curriculum. Probably owing to this perception, there was a tendency for Polli:Nation to be a peripheral activity engaging a minority of pupils, rather than a "whole-school", or even "whole-class" project. It should be noted that in some cases, whole classes *did* carry out Polli:Nation activities all at the same

time. The suitability of such activities for larger groups, however, appeared to depend upon (for example) the size of the school grounds, the accessibility of the Polli:Nation site, or the availability of additional staff to support sessions. Importantly, the perception of the project being more suited to small groups tended to exacerbate the challenge posed by the time pressures discussed above. This combined challenge is summarised in the memo extract below:

Mrs P also talks about difficulty in "getting cover" for her regular class. It reminds me that this is a specific issue with "squeezing the project in", and perhaps that the activities are not suited to whole classes. So that creates a double-edged problem: It's not suited to whole classes, so the lead teacher has to get time off from their class in order that they can work with the small group. That then creates the extra problem of freeing up another teacher to cover their class. Sometimes they'll need to get a supply teacher in, and that costs money, and funds for that are not covered by the project…
Memo 5, 6/10/16, School 5a

As a result of these combined challenges, Polli:Nation was often pushed to the fringes of the core curriculum, and in some cases, even took place entirely outside of school hours. The small group chosen to take part in Polli:Nation in a given school was often a group of specially-selected pupils with additional support needs (ASN), an after-school club (sometimes an existing "gardening club"), or an "eco-committee" (or similar) spanning multiple year groups *(**How pupils selected**)*. The key here was the added flexibility that working with these sorts of groups offered. ASN pupils in secondary schools, for example, were often following an alternative curriculum that was not aimed towards exams in the same way that the core curriculum is, meaning that teachers were not bound to the usual curricular 'outcomes' *(**Alternative curricula eg ASN**).* As discussed below and in the following chapters, this would emerge as an important feature of the project.

6.6.3. Informality – a *relaxed atmosphere*
The tendency for Polli:Nation activities to be carried out in small groups, outside of the core subject-based curriculum, had not been the original intention of the project. From the early stages of participant-observation, however, this began to strike me as an

important feature of it. That is, it seemed to me that working in small groups *(Group size)* and being engaged in activities that stood outside of the core curriculum were in fact central to the experience of the young people who *were* regularly involved in the project. As participant-observation progressed, these factors also appeared central in facilitating the processes by which learning was produced, as discussed in the following chapter.

For me, the key perceived advantage of working in small groups, and a lack of links to the formal curriculum, was the creation of what I labelled a "***relaxed atmosphere***". Initially, this perception of a "relaxed atmosphere" was based on two other trends I had begun to include in my situational maps – namely, the significant amounts of time that pupils seemed to spend, alongside or in-between their 'official' tasks, engaged in free play and exploration *(Free exploration etc.)*, and talking freely about other aspects of their lives *(Other aspects of pupils' lives - freely chatting, etc.)*. Over time, however, I began to make links between this and other stand-out features and occurrences that I had included in the situational maps. A "relaxed atmosphere", I felt, also included the affordance of opportunities for ***human/more-than-human encounters***, as well as the spontaneous imparting of information by teachers, facilitators or other visiting experts (***Spontaneous imparting of info (teachers, facilitators, etc.)***). These elements appeared to indicate the replication of a degree of informality in activities more commonly associated with informal learning contexts (namely practical conservation and citizen science), and are explored in more detail in the following chapter.

6.7. Summary

In this chapter, I have attempted to set the scene through introducing the common activities and features within the Polli:Nation project. I began by displaying the situational map produced following thirty sessions of participant-observation, then continued to refer to the elements comprising it as I accounted for the process by which they were identified. Following new materialist theory, young people' lived experience of the Polli:Nation project can be characterised as a unique assemblage that includes (but is not limited to) the activities, features, and underlying discourses/ideas described here. Further elements within this assemblage are explored in the following chapters.

The common activities and features outlined in this chapter have been split into three key sections. The first of these (6.4) outlined the key activities within the project, which included a series of more-or-less standard activities run by staff from LTL (conducting biodiversity surveys, learning about the science of pollination and its ecological importance, and planning work to be carried out through the project), as well as school-specific practical conservation tasks in order to make the planned changes to school grounds. There were also diverse sessions run by visiting experts in various areas, visits to and engagement with other organisations in the local area, and contributions to blogs and assemblies where other pupils and staff were told about the project. Section 6.5 explored the various ideas and discourses underlying the project. These included a utilitarian view of other species and a related "stewardship" perspective on human-environment relations (Taylor 2017), as well as a connection between immersion in 'nature' and behaviour change. These might be seen as representing the "curriculum-as-plan" (Aoki 1993a) that appeared to exist at the outset of the project. Finally, section 6.6 explored the common features of Polli:Nation across multiple schools. These included the challenge of fitting the project into the timetable and curriculum, reliance on one dedicated teacher, as well as the tendency for the project to involve small groups of young people and take place on the fringes of the curriculum. I suggested, however, that in fact, these last two features appeared important in terms of young people's engagement with the project (6.6.3).

The following chapter continues to draw upon fieldnotes and situational maps in order to highlight the processes by which curricula were produced through these activities and features, and the unique configurations of relations between them. These processes, as well as the activities and features outlined in this chapter, later informed the focus groups I carried out with young people participating in the Polli:Nation project – in which young people selected the activities/features/processes that were "significant" to them. Young people's focus group responses to these are explored in Chapter 8.

7. Findings 1: Co-Producing Curricula

7.1. Introduction

This chapter draws upon a combination of fieldnotes, memos and situational maps to explore primarily the second key question addressed by this study: ***How are curricula produced through the common activities and features within the Polli:Nation project?***

The previous chapter provided an important contextualisation, drawing largely upon the early stages of participant-observation to highlight the common activities and features within the project. These included the particular activities comprising the project, the key ideas and discourses underlying it, and the ways in which the project appeared to fit within or alongside school timetables and curricula. This chapter now explores the *processes* by which curricula were *produced* through this unique combination of features and activities. Importantly, these are processes that cut across any number of the activities and features identified in the previous chapter, rather than being produced by any one of them individually. In exploring these processes, as well as through the "thick description" (Geertz 1973) provided through the inclusion of fieldnote and memo extracts, this chapter also begins to address the fourth of this study's key research questions: ***What is the nature of the relations between these significant features and processes?*** Throughout this chapter, I continue to refer to elements comprising the situational map in Figure 6a (see previous chapter, section 6.2), in order to account for the identification of those elements. Again, these elements appear in the text and in sub-headings, and are written in bold and italics. For example: ***human/more-than-human encounters.***

This chapter is structured as follows: Having provided a reminder of how curriculum is conceptualised in this thesis (7.2), I then outline the processes that were identified as (co)producing curricula (7.3). These included human/more-than-human encounters, the spontaneous imparting of information by teachers and visiting experts, and practical tasks involving non-cognitive forms of 'learning'. Section 7.4 then identifies four themes running throughout these curriculum making processes. These can be summarised as, firstly, the tendency for key curriculum making processes to be unplanned, centred on contingent moments, and characterised by a degree of

informality; secondly, the prevalence of practical tasks and physical sensations; thirdly, the enactment of lived curricula that differed considerably from the "stewardship" perspective underlying the project and indicated a form of "thinking collectively" with more-than-human elements (Taylor 2017, 1456), and finally; the co-shaping of curricula by more-than-human elements, visiting experts from outside of schools, and young people themselves, as well as teachers.

7.2. 'Curriculum' and new materialisms re-visited

This chapter's aim of identifying the processes by which curricula were produced stems from the key conceptions of 'curriculum' outlined in the Chapter 3. The way in which curriculum is conceptualised might be seen as a way in which the operation of a particular "research assemblage" (Fox and Alldred 2015, 2017) influences what is identified and reported. Thus, following Fox and Alldred's (2017, 173) recommendation to "(a)cknowledge and account for the effects that aggregations and specifications of events produced by the research process have upon *accounts of events"* (emphasis in original) , I briefly re-visit this here.

Most importantly for the conceptualisation of curriculum in this chapter, the emphasis on "production" follows the understanding of curriculum as a process of curriculum *making* that represents the "coming together" of the various elements involved in educational processes (Ross and Mannion 2012, 312). Following Aoki (1993a), meanwhile, this chapter aims to highlight the "curricular landscape" that exists in the relations and tensions between "lived curricula" and the "curriculum-as-plan". In this chapter, then, the phrase "how curricula are produced" refers to the processes of curriculum making that create this "curricular landscape". These conceptions of curriculum, in turn, were influenced by my use of new materialist theories, most notably the shift to thinking in terms of "becoming", rather than static outcomes (Clarke and McPhie 2014), which necessitates an approach to research that leans "towards processes and flows rather than structures and stable forms" (Fox and Alldred 2015, 407).

There are two further points to note with regard to the "accounts of events" provided here.

Firstly, the curricula explored here are limited to my own perception of the ideas that were in circulation. Key to young people's *lived* curricula, for example, are the idea of "concepts" that are "invented in practice" (Semetsky 2015) – see 7.3.1 and 7.3.2. These concepts, which were not easily verbalised by young people, were identified only by me, the researcher. Secondly, despite my efforts to account for more-than-human elements and their "responses" (see 7.3.9), running throughout these observations is an inevitable focus on the ideas, perceptions and/or perspectives held by *young people* – that is, an unavoidable human focus. This reflects the ontological challenges around the "performative privilege" (Petersen 2018, 11) held by humans, as discussed in Chapter 4 (see 4.3.6).

7.3. (Co)Producing curricula

The following sub-sections explore the processes, identified principally through participant-observation, through which curricula were produced during the Polli:Nation project. As stated above, these differ from the common activities and features that were the focus of the previous chapter, and instead, can be seen as cross-cutting these activities and features.

7.3.1. (Re)Production of concepts

This and the following sub-section describe the concepts that were identified during the course of participant-observation, and labelled on the situational map in Figure 6a. Some of these ideas appeared to (largely) reflect the curriculum-as-plan discussed in the previous chapter, whilst importantly, this thesis will demonstrate that the activities within the Polli:Nation project enabled the enactment of concepts that differed considerably from this curriculum-as-plan.

The Deleuzian ideas of "concepts", "percepts" and "affects" (Colebrooke 2002) were key to the series of theoretically-sensitive questions I used to direct my fieldnote-writing following participant-observation sessions (see 4.3.5). Chapter 4 explores some of the ways in which thought was activated through this new approach (Sprinngay and Truman 2017). This included the identification of "concepts" (that is, key ideas) that were in circulation, and the understanding of these as "becomings" that are "invented in practice" (Semetsky 2015, see 4.3.7). Drawing upon "concepts" and the idea that these

were "invented in practice" (Semetsky 2015) led me to pay closer attention to how ideas were enacted and (re)produced in the course of Polli:Nation activities, and the affective capacities within the project that potentially gave rise to new ideas that differed from those originally underlying it. I came to see the "invention in practice" of these concepts - that is, their (re)production and enactment through Polli:Nation activities - as a process facilitating the production of a "curricular landscape" existing between the "lived curricula" and the "curriculum-as-plan" (Aoki 1993a).

In keeping with the new materialist theories drawn upon throughout this thesis, there are several more important points to note with regard to my identification of these "concepts". Firstly, "concepts" ought not to be considered static outcomes - that is, things that young people "have learned". This follows the idea that they are "invented in practice" (Semetsky 2015), as noted above. In identifying them, I am labelling ideas that were enacted and/or reinforced by the activities taking place. In other words, their circulation is presented here as just one way in which curricula are produced, which may have been present throughout any or all of the processes explored in the following sections, but which were not the sole product of them. Secondly, although the "invention in practice" of concepts is a process by which curricula were produced, I do not directly link the emergence of any given "concept" specifically to any other such process. I do not, for example, link the idea of "young people as conservationists" directly with young people's participation in the construction of a "bug hotel", although this event did lead me to note the presence of this concept (see below). Instead, concepts ought to be seen as arising from the assemblage as a whole. Thirdly, my identification of these concepts was not limited to what young people explicitly verbalised. That is, it is difficult to locate any of these ideas within an individual young person. Instead, they were in circulation as part of the assemblage, of which young people are part.

In labelling the concepts that were identified as being in circulation, I begin here with *Young people as (becoming) conservationists* and *Young people as (becoming) (citizen) scientists*. These elements were added to my situational maps to reflect the possibilities of young people forming new impressions of themselves as result of the stated aims of the project, and continuing to enact these through project activities. Adding the term "becoming" to these elements was an acknowledgement that these

ideas were not static, but (re)produced through Polli:Nation activities. The idea of "becoming (citizen) scientists" was primarily recorded because of young people's completion of the "baseline surveys", as described in section 6.4.1, and the memo extract below demonstrates how I noted its potential re-production during the activity itself:

The baseline survey actually seems quite vague and not exactly 100% accurate, but it's interesting how it's still presented as hard science - filling out of the standardised survey form, measuring out the 10-metre-squared area exactly and plotting it on the grid so that they use exactly the same one next time, and so on… I think this must be pretty cool for the pupils though, having C come in from this outside organisation and talking about this large-scale, important survey that this activity is contributing to. Is "contributing to scientific research" an important factor in their engagement, then?
Memo 1, 30/8/16

An example of the (re)production of the concept *young people as (becoming) conservationists*, meanwhile, was the construction of a bug hotel and the associated idea of 'giving a home' to other species, as shown in the fieldnote extract below:

(Key ideas include) Giving a 'home' to slaters, other bugs, bees, etc. As I've said before, this seems to be an activity that young people really get into, perhaps because of the relatability of giving something a 'house' or 'home'. So… young people/citizens as conservationists. The idea that we can 'help' wildlife.
Fieldnotes, School 7a, 21/2/17

I also added to the maps several elements pertaining to the perceived aims and desired outcomes of Polli:Nation – that is, the aims that existed independently of how young people may have experienced the project. At this stage, these were labelled **Polli:Nation as conservation project** and **Polli:Nation as (citizen) science project.** It was important, I felt, to distinguish these from the elements outlined above, as young people's *own* perceptions of what the project was "all about" might have been different to the ideas that were more commonly expressed through – for example – the ways that activities were presented by teachers and facilitators. In other words, I was interested in

the extent to which the dominant discourses had "got through" to the young people, or whether the way they experienced the project allowed for different ideas to be produced.

The element ***Young people as (becoming) community activists/active citizens*** had stemmed from early participant-observation visits, where I had included the element "learning about/engaging with own community". This had stemmed partly from the studies cited in the section of the Literature Review on citizen science (section 2.6.2), that point to the importance of learning that begins in young people's own communities (Ballard, Dixon, and Harris 2017; Fazio 2016; Iversen and Jonsdottir 2018). With this in mind, it was interesting to me that Polli:Nation actually began with an issue that was much wider than those existing only in young people's own communities (the decline in pollinator populations), but sought to engage young people with this through engagement with their own local spaces. I therefore noted occasions when the project seemed to be tied in with the local community in ways that differed from the wider issue of pollinator decline. This included, for example, pupils planting flowers in their local railway station – a partnership that pre-existed the Polli:Nation project (***Engagement with other organisations/places in local area).*** This is discussed in the memo extract below.

A real "engaging with the local community" thing today, as the pupils went to the train station to plant flowers. It seems inconsequential, but they are, I guess, learning about their local area – why it's important to have the flowers there beyond it just looking pretty, etc. They also told me about their upcoming visit to a local(ish) orchard – learning about how fruits trees are grown locally, and the importance of them. It gets me thinking about how some articles talk about starting with local issues that they relate to in order to engage young people with wider environmental issues. So far, I think the only "wider environmental issue" that's been talked about is the decline in pollinator numbers (which is quite a big one to be fair). But I mean, no apparent linking it to other big environmental issues.
Memo 7, 12/10/16, after participant-observation session in School 1b

7.3.2. Concepts differing from the curriculum-as-plan

The concepts discussed in the previous sub-section were largely manifestations of the project's curriculum-as-plan, with the Polli:Nation Activity Plan (LTL 2014) listing desired outcomes regarding young people's future participation in conservation activities, their scientific knowledge (for example, ability to correctly identify pollinators), and school-community linking. Clearly, however, the potential for the project to give rise to completely different ideas was already evident in the ways in which the project was presented in some schools. These included School 1c, a secondary school whose lead teacher, from the start, saw the project primarily as a vehicle for improving literacy and "employability" skills among his small group of ASN pupils. He saw the Polli:Nation blog as being particularly important, as it gave the pupils an audience, and an experience to write about. Employability-wise, the project was presented as an important exercise in working together as a team to transform a garden, and learning practical skills for the sort of careers available to these pupils when they finished school. This was a clear example of a teacher playing a prominent role in the curriculum making that took place through the project, and is captured in the memo extract below:

Really interesting that for this school, this project is all about literacy – something for this group of ASN pupils to work on and be part of. Mr G says "don't quote me on this, but I don't really care about the pollinators...". He says it in a tongue-in-cheek way but there's certainly truth in the increase in pollinators just being a potential by-product of a project that's really not about that at all.
Memo 2, 14/9/16, School 1c

Indeed, as will be discussed in section 8.5 in the following chapter, this alternative vision for the project was evident in the focus group I carried out at that school, where participants made no mention of pollinators when asked to reflect on the learning produced through the project. During participant-observation, to acknowledge this potential production of ideas differing from the curriculum-as-plan, I added the elements *Polli:Nation as (other aims/outcomes),* and young people's experience as *Young people as (becoming) (other than project aims)*.

Finally, and importantly for this research's key findings, are moments reflected in the element **_"Collective thinking" with more-than-human world._** Identification of this element drew upon the following quote from Taylor (2017):

"Outside of formalised pedagogical contexts, close observations of young children's everyday interactions with the world around them reveal that many already practice a form of thinking collectively with the more-than-human world… This is presumably because they have not yet been fully acculturated into the foundational binary traditions of western education, whereby 'we' (as the superior knowing human subjects) learn how to separate ourselves from the world that we learn 'about' (as the object of our superior knowledge systems)" (Taylor 2017, 1456).

The moments I was attempting to capture with this element were difficult to summarise as one particular 'perspective' held by young people at a given time, and indeed to fully separate from the "stewardship" perspective underlying the project. With reference to Rautio (2013a), however, Taylor contends that the "immediate and embodied impulses to touch and become with others in their more-than-human common worlds" displayed by children are "nothing like the rational quest to know about the world from a distance that characterises western epistemologies" (Taylor 2017, 1456). The phrase "thinking collectively with the more-than-human world", then, came close to capturing the sort of moments I had been noticing during Polli:Nation activities - instances where young people appeared to enact a relationship with other species that in some way stood out from the dominant "stewardship" perspective.

Of course, as noted previously, such a perspective could not be located in one individual young person, or particular activity, nor could it be entirely separated from the "stewardship" perspective with regard to the processes by which it was produced. Both were concepts in circulation together, both forming part of the unique assemblage that comprised young people's lived experience of the Polli:Nation project. That is to say, I could not point to examples where "this activity led more than others to a *'collective thinking with more-than-human world'* perspective",* or contend that "xx young person seems to think in a more 'collective' manner than xx young person". Indeed, I could not say with any certainty that any activities within Polli:Nation actually 'produced' this

sort of perspective – as Taylor contends, "many *already* practice a form of thinking collectively with the more-than-human world" (2017, 1456, emphasis added). As with previous examples, however, there were particular moments at which, to me, this perspective appeared to be enacted. As will be discussed in section 7.4, and further in Chapter 9, the enactment of this perspective appeared to be enabled mostly during the physical tasks (see 7.3.5), free play and exploration (7.3.7), and other contingent moments (7.3.8) that were enabled by the project.

Moments where this perspective was identified included the expressions of excitement and fascination in response to spontaneous human/more-than-human encounters captured in the fieldnote extracts below. These seemed in keeping with the "immediate and embodied impulses to touch and become with others in their more-than-human common worlds" cited by Taylor (2017, 1456).

At the corner of the site closest to the school building is a sort of "greenhouse" building. Its structure is made out of bamboo canes, and old plastic bottles make up the walls. On the wall of the "greenhouse", Alisa found a green spider. It was one of those impromptu moments I'd come to expect. This was while a couple of the pupils were measuring out the survey area with the trundle wheel. Alisa was keen to show as many people as possible. Several of them peered closely at it. "It's looking after its baby!", she said
Fieldnotes, School 1a, 29/8/17

"Ladybird!", a few of the pupils exclaimed, as one of them found one, and held out his hand as it crawled over it. The others gathered round to peer at it.
Fieldnotes, School 1b, 30/8/16

This, and similar examples, are returned to in section 7.3.8. Another example was the encounter with the woodlouse already included in Chapter 4 (4.3.6) as an example fieldnote extract, where Liam shows an empathy with the woodlouse that to me, seemed to be independent of any perception of it as ecologically 'useful'. Part of the extract reads:

(O)ne of the other boys, Brian, quickly takes the slater off (Liam) and throws it towards one of the girls, who is scared of insects. She screams and runs away. Liam waits until the commotion dies down, then goes and finds the slater, and places it carefully at the side of the path, among the leaves.

Fieldnotes, School 7a, 21/2/17

To re-iterate the point made earlier in this section, the "invention in practice" of concepts is just one process by which curricula were produced through the Polli:Nation project, and can be seen as cross-cutting the other processes outlined in the following sub-sections. Also cross-cutting these processes are ***affective capacities*** (for example, the novelty of a visiting expert as "affectively palpable" - see 7.3.4 below) and percepts, such as ***pupils' emotional responses*** (for example, the excitement expressed at close-up encounters with other species), which are in constant circulation along with concepts (Colebrooke 2002; Semetsky 2015).

7.3.3. Planned imparting of information

This sub-heading refers primarily to the general introduction to the Polli:Nation project given by LTL facilitators in all participating schools, which most commonly preceded the "baseline surveys" - reflected on my situational map as ***Learning about pollinators – i.d, science of pollination, etc.*** Reportedly in some of the schools in which I carried out focus groups (most notably School 10a), the topic of pollinators and the science of pollination was incorporated into mainstream science, so this element is intended to also reflect this. During participant-observation, however, these introductory talks were the only activities within Polli:Nation where the information to be imparted appeared to be truly planned out in advance. Facilitators used the same Powerpoint presentation in each school, and covered the science of pollination and its importance for food growth and biodiversity, the issues facing pollinators and their causes, the identification of different types of pollinators, and an introduction to the types of habitat suitable for pollinators. They were also the only sessions to follow a conventional format of a one-way transmission of information that followed the stated aims of the project, from teacher or facilitator to pupils. As explored previously, these sessions often used ***anthropomorphic impressions of other species*** to somewhat reinforce some of the key

ideas underlying the project, which included what I referred to as a ***stewardship perspective*** and a ***utilitarian view of other species.***

There were, however, already several ways in which this particular planned imparting of information nonetheless stood out from what might be considered 'normal' classroom-based learning. Firstly, they were led not by a teacher, but by a facilitator from LTL, who were the first people to be recorded on my situational maps under the element ***external/visiting experts*** (see 7.3.4 below). This was usually only the first or second time that participating pupils had met this facilitator, and as will be discussed in the following chapter, this novelty of "hearing new voices" appeared to be strongly valued by young people. Secondly, it was only in rare cases that these sessions involved a class of pupils, as they were normally constituted. These initial introductions to Polli:Nation would take place either with the small groups of pupils already identified as being their school's "Polli:Nation team", or with a much larger group, not all of whom would go on to be actively involved with the project.

Finally, I was also struck in these sessions by the amount pupils seemed to participate, despite the standardised format by which information was imparted. This was largely through asking spontaneous questions, or spontaneously sharing stories or memories relating to other species (usually pollinators). With my previous direct experience of primary schools being limited to my time as a pupil more than twenty years ago, I was unsure how 'atypical' this was. I did, however, have a clear sense of pupils' excitement at being part of this new project, and at meeting this external expert for the first time, which seemed, as I note in the fieldnote extract below, to have "captured their imagination". The following extracts capture young people's participation in these sessions:

"I have a bees' nest under my house", one pupil told the group, unprompted. C encouraged him to carefully try to find out what sort of bees were in it... Others chip in with bits of knowledge – it's definitely not a one-way transmission of information. Mrs S said "my beekeeper friend told me..." that worker bees only live for six weeks.
Fieldnotes, School 1b, 30/8/16

With the lights on and without the powerpoint, they seemed to all look at her, and listen better, at least for those few minutes. Actually, a number of them really seem to come to life when given the chance to ask questions… Questions and comments included: "Do you have to put leaves in the bug hotel?" ("You can, or bamboo canes, or bits of wood with holes in, or you could give it a roof – a green roof!", etc.); "I want to make a bug hotel in an old bath"; "How long does a (South-facing) slope have to be?"; "Can we use a shopping trolley as a planter?" ("Well, maybe a wheelbarrow would look nicer…"). Planters, ponds and bug hotels seemed to have really captured their imagination… Mrs E and C actually stopped the questions in the end – they just kept on coming.

Fieldnotes, School 2a, 20/9/16

From the spontaneous discussions and questions from pupils that these fieldnote extracts demonstrate, it was my sense that these initial sessions already appeared to let both external experts and young people themselves into the curriculum making process, as well as change the role that teachers played in it. This was, however, even more the case with the remaining processes discussed in this chapter.

7.3.4. Contact with experts from outside of school

I had included the element *external/visiting experts* in my situational maps from the first day of participant-observation, to refer to the LTL facilitators working with each school on Polli:Nation activities. As described in the previous section, this seemed to add a sense of novelty and excitement, at least to initial Polli:Nation activities. In February 2017, however, a session run by a woodwork and landscaping expert in School 1b, where the pupils had learned to build wooden planters in which to grow flowers, made this element stand out even more. Having by this point changed my fieldnote-writing procedure to include the question "what was affectively palpable today?", I noted in response to this question:

Alex came across as quite a character. A very strong accent from somewhere in that area. A large, dangling, bright blue-coloured earring with a dolphin on it. Long, slightly greying hair tied back in a ponytail. Described himself at some point as someone who "pretty much lives in the woods". He seemed rightfully very proud of his

self-employed accomplishments. He graduated in Art, he said, and one of the main things he does is create wooden artwork – eg, sculptures in forests, school grounds, etc... The kids seemed totally transfixed with Alex and his stories. Is it his status as an outside 'expert'? Or in this case, perhaps, his appearance and demeanour? He probably looks different to anyone they've seen before (the long hair, earring, etc.), speaks to them in a totally different way to how a teacher would - even said "crap" at one point! Different to perhaps C (LTL facilitator), who is also a qualified teacher, so possibly doesn't stand out as much to them?

Fieldnotes, School 1b, 1/2/17

As will be discussed further in the following chapter, it was instances such as this, as well as regular engagement with the facilitators from LTL, that led me to include "working with experts from outside school" as one of the flashcards to be used in my focus groups. During the focus groups, this actually emerged as one of the features of the project most selected by young people, who cited "hearing new voices" as a significant feature of the Polli:Nation project. When hearing this response, I always thought back to this session with Alex the woodworking expert. Pupils had, I reflected, seemed particularly engaged when meeting and listening to him. I wondered if there was an even greater element of novelty that contributed to this – he came across, as the fieldnote extract above suggests, as being very unlike a teacher, and perhaps unlike anyone the pupils had met before. The manner in which pupils engaged with these visiting experts is also an element of the informality or "relaxed atmosphere" identified in the previous chapter, and discussed further in section 7.4.1. Unlike teachers, visiting experts including LTL facilitators were always addressed by their first names, and Alex in particular had a very informal way of speaking to the pupils.

These visiting experts also served to shape pupils' lived curricula beyond the curriculum-as-plan. This could be seen, for example, in several instances where links were made to other environmental issues, beyond that of pollination. From the beginning of this research, I had been interested in the extent to which the project tied young people's learning about pollinators in with issues such as (for example) climate change and wider biodiversity loss. In reality, while links were often drawn between the Polli:Nation activities of a given school and the wider issue of pollinator decline, there had been far fewer examples of other environmental issues being mentioned. Where

this *did* occur *(**other environmental issues – learning about/engaging with**),* it tended to be during these one-off encounters with external experts, as captured in the fieldnote extract below.

Current world issues/politics. Tying the project in with wider events. Alex did this when explaining about the wood. Not sure how he got into this, but he was talking about cattle feed, and how there could be environmental disaster with Donald Trump in power. He explained that the US did not have the same regulations as Europe has over what goes in cattle feed, and therefore, with us leaving the EU and possibly doing deals with "Mr Trump", there could be consequences. He also brought in – not sure how to put it – world ecosystems, or world trade… This example of the Eucalyptus wood he was using with them to build the planters. Apparently it's now being imported from Australia to Portugal, because it only needs twelve years to grow there (because it's wetter but still warm?). And now Portugal are growing and exporting it.
Fieldnotes, School 1b, 1/2/17

In another example, a question-and-answer session with a visiting beekeeper provoked a conversation about veganism:

First time this project has really, obviously connected to wider ethical debates in this school. Mrs C asked if eating honey was "vegan". Beekeeper said yes because bees making honey is a natural process. Mrs C and the Teaching Assistant then had some chat about that, and the beekeeper said something about being vegetarian but still wearing leather shoes - ie, the potential for being a bit contradictory. One kid, at this point, seemed like his mind was blown! "Hang on... WHAT?!", he said. He looked even more shocked when Mrs C mentioned the existence of vegan shoe shops.
Fieldnotes, School 7a, 2/5/17

These examples demonstrate the potential these visiting experts created for discussions, and the imparting of information, to move in unexpected directions. This may have been partly because unlike the LTL facilitators, these visiting experts were not fully 'part of' the Polli:Nation project, and therefore not necessarily aware of its overall aims.

7.3.5. Practical tasks and physical sensations

The previous two sub-sections have focused on processes characterised principally by the transfer of information between human minds through discursive practices (ie, verbal explanations and discussions). Practical tasks, however, and the physical sensations produced by engaging in these, were clearly also important processes within Polli:Nation through which curricula were (potentially) produced. This recognition follows the conclusions drawn in Chapter 3, that 'learning' extends far beyond the acquisition of facts, information and ideas (Sørensen 2009; Van Poeck, Ostman and Block 2018). The concepts that are enacted or (re)produced through these practical tasks and physical sensations, then, are of considerable importance, even though they may sit outside of "what an individual child is able to conceptualise linguistically" (Lenz Taguchi 2011).

The ***practical conservation tasks*** explored in the previous chapter (section 6.4.4), as well as carrying out "baseline surveys" (6.4.1) encompassed many of the physical elements of Polli:Nation. The task of planting flowers and fruit trees, for example, involved a whole range of physical sensations: using a spade to dig holes; handling and pushing the bulbs into the holes; lifting and positioning the trees in the holes before re-filling the holes with soil. Other physical sensations were produced by the handling of other species, such as when pupils allowed insects to crawl across their hands (see also 7.3.2 and 7.3.8) during ***human/more-than-human encounters***; the use of ***specialist equipment*** that was often unfamiliar to young people, including trundle wheels, quadrats, tape measures, spades, gardening gloves, and weed-proof fabric; sensations that were enabled during the ***free play/exploration*** such as picking up leaves and twigs or running through wet grass; as well as sensations relating to the ***weather and seasons.*** The weather, and groups' experience of it, often seemed identifiable as a key more-than-human element during Polli:Nation activities, as in the fieldnote extract below.

The weather was definitely playing a part this time. The autumn sun was coming in and out, but a lot of the time, very overcast, and feeling like it was about to rain. I was dressed in two t-shirts, my Paramo fleece and waterproof jacket. A couple of the boys looked cold, and Mrs S told them to "run and get your jackets". Craig said he was "addicted to the cold" so didn't need to, but then did anyway…. (Later) "There's the

sun out", Mrs S commented. Breaking through the clouds, some slight warmth to it still, countering the slightly chilly and damp breeze. An elemental autumn day.
Fieldnotes, School 1b, 26/10/16

The following fieldnote extract notes the physicality of a session in which young people were engaged in planting trees. I noted the considerable ***physical effort/exertion*** involved in this task:

Craig gives the shovel to Aaron, considerately asking him if he wants a go. Craig manages to get some way into the soil but Aaron is struggling. Doesn't have much dexterity or strength. Can't really position himself so as to get his weight on the shovel (which some of the others do by just jumping or standing on it). I ask if I can have a go, and they're amazed at how my weight easily pushes the shovel into the soil. "Wow, you're stronger!" I'm just heavier, I joke. I note that the moment the shovel bites into the ground and you feel it sinking in, is really satisfying. We dig out quite a big chunk of soil after I've got the shovel in further. I do that a few times – putting my weight on and digging down, then letting Craig and Aaron lever the soil out in chunks. When he digs, I notice Craig is experimenting with how to place his weight on the shovel, balancing force and, well, balance… (Later) Craig is taking a quick break from what he's doing and says "God, I need to sit down". He sits on the bench where the other kid was sitting earlier. One of the others comments how fast the time has gone. "Have you enjoyed it?", asks Mrs S. "Yes", a few of them answer. "Well, that's your exercise for the day!", Mrs S says, "it's certainly mine".
Fieldnotes, School 1b, 26/10/16

Moments such as this led me to reflect on how these physical sensations may contribute to pupils' experience of the project. As well as the non-cognitive learning that was taking place, did a degree of physical exertion add to pupils' sense of accomplishment through the project? In any case, the physicality of tasks, and the sensations experienced through them, were a striking feature of how curricula were produced through the project.

7.3.6. Taking ownership and developing specialist skills

In the previous chapter, I noted the tendency for the Polli:Nation activities to be carried out in small groups *(Group size)* on the fringes of the curriculum, in particular because of the "relaxed atmosphere" it appeared to produce. As participant-observation progressed, I reflected further on this – noting that while perhaps working in a small group on a task within a class is not particularly unusual in young people's experience of formal education contexts, adding to the uniqueness of Polli:Nation was that the small groups of pupils were often the *only* people in their school working on this project. This was, therefore, a process of working in a small, dedicated team on a specialist project *(Sense of being part of a (small?) team).* My sense was that this added what I labelled a *Sense of pride/ownership (pupils)* to those young people's engagement with Polli:Nation, as well as perhaps tapping into interests that pupils had already partly developed (for example, if they were voluntary members of a gardening club or "eco-committee"). This theme can be seen in the following fieldnote and memo extracts:

"You are ambassadors for pollinators!", C told them at the end of that introductory session, at which Alisa clenched her fist and did a silent "yes!", hinting at the sense of purpose/importance this project potentially gives them.
Fieldnotes, School 1a, 29/8/16

(Mrs S) then tells them to all "take a look at your handiwork", and says she needs to get a photo of them "all standing by an apple tree". Photos with our "prized possessions – our first apples", she continues. With all of them sitting on the bench, she tells them to give themselves a pat on the back for the efforts (they actually do) ... Again, she reminds C and I of her pride at their speaking in the assembly the other week. "I'm proud you're my team*", she tells the pupils. That potentially really reinforced this sense that the pupils are doing something special, and perhaps a sense of being "part of something" – ie, having a shared special role within the school as the "Polli:Nation team".*
Fieldnotes, School 1b, 26/10/18

I also noted, owing perhaps to the lack of prescribed curricular outcomes, the chance pupils had to identify new skills and interests through the project (***Chance to identify***

own skills). This, I felt, was a chance that 'normal' classes would not have afforded the pupils, and was thus an example of pupils themselves helping to shape the curricula that were produced through the project. This was perhaps all the more noticeable given that the project tended to involve pupils with additional support needs, or who were in some way 'disengaged' with 'mainstream' education. The memo extract below, for example, describes a girl who otherwise had low school attendance and showed a lack of engagement with 'normal' classes, but who had showed a particular interest in and aptitude for the sort of activities and topics involved in Polli:Nation.

When I chatted to the whole group at the end, there was a real sense from Tara of how inspired/motivated she is by the project. She talked about how much she's learning about gardening, and about pollinators. Previously, Mrs S, and the headteacher who I spoke to in the staff room last time, have both said that normally she's not motivated by school at all, and has big issues with attendance. It's amazing really, given how engaged with this she seems to be. Shows the potential of a project like this (or just anything "different"?) to "draw in" disengaged pupils like that, and discover something different that they're interested in, and/or good at.
Memo 7, 12/10/16

7.3.7. *Free exploration*

As suggested at the end of the previous chapter, a key aspect of the perceived "relaxed atmosphere" within the project was the way in which it provided opportunities for moments where pupils were not directly engaged in any of the project's activities, but instead engaged engaged in free play and exploration ***(Free exploration etc.)***. This tended to happen either during activities that did not require the full attention of all pupils present (such as the baseline surveys), or as part of loosely-structured activities where pupils were given considerable time and space to complete a simple task. A clear example of this could be seen in School 7a, where pupils were sent to gather materials such as sticks, moss and leaves to place in the "bug hotel" they are building. Of the area of school grounds they are in, I noted:

The woodland is fairly large, but bounded by a high fence, so Mrs C is happy to let them out of her sight. It's a unique space that affords opportunities for free exploration without close supervision from the teacher.

Fieldnotes, School 7a, 21/2/17

The encounter with the woodlouse described in 7.3.2 occurred during a moment of free play/exploration afforded by this loosely-structured, distantly-supervised task. The following sub-section discusses other such encounters, as well as the spontaneous imparting of information often enabled by these periods.

7.3.8. *Human/more-than-human encounters* and *spontaneous imparting of information*

From the first participant-observation session, I had been consistently struck by the affect-producing capacities of the encounters with other species (usually pollinators and other insects) enabled by the project. During these initial sessions, although the process of carrying out baseline surveys was set up to enable encounters with pollinators, far more often these encounters seemed to happen spontaneously, when pupils were engaged in the *free play/exploration* described above. To me, there was often a palpable excitement among pupils when these contingent moments occurred. The following fieldnote extracts and memos aim to give a sense of this. This has already been demonstrated in examples given in 7.3.2, and further examples include:

Another off-script moment as a bee landed on one of the purple clover flowers. "That's coool!", exclaimed one of the pupils. Most of them stood and watched it for a few minutes.

Fieldnotes, School 1b, 30/8/17

I say I've heard there have been lots of wasps recently: "O.M.G yes!", says one girl. Then one appears and another girl screams "oh my God it touched me!" Then there's another of those spontaneous, off-script moments as a dragonfly hovers around us, then lands on my face. "Wow! What is it?" This seems to get a few of them started on their own recent experiences with other species. A blond-haired boy with a smiling, enthusiastic face talks about encountering a large bumble bee: "It was that big! My Mum thought it was a Queen!"

Fieldnotes, School 2a, 20/9/17

There are two sort of off-script moments at the DAS garden. A few of the pupils spot a bumblebee. One girl goes to look closer. "He's just out of energy", C says. Also, a butterfly lands on the budlia plant right at the end. Mrs P spots it as we're walking away, and several of the pupils go back over to look more closely at it. C suggests it's a "red admiral, or something".

Fieldnotes, School 5a, 5/10/17

As contingent moments, these encounters then seemed to provoke questions from young people, and the ***spontaneous imparting of information*** by teachers and facilitators, often enabled by the chance to ask questions enabled by the small group sizes and "relaxed atmosphere" noted previously.

"Ladybird!", a few of the pupils exclaimed, as one of them found one, and held out his hand as it crawled over it. The others gathered round. Another impromptu learning moment, as Ms D asked them, "did you know ladybirds are only carnivores? They eat other wee beasties…"

Fieldnote extract, School 1b, 30/8/16

Mrs S and some of the pupils found "owl pellets" in one of the places they were digging, and she and C talked about how it could be any bird of prey that had left it. Mrs S went on to say that she'd heard there is a hawk that perches on the fence of the MUGA pitch at night. Owl pellets, she and C explained to the two or three kids next to her, are the regurgitated remains of mice or other creatures they have eaten. They do this because there are parts of the animal that they can't eat. "That's actually really interesting", said Tara.

Fieldnote extract, School 1b, 1/2/17

These contingent moments provide clear examples of the ways in which more-than-human elements can "co-shape" (Taylor and Pacini-Ketchabaw 2015, 512) the processes by which curricula are produced, and in which the nature of the Polli:Nation project further enables this to happen. Their unplanned (from a human perspective) appearances clearly influence the information that is then imparted. The more-than-

human elements themselves possess capacities to produce certain reactions in young people, and/or to be perceived in certain ways, and these reactions/perceptions are strongly influenced by the key ideas underlying, and/or produced through, the Polli:Nation project.

7.3.9. *More-than-human responses*

This section follows on from the theme identified above, as a further example of how more-than-human elements "co-shape" the concepts, and curricula, that are (re)produced and enacted through Polli:Nation. It builds on the previous section in that it refers not just to the (unplanned) presence of more-than-human elements, but to the ways in which these *respond* (or are perceived to have responded) to the actions young people have taken as part of the project. This included, for example, the visible growth of flowers and trees that young people had themselves planted, as well as the increased presence of pollinators in school grounds.

The relatively short timeframe within which participant-observation was completed meant that my observations of these 'responses' during this period were limited (most participant-observation had been completed by March so, for example, few flowers had begun to grow by this point). It was, however, during the "guided tours" at the beginning of focus groups that these (co)responses became most apparent. The examples cited below are both taken from a focus group carried out in School 1b in June 2017, and were particularly notable since this was one of the schools in which I had previously spent the most time. Often, I opted not to use this "guided tour" activity in schools in which I had already carried out participant-observation (see 5.4.1). This, however, was the first time I had seen these pupils for several months, and reportedly the first Polli:Nation work they had done since my last visit. I therefore felt it would be useful for them to be reminded of the work they had done before asking them more targeted questions about the project. In my research journal, I wrote:

At 1b, where I haven't been since before Easter, it was great to see the school grounds have sprung into life, and the kids' amazement that lots of the flowers they'd planted had grown. Also, the strip of grass where they planted the fruit trees was full of clover, and in turn, SO many bees.

Research journal, 13/6/17

The dialogue below, transcribed from an audio recording, captures the school's "Polli:Nation team" discovering that some of the flowers they had planted earlier in the year had grown. One of the boys reminds me of the session we had spent planting these flowers, when he and two other boys had placed three flowers in a triangle formation, which they called the "illuminati triangle" (and which I assumed was a reference to the novel and film *The Da Vinci Code)*. It captures the pupils' excitement at seeing the school grounds responding to the work they had carried out.

Mrs S (teacher): Go and have a wee look at what's come up where you planted.
Tara: Ella, Ella, look…
Ella: Wow!
Tara: Look, over here as well, they're beautiful!
Me: You remember planting these too, Aaron?
Aaron: Ah yeah…
Tom: Look, Andy, from when we done the illuminati triangle!
Me: Haha yeah, I remember that!
Craig: And we done it there as well.
Me: That's right.
Mrs S: Let's see, whereabouts?
Tom: Here, it's the illuminati triangle we done!
Mrs S: Oh wow, yeah, those are lovely… and they'll spread as well.
(A minute later)
Craig: Andy, up here!… This one's different to the other ones… Look, me and S planted that one.

Focus group audio recording, 13/6/17

The following example, recorded just a few minutes earlier, captures the same young people noticing what they perceive to be an increased number of bees, and through looking closely at them, noticing that there are different types. Again, it captures the excitement at seeing what they perceived to be the results of the work they had carried out, and at applying the knowledge they had gained about bees to close-up encounters with them.

Mrs S: See that one, that one and that one, there's the wildflowers we planted, they're just coming up now…, they're full of wild flowers, so hundreds of bees over here. Look at that one there, it's huge!

Tara: Look, Mrs S!

Me: So do you guys think there are more bees than before?

All: Yeah

Me: There are SO many, aren't there?

Tom: I saw one and it was, like, black and white…

Ella: Look at that one, that one's tiny…

Mrs S: Look, if you stand and stare at one spot, you can see them all move.

Craig: Andy look, there's one with a white butt.

Tara: Ah wow, can I take a picture? Ella, there's a big one over here!

Ella: This one over here has an orange butt.

Craig: Andy, this one's full black and orange.

Sam: Er, I think it likes me…!

Me: This one's almost completely black, isn't it?

Tom: It's awesome!

Sam: Is that the queen bee?

Tara: It IS the queen bee!

Focus group audio recording, 13/6/17

It is important to note that the second example above demonstrates a *perception,* by the young people, of a more-than-human 'response' to the work they have carried out. That is, there has been no actual measure of whether there *are* more bees than previously, so the 'response' may in fact be purely on the part of the young people themselves, in that they show an increased *awareness* of the bees' presence. This can be related back to the point made in section 7.2, where I acknowledge that *young people's* perspectives remain the inevitable focus of this research. The examples here, despite accounting for how the responses of more-than-human elements have co-shaped the processes by which curricula are produced, remain focused on how seeing these responses adds value to the experience for *young people*. This does not, however, detract from the importance of accounting for the ways in which more-than-human elements are entangled in these encounters.

7.4. Themes in the (co)production of curricula

Having identified and explored the processes by which curricula were produced through the activities comprising the Polli:Nation project, this section now points to four themes running through these curriculum making processes. These help to give further clarity to the conclusions listed in the following section, as well as to the overarching findings of this thesis explored in Chapter 9. These themes are further discussed in the sub-sections below.

7.4.1. Contingent moments and a "relaxed atmosphere"

The first theme running through out the processes by which curricula were produced was that, although the imparting of project-specific information was occasionally planned in advance (see 7.3.3), there was a tendency for key curriculum making processes to be unplanned and centred on contingent moments. This can be seen, for example, in human/more-than-human encounters that tended to be unplanned, as well as in the spontaneous imparting of information by teachers, facilitators, other visiting experts, or even young people themselves. The practical activities within the project, as well as the opportunities for free play and exploration alongside or in-between planned activities, appeared to provide plentiful opportunities for moments such as these. The prevalence of these contingent moments was a key part of the perceived "relaxed atmosphere" that appeared to characterise young people's engagement with the project, and which in turn indicated the replication of a degree of informality in activities more commonly associated with informal learning contexts (namely practical conservation and citizen science).

7.4.2. Practical tasks/physical sensations

Another theme in the (co)production of curricula highlighted in this chapter was the prevalence of practical tasks and physical sensations. Practical tasks include the conservation tasks and baseline surveys carried out by pupils, while a large number of physical sensations were enabled by these and through the free play and exploration that took place alongside or in-between them. These included physically engaging with other species (for example, young people picking them up and letting them crawl across their hands), as well as sensations such as physical exertion, picking up twigs and leaves, running through wet grass, and experiencing aspects of the weather and seasons.

The prevalence of these physical aspects within the project leant an importance within curriculum making to processes that were not only cognitive and/or centred around verbal explanations.

7.4.3. Enactment of "collective thinking" with more-than human elements

The third theme in this chapter highlighted here is that activities within the Polli:Nation project appeared to enable the enactment of lived curricula that differed considerably from the "stewardship" perspective underlying the project, which could be summarised as "a form of thinking collectively with the more-than-human world" that is "nothing like the rational quest to know about the world from a distance that characterises western epistemologies" (Taylor 2017, 1456). This perspective appeared most notable during the sort of contingent moments and the physical tasks described above, and is shown through my identification of concepts in circulation within the Polli:Nation project. Whilst always undergoing some form of "becoming", the concepts identified during participant-observation often reflected a re-production of the discourses and ideas underlying the project – the curriculum-as-plan. These concepts were identified as *Young people as (becoming) conservationists, Young people as (becoming) (citizen) scientists*, *Polli:Nation as conservation project, Polli:Nation as (citizen) science project,* and *Young people as (becoming) community activists/active citizens.* Elements identified in my situational map allowed for young people's development of ideas that did not reflect the stated aims of the project - *Polli:Nation as (other aims/outcomes),* and *young people as (becoming) (other than project aims).* Most notable, however, was the element *"collective thinking" with more-than-human world*, which indicated the enactment of the sort of "beyond stewardship" (Taylor 2017) perspective discussed above.

7.4.4. Co-shaping of curricula

A final theme running throughout the processes explored here is the extent to which curricula were co-shaped by more-than-human elements, visiting experts from outside of schools, and young people themselves, as well as teachers. This can be considered a process of collective curriculum making that hints at the value of such a "co-produced" curriculum. This theme is returned to in Chapter 9. The co-shaping of the curriculum by more-than-human elements can be clearly seen in the human/more-than-human

encounters explored in section 7.3.8, as well as the (perceived) responses these more-than-human elements made to the changes young people had made to their school grounds (7.3.9). The influence of external experts on the curriculum making process can be seen in the examples given in section 7.3.4, while young people's co-shaping of their own lived curricula is demonstrated in their free play and exploration, spontaneous questioning and sharing of stories, and the enactment of perspectives other than those forming the curriculum-as-planned. Finally, while the teacher's role in the curriculum making process appeared to be somewhat decentralised by the increased involvement of visiting experts, young people and more-than-human elements, they nonetheless continued to play a key part. This may be, for example, through shaping the ways in which their school engages with the project, as seen in School 1c, where the project was introduced as a means to improve literacy and employability (see 7.3.2). Teachers also continued to be involved in directing practical conservation tasks, as well as (often spontaneously) imparting information about the more-than-human elements encountered during these activities.

At this point, the Social Worlds/Arenas map produced following the process of Situational Analysis provides an illustration of the various human and more-than-human elements involved in this collective curriculum making process. The map is shown in Figure 7a, and represents a coming-together of three main "social worlds", with various smaller "worlds" within them. Polli:Nation, as experienced by young people, is depicted as overlapping with all of these worlds. As explained in Chapter 5 (5.6.4), these maps are based on "social worlds" as conceived by Strauss (1978) and Becker (1982) (see Clarke, Friese, and Washburn 2017, 71-75). Their applicability to this study was more limited than that of situational and relational maps, but in hindsight, I was struck by the way the map resonates with the co-production of curricula highlighted in this chapter. It does this by depicting the various "social worlds" that were brought together in this process. Furthermore, the inclusion of "more-than-human worlds" recalls Tsing's (2013) essay on "more-than-human sociality", which calls for an extension of our understanding of "social worlds" to include the more-than-human.
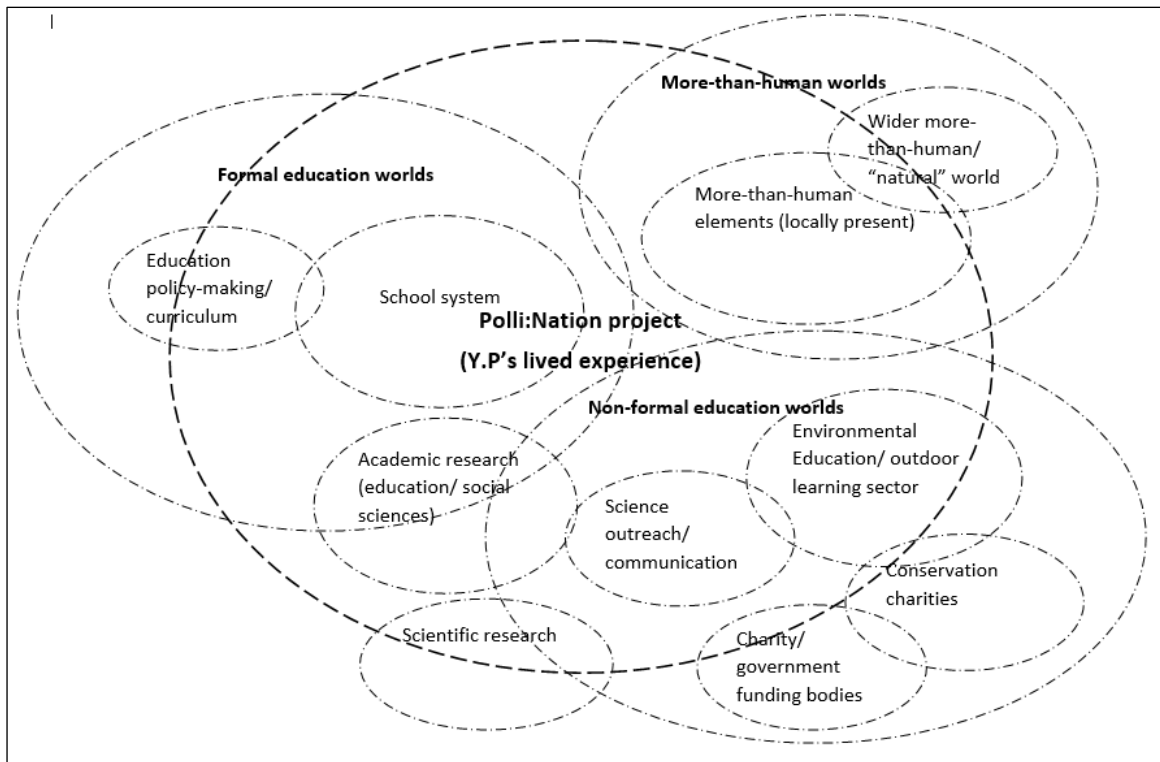
Figure 7a: Social Worlds/Arenas map depicting the various "social worlds" coming together in the curriculum making process.

7.5. Summary and chapter conclusions

This chapter has drawn principally upon participant-observation to explore the processes by which curricula were produced during the activities comprising the Polli:Nation project, thus primarily addressing the question *How are curricula produced through the common activities and features within the Polli:Nation project?* The processes explored here, rather than being linked to any stand-alone activity, instead cut across any number of the features and activities identified in the previous chapter. The processes by which curricula were produced included the "invention in practice" of "concepts" (Semetsky 2015), the planned and spontaneous imparting of information, practical conservation tasks and physical sensations, free play and exploration, (usually unplanned) encounters with more-than-human elements, and the responses (or perceived responses) made by these more-than-human elements.

I have also highlighted four themes running through the ways in which curricula were produced through Polli:Nation. These can be summarised as follows. Firstly, the

tendency for key curriculum making processes to be unplanned and centred on contingent moments – a key part of the informality that characterised the project. This can be seen, for example, in the human/more-than-human encounters, which tended to be unplanned, and often led to the spontaneous imparting of information by teachers, facilitators, other visiting experts, or the young people themselves (see 7.3.8). Secondly, the prevalence of practical tasks and physical sensations through which the production of curricula occurred – that is, curriculum making occurred through means other than the verbal transfer of information. Examples of this include the practical conservation tasks in which young people were engaged, physically engaging with other species, and tactile engagement with items such as sticks, leaves and wet grass. Thirdly, activities within the Polli:Nation project appeared to enable the enactment of a lived curricula that differed considerably from the "stewardship" perspective underlying the project, which could be summarised as "a form of thinking collectively with the more-than-human world" that is "nothing like the rational quest to know about the world from a distance that characterises western epistemologies" (Taylor 2017, 1456). A final theme running throughout the processes explored here is the extent to which curricula were co-shaped by more-than-human elements, visiting experts, and young people themselves, as well as teachers. This can be considered a process of collective curriculum making that hints at the value of such "co-produced" curricula, and is returned to in Chapter 9.

The key conclusions from this chapter are summarised in the box overleaf. These "chapter conclusions" contribute to the four overarching findings from the thesis as a whole, identified in Chapter 9.

Chapter 7 conclusions

1. There was a tendency for key curriculum making processes within the Polli:Nation project to be unplanned and centred on contingent moments. This could be seen through the human/more-than-human encounters, spontaneous imparting of information, and free play and exploration that were enabled by the project.

2. The contingent moments through which curriculum making occurred were enabled by the replication of a degree of informality in activities more commonly associated with out-of-school contexts, and an associated "relaxed atmosphere".

3. There was a prevalence of practical tasks and physical sensations through which curricula were produced/enacted during the Polli:Nation project.

4. Activities within Polli:Nation enabled the enactment of lived curricula that differed considerably from the "stewardship" perspective underlying the project, instead suggesting a form of "collective thinking" with more-than-human elements.

5. Polli:Nation provided opportunities for curricula to be co-shaped by more-than-human elements, visiting experts from outside of schools, and young people themselves, as well as teachers.

The conclusions drawn from this chapter informed the twenty focus groups I later carried out in eighteen Polli:Nation- participating schools (see Chapter 5). Using a series of flashcards that reflected the key observations made during participant-observation, I sought to build upon these conclusions and investigate what young people themselves considered significant with regard to their experience of the Polli:Nation project. Their responses are the focus of the following chapter.

8. Findings 2: Young People's Perspectives

8.1. Introduction

This chapter draws upon focus group data in order to explore young people's perspectives on the key activities and features within the Polli:Nation project, thus directly addressing this study's third central research question: ***What do young people see as the significant activities and features within the Polli:Nation project?*** With reference to relational maps and accompanying memos, I then explore the entanglements between these elements and others within the project. With its focus on relations, this chapter builds further upon simply *identifying* the features operating within this unique assemblage, by going "further analytically and try(ing) to specify *how it is working* in the specific situation under analysis" (Clarke, Friese, and Washburn 2017, 95). It therefore also more clearly addresses this study's fourth key question: ***What is the nature of the relations between these significant features and processes?***

This chapter is structured as follows: Having accounted for the development of the flashcards used in my focus groups (section 8.2), I then explore the five activities and features represented by these flashcards that were most commonly selected by young people (8.3). These are "close-up encounters with other species", "working with experts from outside school", "doing practical conservation tasks", "working in a small group", and "relaxed atmosphere". With reference to relational maps and memos, I then demonstrate the entanglements of these significant elements with others within the assemblage (8.4). I demonstrate this relationality using two of the key features identified here as starting points within the relational maps - "close-up encounters with other species", and "relaxed atmosphere" - and highlight how the strong links between these and other features within Polli:Nation created synergies in terms of the ways in which young people experienced the project.

At the end of this chapter (section 8.5), I also address the fifth key question identified in Chapter 3: ***How do young people describe the learning that is produced by the Polli:Nation project?*** This question draws upon focus group questions that were originally aimed more at the evaluative requirements of this research – that is, towards

evidencing the "outcomes for people" specified by the Heritage Lottery Fund, which included "people will have learned about heritage", "people will have changed their attitudes and behaviour", and "people will have developed skills" (Learning through Landscapes 2014, 37). Asking this question in focus groups, however, nonetheless produced insights that were relevant to this thesis, providing an insight into how the "research assemblage" created by this study helped to influence the way pupils self-reported the 'learning' that had occurred.

8.2. Selection of focus group flashcards

In my focus groups, as outlined in Chapter 5, I attempted to directly address the question "What do young people see as the significant activities and features within the Polli:Nation project?", through an activity involving a series of flashcards. This activity usually occurred towards the end of focus groups, and was usually preceded by (one or both of) a "guided tour" of the school grounds and the changes the young people had made to it, and an activity in which young people were asked to select and talk about one of a series of photos taken during Polli:Nation activities. This was a form of "hierarchical focusing" (Mannion et al. 2006) that aimed to slowly steer the focus groups towards more specific and targeted questioning.

Before introducing the flashcards, I always began by asking an open question – usually phrased as "If you were in charge of a project similar to Polli:Nation, what would be the most important things to include in it?", or "What do you think are the most important 'ingredients' of a project like this?" As highlighted in Chapter 5, however, this open question invariably produced very little discussion, with pupils often simply pointing to the project having taken place outdoors. It is worth noting here that if "being outdoors" had been one of the flashcards used in these focus groups, it may well have been the most commonly selected. Since there is already a wealth of literature pointing to the value of outdoor learning in general, however (e.g, Palmer et al. 1998; Beames, Higgins, and Nicol 2012), my interest was in identifying more specific features of the project than this.

To prompt discussion, then, I would present the collection of eighteen flashcards, and ask participants to choose one that stood out to them as being particularly important

within the project. The activities and features represented by these flashcards (as well as the photos used in the preceding activity) were drawn from the elements making up the situational map in Figure 6a in Chapter 6, which in turn stemmed from my own participant-observation in Polli:Nation-participating schools. When creating these flashcards, the elements as they were written on the situational map did not necessarily translate into a few words that were easily communicable to young people. Instead, some of the flashcards encompassed several different elements from the situational map, and others were re-phrased in order that they could be more easily communicated. Sometimes, the flashcards referred to a specific activity. Other times, I wanted to explore an idea or "concept" – such as the extent to which young people saw themselves as "(becoming) conservationists" and/or "(becoming) (citizen) scientists". The table below shows the elements from the situational map that gave rise to each flashcard. It is then possible to refer back to the previous chapters for my reflexive account of how these elements were, in turn, identified.

Flashcard	Elements/notes
"Working with experts from outside of school"	- External/visiting experts
"Doing science outdoors"	- (Citizen) science-based tasks – outdoors - Pupils as (becoming) (citizen) scientists
"Doing practical conservation tasks"	- Practical conservation tasks - Young people as (becoming) conservationists - Polli:Nation as conservation project
"Learning about the science of pollination"	- Learning about pollinators – i.d, science of pollination, etc.
"Contributing to pollinator conservation"	- Young people as (becoming) conservationists - Polli:Nation as conservation project - Environmental issues –pollinators /biodiversity
"Working in a small group"	- Group size - Relaxed atmosphere
"Relaxed atmosphere"	- Relaxed atmosphere

	- Free play/exploration - Spontaneous imparting of info (teachers, facilitators, etc.)
"Learning about issues in my local community"	- Young people as (becoming) community activists/active citizens - Engaging with other organisations/places in local area
"Learning about wider environmental issues"	- Other environmental issues (learning about/engaging with)
"Close-up encounters with other species"	- Human/more-than-human encounters
"Being part of a team"	- Sense of being part of a (small?) team
"Using specialist equipment"	- Specialist equipment
"Contributing to scientific research"	- Polli:Nation as (citizen) science project - Pupils as (becoming) (citizen) scientists
"The chance to be physically active"	- Physical effort/exertion
"The chance to identify my own skills"	- Chance to identify own skills - Polli:Nation as (other aims/outcomes)
"Telling others about the experience"	- Telling others about the project (blog, assembly etc.)
"Working with parents/adult volunteers"	- Parent helpers
"Working with scientists"	- External/visiting experts - Pupils as (becoming) (citizen) scientists - Polli:Nation as (citizen) science project
"Working with others from outside of school"	Added for the schools in England, Wales and Northern Ireland to which I made one-off visits (and therefore, did not know in advance who else had been involved in the project).

Table 8a: Table showing each of the key features or activities included on the flashcards used in focus groups, and the elements from my situational map from which they had stemmed.

8.3. Key features and processes within Polli:Nation

8.3.1. Introduction

Having accounted for the selection of flashcards used in my focus groups, this section explores the key features and processes of the project identified by young people, and the themes that emerged with regard to the perceived importance of those features. Table 8b details the number of times each flashcard was chosen during focus groups. These demonstrate that among the elements most commonly chosen and discussed by young people were "close-up encounters with other species", "working with experts from outside of school", "working in a small group", "doing practical conservation tasks", and "relaxed atmosphere". For this reason, I choose to discuss these elements in this section. As will be further demonstrated through the use of relational maps later in this chapter, however, rather than viewing these features as stand-alone entities, I instead characterise them as uniquely entangled in unique sets of relations with other elements making up the assemblage described in the previous chapter. As will be demonstrated throughout the following sections, elements within the assemblage were sufficiently entangled that, in effect, I could have started with *any* of the features on the flashcards in order to demonstrate this relationality. Nonetheless, counting the number of times each flashcard had been selected highlighted general trends in terms of the features perceived as significant by young people, and a starting point for deciding which features to focus on in this chapter.

It should also be noted that although these results are presented here in a quantitative manner, they are intended merely as a rough guide, having stemmed from an activity whose primary aim was simply to provoke discussion. It was not designed as a quantitative study, and would therefore have numerous caveats in this respect. For example, there was only one of each flashcard, and although young people were told that they could pick the same one as someone else if they wanted, they rarely did so.

Flaschard/element	Number
Relaxed atmosphere	13
Close-up encounters with other species	11
Doing practical conservation tasks	10
Working with experts from outside of school	10
Working in a small group	9
Being part of a team	8
Learning about the science of pollination	8
Telling others about the experience	7
Learning about wider environmental issues	7
The chance to be physically active	6
Contributing to scientific research	5
Contributing to pollinator conservation	5
Doing science outdoors	5
Learning about issues in my own community	5
Working with others from outside of school	5
Working with parents/adult volunteers	4
Using specialist equipment	3
The chance to identify my own skills	3
Working with scientists	2

Table 8b: Table showing the number of times each flashcard was selected during focus groups.

8.3.2. "Close-up encounters with other species"

As detailed above, this feature had stemmed from the element ***human/more-than-human encounters***. These encounters usually occurred spontaneously either during the course of planned activities or in-between them, and struck me throughout participant-observation as being particularly affect-producing (see 7.3.2 and 7.3.8). For example, I noted numerous instances of young people all crowding round to see a ladybird crawling across someone's hand, and showing collective excitement when seeing a bee landing on a flower. The reasons pupils gave for choosing this flashcard, however, usually had less to do with the affective responses the encounters provoked, and more to do with the perceived benefits of learning about pollinators, and how to 'protect' them, through direct experience. These types of response can be seen in the following quotes:

"Because you're not going to understand how bees work without seeing them up close".
(P7, School 11b[3])

"Like if a bee's sitting on a flower, you can actually see it pollinating the flower".
(P6, School 2b)

"So you know what you're trying to protect".
(P6, School 6a)

These responses perhaps indicate a tendency for pupils to narrate their experiences in relation to the curriculum-as-plan – in this case, to focus on how a particular feature of the project helped them to learn about the science of pollination. They also point to the influence of the "research assemblage" in operation here. That is, in a structured intervention in which a researcher asks them questions about an educational initiative, pupils are far more likely to emphasise 'understanding' and 'knowing' (as in the above responses) rather than the affective dimension, which was instead captured through the fieldnotes drawn upon in the previous chapter. This interpretation is explored further in relation to pupils' reporting of their 'learning' during Polli:Nation, in section 8.5.

Nonetheless, that this feature was commonly selected by young people added to my own observations by highlighting that young people themselves pointed to the importance of such human/more-than-human encounters. When viewed purely as a means of delivering the curriculum-as-plan, meanwhile, the perceived importance of direct experience of other species clearly fits with the numerous studies cited in the Literature Review that point to the importance of "direct" as opposed to "indirect" learning experiences (Duerden and Witt 2010, Kruse and Card 2004, Palmberg and Kuru 2000; Cho and Lee 2018, Schonfelder and Bogner 2018).

8.3.3. "Working with experts from outside of school"
This flashcard stemmed directly from the element ***external/visiting experts***. As detailed in section 7.3.4 in the previous chapter, this initially referred only to the LTL

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[3] Year group of pupil according to Scottish system, school code.

facilitators who regularly engaged with pupils throughout the project. Later in my participant-observation sessions, however, other external experts visited schools to run specialist sessions. Those I experienced in participant-observation included a member of staff from Buglife running a session on building "bug hotels", a woodworking and landscaping expert working with pupils to build wooden planters (both School 1b), and a local beekeeper giving an interactive talk (School 7a). Pupils at School 1b had also visited a local orchard as part of the project. In focus groups carried out in schools to which I made only one-off visits, pupils talked about a number of other experts they had worked with, including a graffiti artist, and staff from local wildlife trusts and conservation charities.

Young people's frequent selection of this flashcard supports the observations explored in the previous chapter regarding the role of external experts in co-shaping the curricula that were produced through the Polli:Nation project. Young people's reasons for selecting this flashcard can largely be split into two themes. Firstly, there was the perception of these visiting experts as being better able to teach them about a specialist subject (than, say, teachers). The following quote demonstrates this viewpoint:

"because if it's just your teacher, or a teacher, just telling you about it, they probably don't know as much as other people would, because... teachers wouldn't know that much about, like, the different parts of a flower and which parts produce pollen, but there are experts that would know about flowers and how they create pollen, how they distribute pollen".
(P6 pupil, School 9a)

This response was particularly interesting because often, teachers *would* know this sort of information, especially those taking a leading role in the Polli:Nation project. It was nonetheless indicative of the value this pupil placed on hearing information from someone with specialist knowledge and direct experience of a particular topic, and therefore, the value of involving such people in curriculum making processes.

The second theme in pupils' responses is the novelty of working with someone they had not previously met, and the opportunity that this affords for hearing different "voices"

to those they would normally come into contact with in formal education contexts. The responses below demonstrate this:

"Just somebody different – that doesn't usually happen. Just someone who comes into school to talk about something that we never usually talk about. We could have someone in about poppies or something, but that would be very rare. Then we had someone, an expert about going outside, and then like, helping global warming, and a few other things…"
(P6, School 2a)

"It's better hearing new voices, d'ye know what I mean?"
(S2, School 1c)

"Talking to new folk and learning more stuff"
(S2, School 1c)

"Like the people who come in and do exhibitions to us - like give us shows to give us information and all that… It's really fun", 'cos you don't know *them"*
(P6, School 13a)

The role that these visiting experts play in shaping curricula beyond the curriculum-as-plan, as well as young people's appreciation of this aspect of the project, has strong resonances with literature highlighting the potential of curricula that are co-produced with members of the wider community (Leat and Thomas 2016a; Breiting 2018; Green and Somerville 2011; Peacock and Pratt 2011). I return to this when discussing the implications for school-linked environmental education in the following chapter.

8.3.4. "Doing practical conservation tasks"

This flashcard stemmed directly from the element *practical conservation tasks*, which covered a variety of activities such as planting flowers and fruit trees, digging up a large area for planting, building "bug hotels" of various sizes and designs, and digging and filling a new pond. It also took into account two of the key ideas or "concepts" I had noted as being in circulation: the idea of *Polli:Nation as conservation project,* and of

Young people as (becoming) conservationists. Similarly to "close-up encounters with other species" (see 8.3.2), young people often selected "doing practical conservation tasks" as a significant feature of the project due to perceived benefits of learning through direct experience. Again, this is demonstrated in the following quotes:

"You're doing stuff, you're not just like copying it down. Like, we'd normally get like a worksheet, or something..."
(P6, School 9a)

"It gets you more into stuff, it feels less like school".
(S2, School 9b)

"It makes you understand a lot better. Getting up close gives you more of a first-hand experience of it..."
(P7, School 11b)

This pupil, meanwhile, talks about how engaging directly in practical tasks helps them to notice more in their local area:

"It's fun to do, and just so you know what there is (in the local area), what's going on..."
(P6, School 2b)

These responses from young people further suggest the importance of practical activities involving processes other than the verbal transfer of information. In terms of delivering the curriculum-as-plan, as with "close-up encounters with other species", it is interesting that young people themselves perceive this direct experience as being higher quality learning – as seen, for example, in the statement that "it makes you understand a lot better".

8.3.5. "Relaxed atmosphere"

As outlined in the previous two chapters, the inclusion of this element had come about through my own perception of Polli:Nation activities as taking place in a more 'relaxed'

atmosphere than classroom-based learning, due to small group sizes and the opportunities for spontaneous imparting of information, free play and exploration in between organised activities, and close-up encounters with other species. This was, as discussed previously, one of the elements that most clearly reflected the situated opinions, experiences and perceptions held by the researcher. It was striking, then, that this was in fact the most commonly-selected flashcard during focus groups ("working in a small group", which I considered to be a key part of this "relaxed atmosphere", was also commonly selected – see following sub-section). When pupils selected this flashcard, I asked a follow-up question along the lines of "what is it about this project that's relaxed?" In response, pupils' own interpretation of the "relaxed atmosphere" of project activities tended to focus on the project's position on the margins of the curriculum – in particular, that what they were doing did not count towards any sort of formal assessment, and/or was perceived as being 'easier' than core curricular subjects such as maths. The following quotes give a sense of this:

"It's like when you're in a classroom, you know you have to be taking in everything 'cos you know you're going to be tested on it, whereas this is more enjoyable but it's also actually beneficial… And doing these things, like, extra-curricular, it is more enjoyable than sitting in a classroom and knowing you're going to be tested on it. It's like, that pressure, it makes it less enjoyable".
(S5, School 9b)

"A break from lessons. It's not like you have to do it, and write everything down. It's not like you're being tested".
(S2, School 10a)

"You don't have to do huge calculations like in maths".
(P6, School 2b)

"Fresh air and stuff…. You get the chance to just sit down and enjoy the moment".
(P5, School 2a)

In the previous chapter, I highlighted through participant-observation the informality that appeared to by a key feature of the project. Activities normally associated with

informal education contexts had, it seemed, retained a degree of this informality when introduced to *formal* education contexts. Young people's responses here suggest that they value this sense of informality, which adds further weight to my contention that this was a "significant feature" of the project. In the following chapter, I reflect on the challenges of continuing efforts to embed such projects into mainstream curricula in the hope of engaging greater numbers of pupils, whilst still retaining this significant feature.

8.3.6. "Working in a small group"

Given the tendency for Polli:Nation activities to involve small groups of pupils working as a dedicated Polli:Nation "team", the apparent significance to young people of "working in a small group" was particularly interesting. Among young people's reasons as to why this was an important aspect of the project, the first quote below in particular fits with my own impression of the small group sizes allowing for more spontaneous interactions between pupils and teachers and/or visiting experts:

"You can do more stuff with a smaller group, and ask more questions".
(Year 9 pupil, School 7a)

"It's fun compared to working on your own. You can have multiple opinions, and maybe someone's opinion is better, and you can learn from it and do that".
(Year 5 pupil, School 11b)

"You're able to chat and just have fun. Because it's a small group, and you get to talk to each other".

(P5, School 13a)

The perceived importance of this feature gives rise to a similar discussion to the one mentioned under "relaxed atmosphere". Whilst the number of pupils regularly engaged in the project within each school tended to be limited, it was this very tendency that, amongst other factors, enabled young people who *were* regularly involved to be engaged in powerful and memorable ways that would perhaps not have been possible in

larger groups, or within the constraints of the mainstream curriculum. Again, this is discussed in more detail in the following chapter.

8.4. Relations between elements

8.4.1. Introduction

I have chosen to demonstrate the nature of relations between elements within the unique assemblage created by the Polli:Nation project using two key features as a starting point for analysis – "close-up encounters with other species", and "relaxed atmosphere". As part of the analysis process, as explained in Chapter 5, I produced relational maps using each element making up the situational map in Figure 6a as a starting point. Highlighting these relations using every significant feature or process would, however, result in a significant amount of repetition. Instead, then, I have chosen two features to focus on. This section will also demonstrate that there was a sufficient entanglement of elements within the assemblage that, in effect, I could have started with *any* of the features on the flashcards in order to demonstrate their interconnectedness through relational maps. These particular two features, however, appeared to me to provide the richest opportunities in terms of tracing relations with other elements within the assemblage, and to have the most potential as a starting point from which to illustrate the interconnectivity of multiple elements, and the synergies created when these elements are combined.

8.4.2. "Close-up encounters with other species"

Following my focus groups, then, and having updated the situational map as described above, I began the process of analysing the "nature of the relationship" between elements (Clarke, Friese, and Washburn 2017, 138) through the creation of relational maps, and the writing of accompanying memos. Below, I summarise the key points that stemmed from this, with reference to the elements making up the situational map created after focus groups had been completed (and with these elements displayed in bold and italics, as per previous chapters). In doing so, I demonstrate the ways in which this stand-out feature of the project is entangled with many of the other elements forming this unique assemblage. The relational map produced to explore these relations is included as an example in section 5.6.2. Its accompanying memo is shown in Appendix 3.

i) The key activities within the ***Polli:Nation project***, such as ***practical conservation tasks*** and ***(citizen) science-based tasks***, serve to facilitate these (often spontaneous) close-up encounters. The human/more-than-human encounters are also further facilitated by the ***"relaxed atmosphere"*** that appeared to characterise the project – that is, one that involved ***small groups*** of pupils and enabled, for example, the chance for ***free play/exploration*** during, or in-between, planned activities.

ii) Pupils were, in turn, often selected to be part of the Polli:Nation project because they were following ***alternative curricula (e.g, ASN),*** and/or were part of an extra-curricular club (***how pupils are selected***).

iii) These human/more-than-human encounters are "co-shaped" (Taylor and Pacini-Ketchabaw 2015) by the more-than-human elements themselves, such as ***pollinators (present)*** and ***other insects (present).*** As described in the previous chapter (7.3.8), the (usually unplanned) appearances of these more-than-human elements influenced the information that was then imparted. It also demonstrated the ***affective capacities*** these more-than-human elements have in provoking different responses in young people.

iv) Another way in which these encounters were co-shaped by the more-than-human elements themselves was through their responses, or perceived responses, to the work carried out by young people as part of Polli:Nation – I labelled these ***more-than-human responses***. This is discussed in section 7.3.9 in the previous chapter. Examples of these responses include the growth of flowers that pupils had planted, and the (perceived) increase in numbers of bees due to the landscape changed that had been made. Although the focus continued to be on how *young people's* learning was influenced, at the very least these responses demonstrate ways in which more-than-human elements are entangled in the learning produced by the project.

v) The affective capacities present within these human/more-than-human encounters were, in turn, shaped by the learning that had already taken place around pollinators – for example, in the introductory presentations given by ***external/visiting experts*** about the ecological importance of pollinators (***Learning about pollinators – i.d, science of pollination, etc.***). The encounters themselves, then, had the capacity to reinforce the

utilitarian view of other species and *conservation/"stewardship"* underlying the project, but also to enable other "concepts" to be enacted and/or "invented in practice" (Semetsky 2015). For example, these encounters provided some of the key moments through which lived curricula suggesting *"collective thinking" with more-than-human world* were enacted (see 7.3.2). These encounters were also, I felt, given greater meaning for pupils by the *sense of pride/ownership* they often displayed while working as part of a small, dedicated team on a specialist topic that sought to address a wider environmental issue.

v) These human/more-than-human encounters also enabled the *spontaneous imparting of information* about the species encountered, which was further enabled by the presence of *external/visiting experts* – also often selected as a significant feature by pupils. Pupils also often spontaneously recounted *memories, stories, or related knowledge*, and appeared readily able to ask spontaneous questions of the visiting experts, most likely owing to the small *group sizes* that characterised the project. This, in turn, shaped the curricular landscape that was produced through these encounters.

8.4.3. "Relaxed atmosphere"
Again, I summarise below the key relations between this feature of the Polli:Nation project, and other elements identified in previous situational maps.

i) The perceived "relaxed atmosphere" within the Polli:Nation project was closely related to the tendency for the Polli:Nation project to take place on the fringes of the relevant *curricula (4 different)*, as part of *alternative curricula* such as the timetable followed by a dedicated Department of Additional Support Needs, or in a context entirely outwith the core, subject-based curriculum (*how pupils selected*). This usually meant that the project was not directly linked to formal assessments – a feature that was valued in particular by older pupils. Working in a small group (*group sizes*) was also a common feature of the project – again, enabled by its position on the margins of mainstream curricula – and this also appeared to play a key part in enabling the "relaxed atmosphere". These trends appeared to be largely a consequence of *time pressures* and a perceived lack of flexibility in these curricula, as well as the perceived

lack of suitability of Polli:Nation activities (such as the baseline survey, and *practical conservation tasks*), to whole classes.

ii) Elements that were key to this "relaxed atmosphere" were the opportunities for pupils to ask questions and share *spontaneous memories/stories*, the chance for *free play/exploration* and/or freely talking *(Other aspects of pupils' lives (freely chatting etc.))* during or in-between planned activities, as well as the *spontaneous imparting of information,* by teachers as well as by *external/visiting experts*, These external experts, I felt, also added to the sense of informality – they were, for example, addressed by their first names, and often spoke to pupils in an informal manner (or at least an atypical manner in formal education contexts).

iii) The "relaxed atmosphere" also seemed to produce greater affordances for moments with *affective capacities*, such as more opportunities for *human/more-than-human encounters*, which in turn were co-shaped by *pollinators (present)*, *other insects (present)*, and other more-than-human elements, and also enabled the enactment of *pupils' differing attitudes to other species.*

iv) It was during contingent moments enabled by this relaxed atmosphere (such as the unplanned human/more-than-human encounters described above) that the enactment of lived curricula that differed considerably from the curriculum-as-plan were most clearly observed. The perspectives observed during these moments were summarised as *"collective thinking" with more-than-human world.* These appeared to be closely linked to the *affective capacities* of such moments, and *pupils' emotional responses* (for example, the excitement expressed at close-up encounters with other species) that were prompted by them. More broadly, I felt that the relaxed atmosphere of the project left open the possibilities of *young people as (becoming) (other than project aims).*

v) I felt that the relaxed atmosphere – in particular, the outdoor setting, the opportunities for *human/more-than-human encounters,* and the *spontaneous imparting of information* that was often provoked by such encounters - enhanced the ways in which pupils were able to engage with *external/visiting experts* (as well as perhaps *dedicated/activist teachers,* who were often particularly passionate about the topics covered through Polli:Nation). That is, pupils' engagement with these experts,

and the way the experts were able to talk about their subject, were different to, say, if they had been giving a talk in front of a class or assembly.

vi) My overall sense was that the elements cited in the previous five points – the outdoor setting, the "new voices", the unplanned events, the chances for free exploration and the lack of links to formal assessment – combined to make the project feel hardly "school-like" at all.

vii) As noted elsewhere, my inclusion of "relaxed atmosphere" as an element in my situational maps came about through my own perception of Polli:Nation activities as being more 'relaxed' than those taking place in more 'conventional' settings. This is acknowledged with the element *researcher – emotions, attitudes, events on the day, etc.*

8.4.4. Discussion – entanglements and synergies

This section has explored the nature of relations between elements within Polli:Nation, drawing upon relational maps and accompanying memos, and taking as a starting point two of the features commonly cited by young people as being significant within the project. In doing so, it has demonstrated strong entanglements between these elements. These entanglements, in turn, have two key implications. Firstly, they illustrate the situatedness of pupils' responses, highlighting the difficulty of picking out any element in isolation as being central to the success of environmental education projects in general. For example, it is not possible to conclude from this chapter simply that "close-up encounters with other species" should always form part of an environmental education initiative, since pupils' experiences of these encounters were strongly enhanced by some of the other elements within the project – the "relaxed atmosphere" that frequently gave rise to them, the learning about the ecological importance of pollinators that had already taken place, and the context of a specialist project that pupils appeared to feel a sense of pride and "ownership" towards.

The example above, however, also gives rise to a second, closely related implication: The entanglements highlighted here demonstrate that significant features of Polli:Nation, when combined, can create synergies in terms of young people's

experience of the project. To use another example: as highlighted by the focus group responses cited in this chapter, a visit from an external expert to speak about a specialist subject, and the sense of novelty this creates, might in itself be a memorable experience for young people. Through Polli:Nation, however, young people were not only engaging with experts from outside of school, but doing so in a "relaxed atmosphere" that afforded opportunities for them to spontaneously ask questions, and for spontaneous discussions that were co-shaped by (often unplanned) encounters with more-than-human elements. Furthermore, the experts formed part of a larger project on which the young people were working in small, dedicated groups, and towards which they appeared to feel a sense of pride, or "ownership". This study, then, has highlighted not only the "significant features" of the Polli:Nation project in isolation, but the ways in which the nature of relations between these served to enhance young people's experience of it.

8.5. Learning produced by Polli:Nation: Young people's descriptions

Having explored the processes and features within the Polli:Nation project deemed significant by young people, as well as the ways in which these are entangled with other elements in the assemblage, this section briefly addresses the fifth question identified in the Chapter 3: *How do young people describe the learning that is produced by the Polli:Nation project?*

8.5.1. The curriculum-as-plan and the hybrid assemblage

As discussed in the Literature Review, Chapter 3 and elsewhere, it was never the purpose of this thesis to investigate "what young people have learned" through Polli:Nation – that is, to evidence the project's outcomes. The evaluative element of this research, however, nonetheless required that I ask questions along these lines as part of my focus groups. This was owing to the need to evidence the "outcomes for people" specified by the Heritage Lottery Fund (HLF), which include "people will have developed skills", "people will have changed their attitudes and behaviour", and "people will have learnt about heritage" (LTL 2014, 37). For the doctoral element of this research, however, it was nonetheless insightful to consider the way pupils *describe* the learning that had taken place through Polli:Nation. With this in mind, I devised the research question addressed in this section.

In all focus groups, I asked a question along the lines of "what sort of things do you feel you know more about after taking part in Polli:Nation?" This was phrased so as to be as open as possible, potentially accommodating "skills" developed as well as "learning about (natural) heritage". In response to this question, the vast majority of pupils' responses related to knowledge about the important ecological role that pollinators play, reflecting the *"stewardship" perspective* and *utilitarian view of other species* identified as underlying the project. That is, young people's responses to the question largely reflected the project's pre-stated curriculum-as-plan. This is demonstrated by the selection of focus group responses below.

"The Polli:Nation project is about helping the bees, and finding out what we can do to help. Like, even more than we are now. Like, 'cos we're building habitats for them, and if we don't do anything about it, they'll be extinct in twelve years… And if we didn't have bees, like, most of our food we wouldn't have, like bread or stuff like that, because of the pollination."
(P7, School 11a)

"(I've learnt to) be kinder to bees, because once you realise like how important bees and stuff are, you actually start to take more care of them"
(P5, School 2a)

"Pollinators are one of the main things that are keeping humans alive"
(P5, School 2a)

"I've learned about what an important job bees do, and I didn't even know that if bees didn't do their job, or just didn't want to do it, or we just get rid of them, then we wouldn't have any honey, we wouldn't have any chocolate, we wouldn't have any vegetables…"
(P6, School 2b)

"I've got a lot more respect for the bees now… They do a lot of hard work"
(S3, School 7a)

It should be noted that in terms of HLF's stated "outcomes", this represents a clear success for Polli:Nation, as highlighted in the evaluative report written at the project's conclusion (Ruck and Mannion 2019a). Pupils' responses here, however, enable a reflection on how the "hybrid assemblage" creating these focus groups - that is, the "event assemblage" of the activities comprising Polli:Nation, combined with the accompanying "research assemblage" (Fox and Alldred 2018) had influenced the responses given by pupils. Clearly, the *"stewardship" perspective* and **utilitarian view of other species** formed part of the "event assemblage". Although there were other concepts in circulation reflecting lived curricula that differed from these underlying discourses, these were not easily verbalised - least of all during a structured research intervention conducive to relatively short responses. Added to the "research assemblage" hereby created was my own close association with the Polli:Nation project, which most likely led pupils to associate me with the project's stated aims. Phrasing the question along the lines of "what have you learned?" would then have added to this, further encouraging pupils to give answers that simply reflected the curriculum-as-plan. In short, the effects of the research assemblage made it difficult for pupils to verbalise anything other than 'learning' that related to the project aims, and that "an individual child is able to conceptualise linguistically, emerging from within the child" (Lenz Tacguchi 2011, 39).

The influence of this "hybrid assemblage" can be further illustrated in relation to the responses given by pupils at school 1c, where, right from the start, there had been a different vision for the Polli:Nation project to that laid out in the Polli:Nation Activity Plan. As discussed in section 7.3.2, the lead teacher in this Scottish secondary school saw Polli:Nation primarily as a vehicle for improving literacy among his ASN pupils, as well as their practical and "employability" skills. Accordingly, the focus group I carried out at this school was notable in that, in total contrast to all other participating schools, the question of what pupils "knew more about" produced absolutely no responses relating to pollinators. Instead, pupils focused more on the practical skills they had developed, as shown in the examples below.

"Life skills, like gardening. Like how to plant plants, and bulbs and that"

"Team building, groupwork, confidence, that kinda thing"

"If you weren't at school and had to go to like a normal job, you'd obviously know what to do"

"Building things. Like, we were building the things for the flowers – the planters"
(S2, School 1c)

8.5.2. Hints of lived curricula "beyond stewardship"

While pupils' self-reported learning largely reflected the "stewardship" perspective underlying the project, the less structured methods used in this study captured elements of a "lived curriculum" that was not easily verbalised by young people, but which was markedly different from this curriculum-as-plan. This can be seen most clearly in Chapter 7, which highlights through participant-observation moments that demonstrate young people's ***"collective thinking" with more-than-human world*** that is "nothing like the rational quest to know about the world from a distance that characterises western epistemologies" (Taylor 2017, 1456).

It should be noted, however, that perspectives going "beyond stewardship" (Taylor 2017) in this way were occasionally hinted at during focus groups. Significantly, such moments tended to arise through unplanned conversations that stemmed indirectly from some of the pre-set questions – for example, conversations that would often develop around young people's attitudes towards bees, and how these had changed in the course of the project. The following quotes give a sense of this:

"The bees are attracted to me, and I think they're cute… (Before Polli:Nation) I thought like they were going to sting you all the time so I carried on running away from them, and then when I picked up my first bee I was really happy, and I picked up some more. They just crawled on my arm… (There's something powerful about) the way they look at me"
(S2, School 10a)

"I helped a bee the other day, I saw one just on the floor doing nothing, and then I gave it sugar water then it flew away"

(P6, School 2b)

"Bees are more scared of us than we are of them. Imagine if you were a bug and someone stood on you!"

(P5, School 2a)

The discussions provoked by the lived curricula highlighted here and (especially) through participant-observation, are explored in the following chapter.

8.6. Summary and chapter conclusions

This chapter has drawn upon focus group data to explore the features and processes that young people themselves consider significant in terms of their lived experience of the Polli:Nation project. In the key activity within my focus group, young people were asked to select from a series of flashcards representing key features of the project that stemmed from the participant-observation in Polli:Nation schools described in the previous chapters. In this chapter, I first identified the features most commonly-cited by young people, and picked out key themes with regard to their reasons for selecting these features. These features were "close-up encounters with other species", "doing practical conservation tasks", "working with experts from outside school", "working in a small group", and "relaxed atmosphere". Drawing upon the process of creating relational maps, I then explored the relationships that could be drawn between these features and other elements comprising young people's lived experience of the Polli:Nation project. These entanglements illustrate the situatedness of pupils' responses, highlighting the difficulty of picking out any element in isolation as being central to the success of environmental education projects in general. Nonetheless, this research has illustrated the synergies that were created in terms of young people's experience of the Polli:Nation project, when these features were combined.

Additionally, I also sought to explore how young people describe the learning that has been produced by the Polli:Nation project. This highlighted ways in which the "hybrid assemblage" in operation produced responses that largely reflected the "stewardship"

perspective and utilitarian view of other species underlying the project. I also, however, highlighted occasional responses that serve as a reminder of the enactment of lived curricula that went beyond an understanding of their ecological importance. This, however, was better evidenced through participant-observation, as seen in Chapter 7.

The wider implications of these conclusions for school-linked environmental education initiatives (in particular the use of practical conservation and citizen science within these) are now explored in the following chapter.

The key conclusions from this chapter are summarised in the box overleaf.

Chapter 8 conclusions

6. Young people identified "practical conservation tasks" and "close-up encounters with other species" as significant features of the Polli:Nation project. These further suggest both the value young people attach to educational processes that differ from the verbal transfer of information, as well as the extent to which lived curricula are co-shaped by more-than-human elements.

7. Young people identified "relaxed atmosphere" and "working in a small group" as significant features of Polli:Nation. Taken together, these suggest that young people valued the feeling of informality that was enabled by various elements within the project.

8. Young people identified "working with experts form outside school" as a significant feature of the Polli:Nation project, which highlights further the role that community members and organisations from outside school can play in co-shaping curricula.

9. Key features within Polli:Nation gained greater significance from their relations with *other* key features within the project. While pointing to the highly situated nature of young people's experience of the project, these relations also highlight the synergies that were created when these features were combined.

10. Young people's descriptions of the learning produced through Polli:Nation largely reflected the curriculum-as-plan. This demonstrated the influence of the "hybrid assemblage" on their responses – a combination of the prioritisation of cognitive aspects of 'learning', and structured research interventions such as focus groups.

9. Overarching Findings and Discussion

9.1. Introduction – orientations and practical challenges

In this chapter, I seek to place the conclusions from the previous chapters in a wider context. I begin by identifying four overarching findings that draw on a combination of these chapter conclusions. I then discuss these findings with reference to existing research in environmental education and related fields, as well as the possible orientations for pedagogy, curriculum and environmental education practice that these findings point towards. With reference to the evaluative element of this research (Ruck and Mannion 2019a), I also consider the challenges of implementing these orientations in practice, and offer tentative recommendations for how practitioners may begin to work with them. In doing so, I aim to address the final research question identified in Chapter 3: ***What are the implications of these findings for school-linked environmental education initiatives, in particular the use of practical conservation and citizen science within these?***

9.2. Summary of overarching findings

The following findings are drawn from a combination of the conclusions listed in each of the previous chapters. I provide an in-depth discussion of each in the following sections.

Finding 1: **This research demonstrates the value of a process of curriculum making involving people and organisations from outside the school system, more-than-human elements, and young people themselves. Indeed, young people considered the manner in which these elements came together to be a key feature of the Polli:Nation project.**

Finding 2: **The informality that characterised young people's participation in practical conservation and citizen science within formal education contexts appeared to add value to their experience of the Polli:Nation project.**

Finding 3: **The practical tasks, contingent moments and human/more-than-human encounters within Polli:Nation enabled the enactment of lived curricula that indicated a form of "collective thinking" with more-than-human elements, and which differed considerably from the "stewardship" perspective underlying the project.**

Finding 4: **Key features within Polli:Nation gained greater significance from their relations with *other* key features within the project. While pointing to the highly situated nature of young people's experience of the project, these relations also highlight the synergies that were created when these features were combined.**

9.3. Discussion of Finding 1

Finding 1: **This research demonstrates the value of a process of curriculum making involving people and organisations from outside the school system, more-than-human elements, and young people themselves. Indeed, young people considered the manner in which these elements came together to be a key feature of the Polli:Nation project.**

9.3.1. Related chapter conclusions

Each of the four overarching findings draw upon a number of the conclusions listed at the end of the previous two chapters. Clearly, there is a degree of overlap between these – that is, one chapter conclusion will relate to more than one of these overarching findings. Here and in the following sections, however, I list the chapter conclusions that pertain most clearly to each of these overarching findings. Finding 1 relates primarily to the following chapter conclusions:

5. Polli:Nation provided opportunities for curricula to be co-shaped by more-than-human elements, visiting experts from outside of schools, and young people themselves, as well as teachers (Chapter 7).

8. Young people identified "working with experts form outside school" as a significant feature of the Polli:Nation project, which highlights further the role

that community members and organisations from outside school can play in co-shaping curricula (Chapter 8).

9.3.2. Co-produced curricula

The contribution made by this finding is, through ethnographic insight, to highlight the educational value of what I will call "co-produced curricula". The term "co-production" has seen limited but varied use across the academic literature - for example, in research co-designed by participating communities (Durose et al. 2011; Bell and Pahl 2018); and in contexts such as higher education (Carey 2013) and workplaces (Boreham 2004) where context-specific 'curricula' are shaped with input from students and employees respectively. Here, I use the term to refer to a process of curriculum making within Polli:Nation schools that enabled the "curricular landscape" to be co-shaped by young people themselves, more-than-human elements, teachers, and people and organisations from outside the school system. The ways in which this co-shaping occurred can be briefly summarised as follows:

- As per conclusion 5 above, **young people** themselves appeared to be given opportunities to shape their experience of the Polli:Nation project in their own ways - for example, through opportunities for free play and exploration, the chance to ask spontaneous questions of or share memories with visiting experts, and to express their own (differing) attitudes to other species.

- As demonstrated in Chapter 7, the project afforded opportunities for **more-than-human elements** to co-shape the processes by which curricula were produced - most commonly through appearing unexpectedly and provoking related questions or discussions.

- Although somewhat decentred, **teachers** remained key in shaping the ways in which learning, and curricula, were produced. This can be seen most clearly in their decisions as to which pupils to involve in the project (for example, a whole class, or a group of pupils with additional support needs), and as to the project's main aims in their particular school (the clearest example being School 1c, where the project was seen as a vehicle for providing literacy and employability).

- Of these elements, the involvement of **visiting experts, and/or organisations from outside the school system,** were the most striking with regard to

Polli:Nation specifically. Polli:Nation was unique in its long-term links with NGOs such as LTL and OPAL, as well as involving a variety of other experts - for example, beekeepers, woodwork and landscaping experts, graffiti artists, and members of staff from local wildlife charities.

The processes by which curricula were co-produced through Polli:Nation, and young people's identification of these as significant features of the project, point to the potential of alternative forms of curriculum making that involve young people themselves (Fraser 2013; Rennie, Venville, and Wallace 2012), more-than-human elements (Gough 2018), and other organisations and members of the community (Leat and Thomas 2016a; Peacock and Pratt 2011; Somerville and Green 2011). My term "co-produced curricula" refers in this instance to the collective involvement of all of these elements in curriculum making processes.

The suggestions for co-produced curricula discussed below have their roots in critiques of approaches to curriculum design that emphasise predictable, measurable outcomes and the reduction of complexity. These reflect the simplified understandings of curriculum discussed in the Chapter 3 (3.4.1), where it is assumed that "curriculum is determined by national government and teachers 'deliver' it" (Leat and Thomas (2016a, 380). These trends with regard to curriculum design result in two key issues of relevance to this study. Firstly, they privilege a narrow set of outcomes that are valued by their designers, thus being potentially oppressive towards other viewpoints, as well as devaluing outcomes and effects that "emerge in and through educational processes in unique and unpredictable ways" (Gough 2013, 1221). Secondly, such curriculum planning results in the structural reinforcement of the separation between learners and the communities in which they live (Gruenewald 2003; Anderson-Butcher et al 2008; Leat and Thomas 2016a), as well as learners of different ages, and the more-than-human world (Ross and Mannion 2012).

The approaches to curriculum design outlined below, then, meet these criticisms firstly by opening up the process of education to other viewpoints and unpredictable outcomes, and secondly by encouraging greater connections between learners and the world. They have strong resonances with the relational theories of curriculum making

outlined in Chapter 3 (3.4.1). These include Ross and Mannion's (2012) view of curriculum making as "the process of the coming together of teachers, learners, generations, materials and places" (312), as well as Jardine, Friesen, and Clifford's (1997) emphasis on an "integrated curriculum" through which "the world is already integrated in an abundant world of relations" (172).

9.3.3. More-than-human curricula

One approach to curriculum design with clear resonances with this finding is Gough's (2018, 3) notion of a "more-than-human curriculum". There is considerable overlap here with the alternative pedagogical approaches that will be explored in response to Finding 3 (see 9.5.4 and 9.5.5). Indeed, for Gough, a "more-than-human curriculum" is in large part one that affords opportunities for pedagogies that avoid "simplifying the environment and accept that environments constitute complex entanglements" (3) – orientations shared by the approaches explored in those later sections.

Gough (2018) does, however, extend this orientation to consider how these entanglements may cross-cut traditional curricular areas. She refers to an example given by Probyn (2016) of an area of study within the Australian Humanities and Social Sciences curriculum looking at the effects on marine animals of human rubbish. Here, "(f)ish eat the microplastics used in daily skin care; humans eat the fish and the microplastics; and fish and human bodies intermingle" (Probyn 2016, 16). For Gough (2018, 3), rather than being a "simple study of the environmental and social impacts of individual and group daily lifestyle choices", this represents an "entanglement of the economic, environmental, social and cultural with the political and biological, if not more". The implication here is that such entanglements would be difficult to fully acknowledge given the stratification of curricular areas, especially in secondary schools. The approaches laid out in the following sub-sections, however, provide alternative orientations for curriculum design that are constrained by (but do not necessarily exist in opposition to) adherence to specific subjects.

9.3.4. Curriculum integration

The opportunities that young people themselves had for producing the curricular landscape that emerged through the Polli:Nation project points to the potential of the

"curriculum integration" approach advocated by Fraser (2013) and Rennie, Venville, and Wallace (2012). This differs from the "integrated curriculum" mentioned above – a term Jardine et al. (1997) use to refer to the pre-existing world of relations from which "curricula" stem. "Curriculum integration" is instead an approach to curriculum design that, for Fraser (2013) involves learners themselves in the decision-making process with regard to what and how they learn. Pupils' level of involvement can vary - for example, ranging from helping to plan activities within a study, to determining and helping to design the study itself. The key, for Fraser, is in starting with an *issue* that is of relevance to learners' own lives, and from which topics and curricular outcomes may then stem. Examples given are "weighing up evidence and argument, exploring ways to preserve the past and educate for the present, rebuilding a school environment and instigating an aid project" (21).

Fraser differentiates this from an approach to curriculum design exactly like that taken by the Polli:Nation project – one in which the teacher begins with a *topic* that they have selected, then tries to fit as many curricular areas into it as possible. A curriculum integration approach would instead only draw upon areas of learning that are relevant to the issue at hand, and "(n)o attempt is made to cover all curriculum areas" (21). Through this approach and the reflective and critical thinking skills thereby developed, Fraser (2013) suggests, students are "better prepared for life through examining social issues of personal significance" (28-29).

Clearly, Polli:Nation demonstrated that even though the overarching topic was not one chosen by pupils themselves, there were considerable opportunities within it for them to respond in their own ways to activities and more-than-human encounters, as well as to ask questions and to freely explore, thus further shaping the processes by which learning was produced. Since these appeared to be aspects of the project that were valued by young people, Fraser's (2013) curriculum integration approach merits consideration because it goes even further in offering pupils the chance to co-produce their own learning, and the processes by which this learning takes place. As Rennie, Venville, and Wallace (2012, 99) suggest, curriculum integration offers "a holistic view of knowledge, grounded in students' experiences, relationships and contexts" (2012, 99). Clearly, however, there are practical challenges with such an approach, and these are explored further in section 9.3.7 below.

9.3.5. Community curriculum making

"Community curriculum-making" (CCM) is an approach to curriculum design put forward by Leat and Thomas (2016a, 2016b, 2018) that focuses on building partnerships with people and organisations from outside of school. In essence, the approach "argues that young people should 'connect' with the world beyond the school fence: go places, meet people and do and make things" (Leat and Thomas 2016a, 371). Leat and Thomas (2018) point out that the forming of "connections" need not focus only on local issues and knowledge, pointing to the potential, for example, of forming international partnerships via Skype (2016b). There is, however, an apparent emphasis on directly experiencing places and activities, and meeting people face-to-face.

The key aspects of CCM listed by the authors also have clear links to the "curriculum integration" approach outlined above, including that projects developed using a CCM approach "(a)re driven by a question or curiosity, where possible emanating from the students" , and "(e)nsure students take as much responsibility as possible". An added criterion for a CCM approach is that learners "(h)ave a client or audience for the work, sometimes a public audience" (Leat and Thomas 2016a) – that is, they are creating something for a purpose beyond merely meeting a curricular outcome, or preparing for an assessment.

There are, from the various literature, two key advantages to a CCM approach. Firstly, a CCM approach works against the separation between learners and their communities cited earlier, that is reinforced by the "failure to look beyond the school gates" (Leat and Thomas 2016a, 372) typical of contemporary approaches to curriculum design. Such a failure, argue Leat and Thomas (2016a), can lead many students to become disengaged from school. Projects carried out using a CCM approach have the potential to rebuild these connections, thereby increasing pupils' engagement. As Leat (2015) argues elsewhere, producing work for a particular "client" or audience outwith the school "gives meaning" to young people's work. The theme of better "engaging" young people has clear resonances with this study, given that, as described in Chapter 6, many of its participating pupils had been identified as having "additional support needs", and/or being "disengaged" with the mainstream curriculum. Added to this, pupils'

strong emphasis on the importance of "working with experts from outside of school", and the affect-producing capacities of such experiences, make this an approach with great relevance to this study.

A second, related advantage of a CCM approach is facilitating what Leat and Thomas (2016a, 375) call "boundary crossing", and Peacock and Pratt (2011, 20) call the "crossing of boundaries between different communities". Following Akkerman and Van Eijck (2013), Leat and Thomas (2016a, 375) argue for the need to prepare students to "adjust and adapt to moving between contexts or communities" - that is, to move between "places where the norms of behaviour and culture are very different". Peacock and Pratt (2011) call these "communities of practice", and similarly argue for learning practices in which such different communities come into contact. Engagement in such practices, they argue, offers more than simply learning 'about' a new subject or community. Instead, learners' knowledge comes to be "structured differently… often with greater depth in the sense that connections, patterns and implications are clearer" (15). Another common feature of these authors' work is the emphasis on the essential role played by "brokers" (Leat and Thomas 2018) or "learning professionals" (Peacock and Pratt 2011) in building and maintaining connections with schools, and in facilitating the "boundary crossing" required between schools and other "communities of practice". In the Polli:Nation project, this was evident in the role of the visiting staff from Learning through Landscapes, and young people's identification of the significance of "working with experts from outside school". In a blog post, Leat (2015) summarises the advantages of a CCM approach. The summary brings to mind especially the secondary school pupils at School 1c, otherwise apparently disengaged with mainstream education, who described how the project had made them aware of careers such as landscape gardening and construction work:

"CCM projects and enquiries have the potential to help students build more complex identities…. meeting a dietician, a curator, a care worker, a sound engineer, an allotment holder, a fashion buyer, a joiner or a university researcher can all add to an early store of social capital, as well as create insights into working and volunteering worlds and career opportunities" (Leat 2015).

Leat and Thomas (2016a) trace the theoretical roots of CCM to John Dewey, who argued that getting to know the community around the school was an essential aspect of teacher training. Education, he argued, should work to resist what he considered an "undesirable split" between experience gained "in more direct associations and what is acquired in school" (Dewey 1916/1944, 9). Other contemporary authors, meanwhile, point to similar advantages of learning that elides the distinction between ways of 'knowing' to be gained in school and elsewhere. Somerville and Green (2011), citing two case studies of environmental education projects in rural schools involving members of the wider community, point to the advantages of "(d)rawing on rich and diverse communities of knowledge" and the "chaotic possibilities of other knowledges" that this brings (29-30). Elsewhere, Green and Somerville (2015) have also written of teachers' recognition of "the benefits of expanding sustainability practice to include a committed collective of adults who share environmental knowledge, skills and community heritage" (840). Finally, Mannion's (2019) recent paper demonstrates clear links with the arguments around "boundary crossing" outlined above. Describing an intergenerational approach to curriculum making that took place across "contact zones" such as school-community, adult-child and nature-culture (6), Mannion similarly argues that "schools and other educational settings can benefit from enrolling local community members from diverse generations and harnessing places into emergent processes of curriculum making" (15).

It should be noted that the emphasis within CCM is on long-term *partnerships* with organisations, rather than simply one-off collaborations with them. As touched upon in the Literature Review, researchers looking at young people's participation in citizen science activities point to the importance of *regular* engagement in a study over an extended period of time (Ballard, Dixon, and Harris 2017; Falk et al. 2012). Falk et al.'s (2012) report on science education in the UK is in fact critical of approaches taken by the informal education sector that focus on "stimulation of interest as opposed to sustaining or building interest", when in fact "rarely is there a magic moment when learning happens – rather it is an ongoing process occurring over time and through multiple experiences" (48). This suggests that the novelty of "hearing new voices" of people from outside the school system does not itself create an effective learning experience, and instead, these educational partnerships ought to be built and sustained over time.

9.3.6. (Changing) role of the teacher

With the proposed curricula outlined above advocating the increased role of young people, more-than-human elements and community members/organisations in curriculum making, it is important to note the continuing involvement of teacher in this process, as was the case during the Polli:Nation project (see section 9.3.2 above). For Fraser (2013), since curriculum integration gives pupils more input into shaping the curriculum, the teachers' role is altered yet remains important, and perhaps becomes even more skilled. Teachers using a curriculum integration approach are "scaffolding students' learning rather than directing them. This scaffolding is the sophisticated artistry of teachers' work—work that is far more nuanced, intuitive and skilful than mere telling" (21). Knowing when to intervene and when to allow students to work something out for themselves, as well as knowing *how* to intervene in order to further stimulate curiosity and interest, are examples of this more nuanced work.

Mannion (2019), with reference to new materialist theory, also stresses the continued role of the teacher in the assemblage created by a project involving community members and more-than-human elements. Although "our intentional will as educators…. is always dependent on the forces and agencies of other entities" (16), Mannion nonetheless draws upon Bowden (2015) to emphasise the continued autonomy of all entities, including teachers, *within* educational assemblages. In practical terms, Mannion (2019, 16) recognises that "(n)ot just any entanglement will form an assemblage with pedagogical reach", and a teacher's role includes purposefully selecting elements that will help to create such an assemblage.

9.3.7. Challenges: Opening to the wider community

As with the pedagogical orientations explored in the previous section, applying these orientations for curriculum design in practice presents a considerable challenge. As Leat and Thomas (2016a) accept, for example, embedding a CCM approach into schools' and teachers' practice requires a "cultural change… that normalises working with community partners at a deep level in order to develop a curriculum that provides an alternative experience to one dominated by subjects learned in classrooms" (380). As demonstrated by Rennie, Venville, and Wallace (2012), meanwhile, the subject-specific

approach by which secondary schools operate presents similar challenges for the use of a "curriculum integration" approach.

The principal barriers to these alternative approaches to curriculum making relate primarily to time pressures and a (perceived) lack of curricular and timetable flexibility. In their work on community curriculum making, one of the case studies used by Leat and Thomas (2016a) was a project centred on beekeeping that took place in one of the schools in which I carried out a focus group for this research (School 8c), and which immediately preceded that school's involvement in the Polli:Nation project. It is perhaps unsurprising, then, that some of the challenges they recognise have strong resonances with those cited by teachers and project facilitators during this research. These include:

"Senior leaders and classroom teachers have a 'budget' of time and mental energy and while this has some elasticity it is not endless. For some schools, delivering the curriculum and measuring student progress absorbs all their available energy and spending time working with community partners is a distraction and might mean that they lose focus on progress" (Leat and Thomas 2016a, 378).

Time pressures and the constraints of the school timetable and curriculum-as-plan were themes running throughout the evaluative element of this research (Ruck and Mannion 2019a). The problem of keeping teachers engaged with a long-term project of this nature was in fact anticipated by LTL staff from the outset, and there was a clear effort from the beginning to select schools with teachers who were particularly enthusiastic and committed to the project. As the project went on, however, even some of the most enthusiastic teachers became difficult to engage, as other priorities took over, and the project became somewhat "squeezed in" amongst other commitments. In participant-observation and in interviews with teachers, I was constantly reminded of the time pressures teachers were under, and the priorities with which the project was competing (such as schools' accountability for the demonstrable improvement of pupils' literacy and numeracy).

In secondary schools, the compartmentalisation of the curriculum and timetable into subjects provided even greater challenges with regard to regular engagement with the

Polli:Nation project. As highlighted in Chapter 6, the most active secondary schools within Polli:Nation were those that involved a group of pupils with additional support needs, who enjoyed greater flexibility in a timetable that was not geared towards subject-specific curricular outcomes and assessments. Again, this challenge is reflected in Leat and Thomas's (2016a) findings:

"The secondary school curriculum in particular remained not only resistant to modification but also to enhancement by the locality. This is in part due to the structures of the schools, where subject and classroom teachers were difficult for partners to access" (378).

A key point with regard to applying these co-produced approaches in practice is that they are not being proposed instead of, or in opposition to, a subject-oriented curriculum. This point is made by Leat and Thomas (2016a, 2018) in reference to community curriculum making, and by Fraser (2013) in reference to curriculum integration. In fact, Leat and Thomas (2018) contend, it is important to draw upon both a subject-specific curriculum *and* "more holistic" approaches. Separate subjects, they accept, "remain important stores of knowledge and reasoning, representing valued epistemological traditions and sources of identity for many teachers" (Leat and Thomas 2018, 215).

The key message, then, is that these orientations need not represent a complete departure from the approaches that teachers are used to. The important first step, for Leat and Thomas (2016a), is simply to "run a project which has a community orientation and uses community resources and to learn from it" (380). They accept these approaches are not always successful – for example, they point to cases where pupils have not engaged as hoped with CCM projects, as well as cases where both teachers and partner organisations have fallen short of the levels of effort required to build and maintain such partnerships. The key, however, is in a willingness to experiment with such approaches for part of the time.

A closely related consideration, however, is the amount of support and engagement that schools and teachers require to bring about such a "cultural change" (Leat and Thomas 2016a, 380) – that is, to get to a position where teachers' use of such co-produced

approaches at least part of the time is normalised within a school. This is an important consideration for the "community partners" (Leat and Thomas 2016a), "brokers" (Leat and Thomas 2018), or "learning professionals" (Peacock and Pratt 2011) involved in building these partnerships – in this case, LTL and the other partner organisations within Polli:Nation. The primary challenge here is teachers' aforementioned "'budget' of time and mental energy" (Leat and Thomas 2016a, 378). If not properly supported, say Ross and Mannion (2012, 312), "teachers can be inclined to achieve predictable outcomes in routine ways".

Among Polli:Nation project facilitators, there was a feeling that teachers had been given insufficient support for the project to become more than an "add on" to the mainstream curriculum. That is, the number of standard sessions with each school that their own "budget of time" allowed was insufficient to enable those schools to really "get going" with the project. Project facilitators interviewed for this research suggested that working with fewer schools, more often and more intensively, would have been preferable in this respect.

Two clusters in the North of England, however, provide an encouraging example here. I visited one of these clusters to carry out focus groups (School 8a, 8b and 8c), and interviewed the project facilitator attached to these schools on two occasions – the first in March 2017 immediately before carrying out the focus groups, and the second at the end of the project for the purposes the evaluation report (June 2018). Significantly, this facilitator had been able to give more regular, extensive and flexible support to these schools than other project facilitators, being employed on a freelance basis by the LTL network to work only with these schools, and living in close proximity to them. This had enabled her to be flexible with the times and dates of meetings, and hold meetings every half-term with teachers across all eight schools within the two clusters. There was a sense among other facilitators that this would have been impossible for them, given the high numbers of schools, and relatively large geographical areas, that their work was spread across. Whilst I did not visit these schools during Phase 2 of the project, their facilitator reported that Polli:Nation had, over time, begun to be embedded on a whole-school basis as a project for multiple classes to periodically work on, and through which to cover multiple curricular areas. She also felt that it had begun to bring about the necessary "cultural change" that would normalise such approaches to

curriculum making. She had, she said, felt a shift in the way teachers saw the project – initially looking to her expecting to be told what to do, but later beginning to take the initiative and find creative ways of teaching outdoors.

9.4. Discussion of Finding 2

Finding 2: **The informality that characterised young people's participation in practical conservation and citizen science within formal education contexts appeared to add value to their experience of the Polli:Nation project.**

9.4.1. Related chapter conclusions:

The chapter conclusions pertaining most clearly to this overarching finding are:

1. There was a tendency for key curriculum making processes within the Polli:Nation project to be unplanned and centred on contingent moments. This could be seen through the human/more-than-human encounters, spontaneous imparting of information, and free play and exploration that were enabled by the project (Chapter 7).

2. The contingent moments through which curriculum making occurred were enabled by the replication of a degree of informality in activities more commonly associated with out-of-school contexts, and an associated "relaxed atmosphere" (Chapter 7).

7. Young people identified "relaxed atmosphere" and "working in a small group" as significant features of Polli:Nation. Taken together, these suggest that young people valued the feeling of informality that was enabled by various elements within the project (Chapter 8).

9.4.2. Replication of informality

As highlighted in the Literature Review, previous research into people's participation in practical conservation and citizen science has tended to focus on those who are participating on a voluntary basis – usually adults (Hine, Peacock, and Pretty 2008; Halpenny and Caissie 2003; Guiney and Oberhauser 2009; Haywood 2016; Drushke

and Seltzer 2012; Bonney et al. 2015). Where studies have focused specifically on young people participating in (or learning about) practical conservation and citizen science, these have tended to be in informal educational contexts (Zint et al. 2002; Schusler and Krasny 2010; Smith, DuBois, and Krasny 2015). With its focus on a project that brought practical conservation and citizen science into *formal* educational contexts, this study sought to make a unique contribution.

Whilst schools as a whole might be considered formal educational *contexts*, it is important to recall that there are still informal *processes* operating *within* the curricula followed by these schools. This can be illustrated with reference to the Scottish Curriculum for Excellence (CfE), which is the overarching curriculum followed by all schools in which I carried out participant-observation for this study. According to the Education Scotland website, curriculum within the CfE is understood to mean "everything that is planned for children and young people throughout their education, *not just what happens in the classroom*" (Education Scotland, n.d, emphasis added). As well as "curriculum areas and subjects", then, the CfE includes three other recognised contexts for learning: "Interdisciplinary learning", "Ethos and life of the school", and "Opportunities for personal achievement". As a result, rather than being "extra-curricular", Polli:Nation can be seen as having largely taken place outside of the "curriculum areas and subjects" referred to above – that is, the core curriculum most associated with classroom-based learning and preparation for formal assessments. With the term "informality", I am referring to activities taking place outside of this, or at least young people's apparent *feeling* that this was the case.

The tendency for Polli:Nation activities to take place outside of the core, subject-defined curriculum was in large part due to a combination of time pressures and the perception of its core activities as being best-suited to small groups of pupils. This included instances where the project involved a small group of pupils with "additional support needs" who were following an alternative curriculum, or an "eco committee" spanning multiple year groups. There were also schools in which the project remained entirely outside of formal school hours – for example, involving an after-school gardening club.

Whilst involving small groups of pupils in activities outside of the mainstream curriculum was not the original intention of the project, it became apparent during participant-observation that the subsequent sense of informality was one of the key elements that pupils valued about the project. Here, I was struck by the "relaxed atmosphere" that seemed to characterise the project across multiple schools, and how the small groups in which the project took place helped to create this atmosphere. By this, I mean one that enabled contingent moments such as human/more-than-human encounters, the spontaneous asking of questions and imparting of information, and the chance for free play and exploration in-between, or alongside, the main tasks. In later focus groups, further suggesting the importance of this informality, young people commonly selected "relaxed atmosphere" and "working in a small group" as significant features of the project.

The key contribution this finding makes to the field of education research is in highlighting the value of informality specifically in relation to young people's participation in practical conservation and citizen science. This is important for three reasons. Firstly, since little attention has been paid to young people's participation in these activities, especially in formal education contexts, this finding fills an important gap in the literature, especially as the use of citizen science in particular grows in popularity (Dickinson and Bonney 2012)

Secondly, practical conservation and citizen science in particular are activities with the potential to be run in a somewhat prescriptive manner that minimises the potential for the contingent moments that are central to the informality highlighted here. This would risk a decrease in pupils' levels of engagement with the activity. Karrow and Fazio (2010) demonstrate this potential with reference to their study of a school's participation in a nationwide citizen science initiative focused on monitoring worm populations. For these authors, the project was solely premised on "scientific-technical knowledge", which led to a perception among teachers that "the implied value of the program hinged upon students' correct identification of worm specimens" (203-4). These authors connect this to a decrease in students' interest in the project over successive visits to the data collection site. I suggest that the potential for activities to be run in a prescriptive manner also apply to practical conservation – for example, with an emphasis on the importance above all else of completing a set task in a limited

timeframe. Below (9.4.3), I discuss the increased potential for this when attempts are made to engage higher numbers of young people in practical conservation and citizen science activities, or to link them more directly to curricular outcomes.

Thirdly, and also of relevance to the discussion of Finding 3 in the following section (9.5), practical conservation and citizen science activities also have potential to reinforce the "stewardship pedagogies" that prevail in environmental education. In that section, I argue that retaining a degree of informality is important for maximising the potential for the enactment of young people's "lived curricula" which, I suggest, demonstrate thinking or feeling that goes "beyond" this stewardship perspective (Taylor 2017).

9.4.3. Challenges: "Mainstreaming" practical conservation and citizen science

Although the informal nature of Polli:Nation proved to be a significant element of the project for young people, this represented something of a failure with regard to embedding practical conservation and citizen science into formal education contexts. It should be noted that HLF do not officially fund projects whose sole aims are closely linked to curricular outcomes, and linking the project to the mainstream curriculum was therefore not a stated aim of the project. In practice, however, there were clear efforts by project facilitators to encourage teachers to use the project as a topic within which to cover multiple curricular areas. In reality, the majority of schools in which I carried out this research engaged only a small number of pupils in the project on a regular basis, often outside of the mainstream curriculum and/or class timetable. As noted above, however, these very tendencies were key in creating the informal, "relaxed atmosphere" that the pupils who *were* regularly involved considered significant about the project.

This gives rise to an important discussion framed by questions such as the following: Is it possible to retain this informality while engaging larger numbers of pupils, and linking these activities more closely to subject-based curricula? Is it best to keep projects such as Polli:Nation outside of the core, subject-based curriculum, thus engaging in powerful and memorable ways those who are taking part? Or to continue efforts to embed such projects into subject-based curricula in the hope of engaging greater numbers of pupils? Are teachers' reservations about engaging larger groups of

pupils in practical conservation tasks justified – that is, *can* such activities be effectively run with a whole class of thirty pupils? This was a study grounded in a particular project whose tendency was towards small groups and activities that took place on the fringes of the curriculum, and therefore can provide no definitive answers to these questions. The importance of informality within these activities, however, nonetheless gives rise to the following considerations for teachers, schools and conservation/citizen science charities if attempting to engage larger groups of young people in these activities, or link them more closely to the core subject-based and examination-focussed curriculum.

The most important consideration here, as demonstrated by this study, is the importance of retaining a degree of informality, and continuing to allow for contingent moments and unpredictable learning possibilities, *within* more structured activities such as practical conservation and citizen science. This has greatest resonance with Mannion, Fenwick, and Lynch's (2013) recommendations regarding "place-responsive" pedagogies. These authors agree that such an approach "requires in educators a degree of flexibility, creativity… and the ability to respond to places and the entities found there via the contingent facilitation of pupils' first-hand experiences" (803). With practical conservation tasks, this may amount to having an overarching task with which to frame the session/s, but not placing too much emphasis on the need to complete it within a limited timeframe, thereby better enabling the facilitation of contingent moments stemming from a specific place. In citizen science, the emphasis ought to be on providing opportunities for the enactment of forms of knowledge other than the "scientific-technical knowledge" cited by Karrow and Fazio (2010). In addition to satisfying the objectives of a given citizen science initiative, these authors recommend a phenomenological approach that "might also involve having participants describe worms using a variety of mediums. They could photograph them, draw, poeticize, or narrate their experiences *with* worms and their ecology" (204-5).

As in the discussion of Finding 1 (see 9.3), it is important to note here that activities such as practical conservation and citizen science are not being proposed *in opposition to* classroom-based, subject-specific approaches to learning and teaching (Leat and Thomas 2016a). In other words, doing practical conservation and citizen science will, in reality, only take up a small part of the school timetable. With this in mind, there ought

to be sufficient flexibility within these activities in particular to ensure that this informality is retained. This important orientation with regard to these activities is encapsulated in Rautio's (2013, 454) recommendation that:

"(r)ather than worrying over teachable contents and curricula… We would do well to appreciate also the momentary and the seemingly unguided in education. We would need to trust that some of the interaction between children and the world, seemingly irrational and mostly unreflected, has educational value".

There are two further recommendations to be made with regard to efforts to embed practical conservation and citizen science into mainstream curricular contexts. The first of these is, wherever possible, to continue to give pupils the feeling of working in a small group. This research has also suggested that pupils gained a sense of purpose and ownership towards the Polli:Nation project from being part of a small, dedicated "team" (see 7.3.6). Clearly, this was only possible in these cases *because* the project took place in small groups and outside of the core curriculum. It does, however, suggest that when working with a whole class of pupils, there is value in splitting the class into small groups to work on particular tasks. This is perhaps easiest with citizen science activities, where small groups can, for example, each choose their own "site" (still in close proximity to the other groups) within which to count numbers of pollinators. In practical conservation tasks, however, there may also be possibilities to put each small group "in charge" of its own area of the site, or to split the task into a number of sub-tasks, with groups swapping between these.

The second recommendation is a reiteration of the key consideration for organisations from outside of schools, such as conservation NGOs, touched upon in the previous section (see 9.3.7): Successfully embedding practical conservation and citizen science activities into formal education contexts requires high levels of support for, and engagement with, teachers. A theme within the evaluative aspect of this research was the feeling among project facilitators that the amount of time they were given to work with each school was insufficient to enable those schools to really "get going" with the project, and that working with fewer schools, more often and more intensively, would have been preferable.

9.5. Discussion of Finding 3

> *Finding 3:* **The practical tasks, contingent moments and human/more-than-human encounters within Polli:Nation enabled the enactment of lived curricula that indicated a form of "collective thinking" with more-than-human elements, and which differed considerably from the "stewardship" perspective underlying the project.**

9.5.1. Related chapter conclusions:

This finding relates primarily to the following chapter conclusions:

3. There was a prevalence of practical tasks and physical sensations through which curricula were produced/enacted during the Polli:Nation project (Chapter 7).

4. Activities within Polli:Nation enabled the enactment of lived curricula that differed considerably from the "stewardship" perspective underlying the project, instead suggesting a form of "collective thinking" with more-than-human elements (Chapter 7).

6. Young people identified "practical conservation tasks" and "close-up encounters with other species" as significant features of the Polli:Nation project. These further suggest both the value young people attach to educational processes that differ from the verbal transfer of information, as well as the extent to which lived curricula are co-shaped by more-than-human elements (Chapter 8).

10. Young people's descriptions of the learning produced through Polli:Nation largely reflected the curriculum-as-plan. This demonstrated the influence of the "hybrid assemblage" on their responses – a combination of the prioritisation of cognitive aspects of 'learning', and structured research interventions such as focus groups (Chapter 8).

9.5.2. "Stewardship pedagogies" - the curriculum-as-plan

As highlighted principally in Chapter 6, the key discourses and ideas underlying the Polli:Nation project largely reflected the "stewardship pedagogies" critiqued by Taylor

(2017). As Taylor (2017, 1453) explains, stewardship pedagogies are those operating from the premise that "humans have exceptional capacities, not only to alter, damage or destroy, but also to manage, protect and save an exteriorized (non-social) environment" (1453), and in which the environment is positioned as "the passive object of human knowledge/needing human care and protection" (1452).

With Polli:Nation, this "stewardship" perspective was clearly reflected in the project's Activity Plan (Learning through Landscapes 2014), which refers to young people as "the future custodians of our natural heritage" (3), and lists "how likely (pupils) are to act in the future to conserve and protect natural heritage" (32) as a measure of the project's success. I also, through participant-observation, observed how this "curriculum-as-plan" (Aoki 1993a) was largely re-produced during some of the project's activities, and reflect later in this section on the potential for it to be further reinforced through participation in practical conservation activities (Fletcher 2017).

Pupils' ability to self-report learning that was largely in keeping with this curriculum-as-plan is clearly demonstrated in section 8.5. Here, when asked (for the purposes of the evaluative element of this research) to identify what they 'knew more about' after taking part in Polli:Nation, pupils' responses most commonly referred to the ecological importance of pollinators and importance of 'protecting' them - a clear success for Polli:Nation, in terms of the Heritage Lottery Fund's desired "outcomes" (Ruck and Mannion 2019a). Pupils' self-reported learning, however, also points to the ways in which these responses were influenced by a "hybrid assemblage" comprising the "research assemblage" as well as the "event assemblage" that included the curriculum-as-plan (Fox and Alldred 2018). This influence was further demonstrated with reference to the focus group carried out in School 1c, where Polli:Nation was seen as a vehicle for improving literacy and developing "employability" skills. Accordingly, the focus group I carried out at this school was notable in that pupils focused on the practical skills they had developed, making no mention of pollinators.

9.5.3. Lived curricula – "beyond stewardship"?
While pupils' self-reported learning largely reflected the "stewardship" perspective underlying the project, the less structured methods used in this study captured moments

that highlighted "lived curricula" that were not easily verbalised by young people, but which was markedly different from this curriculum-as-plan. As discussed in Chapter 7 (Section 7.3.2), this was difficult to summarise as one particular "perspective" held by young people at a given time, and indeed to fully separate from the "stewardship" perspective discussed above. My identification of such moments, however, had strong resonances with the work of Taylor (2013, 2017) and Rautio (2013a), in which "children's intimate, immediate and embodied impulses to touch and become with others in their more-than-human common worlds is nothing like the rational quest to know about the world from a distance that characterises western epistemologies" (Taylor 2017, 1456). I included the element ***"collective thinking" with more-than-human world*** in my situational map to account for such perspectives.

Since they were not easily verbalised, enactments of relations with other species that went "beyond stewardship" were most clearly observed during participant-observation. I previously discussed this primarily in sections 7.3.2, 7.3.7 and 7.3.8. These sections highlight the sort of activities and processes that enabled the enactment of perspectives that went "beyond stewardship" – or at least, where this was most clearly observed. These were activities that were embodied, open to contingent moments, open to more-than-human co-shaping, and which gave pupils the opportunity to respond in their own ways to encounters with more-than-human elements. One example carrying all of these features was the encounter with the woodlouse explored in 7.3.2, which came about through pupils being given the opportunity to freely explore during a loosely structured and distantly supervised task.

Despite having identified moments where perspectives going "beyond stewardship" are expressed, it is challenging to point to any degree of causation with regard to the Polli:Nation project. That is, as highlighted in Chapter 7, it is difficult to identify one activity as producing this lived curriculum more than others, or one young person having this attitude more than others. It is, in fact, unclear as to whether any activities within Polli:Nation actually *produced* such a perspective, rather than simply enabled a pre-existing perspective to be enacted. As will be discussed in the following sub-section, Taylor (2017) and others argue for alternative pedagogical approaches that enable such "beyond stewardship" perspectives to flourish. With this in mind, it is

significant that the Polli:Nation project enabled the enactment of such perspectives, even though its curriculum-as-plan did not reflect this.

With this overarching finding, this study makes two clear contributions to the field of environmental education research. Firstly, it highlights the lived curricula that are enacted through young people's participation in practical conservation and citizen science activities, and the processes that give rise to such enactments. As described above, this research has shown empirically that in particular, it was activities that were practical, open to contingent moments, and open to more-than-human co-shaping, that appeared to enable the enactment of such lived curricula. These approaches gave pupils the opportunity to respond in their own ways to the setting and to more-than-human elements via practical conservation and citizen science activities. This finding significantly adds to the literature on young people's participation in these activities which, as highlighted in the Literature Review, has tended to focus on informal contexts, and in the case of practical conservation, learning *about* conservation rather than the effects of actively taking part in it (Schusler and Krasny 2010; Zint et al. 2002).

Secondly, in highlighting the sort of "beyond stewardship" perspectives enacted through the activities described above, this finding extends arguments made by Taylor (2017) and Rautio (2013a) beyond the "early years" contexts in which their work is situated. Since this study involved mostly pupils in the upper years of primary school and lower years of secondary school, it is significant that I was still able to observe the expression of a perspective that, as Taylor (2017, 1456) describes, went beyond "the rational quest to know about the world from a distance that characterises western epistemologies".

These contributions point towards the alternative pedagogical orientations discussed in the following sections.

9.5.4. Common world pedagogies
This finding gives rise to a discussion around the potential of alternative pedagogical approaches that aim to encourage a shift away from a human-centric, "stewardship" approach to one that further encourages the sort of lived curricula discussed in this

section so far. Given the influence of Affrica Taylor's (2013, 2017) work on the "beyond stewardship" perspectives I identified in this study, the most clearly relevant among these are the "common world pedagogies" advocated by Taylor and others (Pacini-Ketchabaw 2013; Nxumalo and Pacini-Ketchabaw 2017; Somerville and Powell 2019). I will also, however, go on to discuss other examples of posthuman pedagogies, as well as to consider the challenges of drawing upon these in practice.

Before outlining the suggested alternatives, it is first important to establish the key reasons for critiques of the "stewardship pedagogies" that were evident in the Polli:Nation project. Taylor's (2017) criticism of such approaches relates to the idea of the "Anthropocene", which as Somerville and Powell (2019, 14) explain, is a term given to a new geological epoch characterised by "human entanglement in the fate of the planet" (14). Its beginnings, they explain, are variously cited as being the industrial revolution, the development and first use of the atomic bomb, or changes to the geological record as a result of the extensive use of plastics. For these authors, however, "the full impact of the consequences of this entanglement will only be felt by children born in the twenty first century into an entirely different world than the one we know and understand" (15).

For Taylor (2017, 1449), accepting this inextricable entanglement calls for a paradigm shift that "firstly resists modern humanist tendencies to enact the epistemological nature-culture divide that separates our species off from the rest of the world; and secondly to think and act as if we are the only ones that shape the world". That is to say, learning to live in the Anthropocene requires a radical re-thinking of our relationship with the 'environment' and the other species comprising it, to try to de-centre ourselves in our thinking, and see ourselves as co-existent with other species rather than having any degree of mastery over them. This, as Taylor and Giugni (2012, 115) contend elsewhere, is the sort of radical paradigm shift that is required if children are to learn to live in entanglements with other species in the Anthropocene, and to develop a sense of responsibility for and with these.

Taylor's overarching criticism of such "stewardship pedagogies" is that they fail to bring about this necessary paradigm shift. "Although well meaning", she contends, "stewardship pedagogies do not lead us towards fundamentally rethinking our place and

agency in the world" (2017, 1449). In fact, she goes further than this, suggesting that such pedagogies actually reinforce the separation of humans and environment. That is, in positioning humans as having the capacities to manage and protect a passive and exteriorized environment (as well as damage and destroy them), stewardship pedagogies "unwittingly rehearse the division of cultural and natural worlds, not their inseparability" (2017, 1453).

In response to the Anthropocene, and the related shortcomings of stewardship pedagogies, Taylor and Giugni (2012) propose "common world pedagogies" as an alternative – an approach that now gives its name to an international "research collective" (commonworlds.net, n.d). Following Latour (2004), the concept of a "common world" is used to describe the unique sets of "enmeshed relations with others in their worlds" through which young children experience their environments (Taylor 2013, 121). Common worlds, say Taylor and Giugni (2012, 108), "take account of children's relations with all the others in their worlds – including the more-than-human others".

Importantly, however, common world pedagogies do not take the idea of common worlds as a mere descriptor of the human and more-than-human elements experienced by a young person, instead "approach(ing) the collectivity of common worlds … as an opportunity to actively assemble or bring together" (Taylor and Giugni 2012, 110). Taylor and Giugni (2012, 11) follow Deleuze and Guattari (1987) in employing the "active notion of common worlds as assemblages", highlighting the clear links with new materialist theories, and the notion of "assemblage" as a verb rather than a static noun (Mannion 2019). Following this thinking, and drawing on Haraway's (2008) notion of "worldings", Taylor and Giugni (2012, 111) contend that the processes by which young people negotiate and form relationships with others in their worlds may be better thought of as "common worlding".

Common world pedagogies, then, are pedagogies that aim to bring about a shift from humanist thinking, to thinking of ourselves as living in common worlds - that is, emphasising our co-existence and entanglements with others in our/their common worlds, and the ever-changing nature of these relationships. As Taylor (2017, 1449) puts it:

"(C)ommon world pedagogies seek to move beyond the limits of humanism and environmental stewardship by acknowledging more-than-human agency, learning with the more-than-human world rather than about it, paying attention to the mutual affects of human-nonhuman relations, pursuing more-than-human collective modes of thought, and by learning from what is already happening in the world".

For Taylor and Giugni (2012, 115), common world pedagogies also encourage "children to actively seek out and include others, to establish 'questioning relationships' with these others and to practise responsibility for and with these others within their common worlds".

In terms of how they work in practice, common world pedagogies carry the following inter-related orientations that are relevant to this discussion. Firstly, there is an emphasis on encouraging, or at least not interfering with, the sort of non-cognitive learning processes (such as those highlighted in Chapter 7 of this study) where "children appear to be immersed in the process of more-than-human collective and relational ontological emergence" (Taylor 2017, 1456). This is reflected in the emphasis on resisting the romanticised ideas of nature discussed in the Literature Review. It is also reflected in the emphasis on "learning *with* the more-than-human world rather than about it" (Taylor 2017, 1449). In practical terms this may mean, for example, allowing children the freedom to play and explore with and alongside other species, without a pre-defined agenda towards carrying out tasks in order to 'protect' them.

Secondly, and closely related, rather than rushing to find or promote solutions or quick fixes to environmental issues, common world pedagogies emphasise "slowing down" and seeking new relationships with others within common worlds. This follows Haraway's (2016) work, in which she advocates slowing down our responses to issues such as climate change, and instead "staying with the trouble". It is also reflected in Hohti and Tammi's (2019) concept of a "multispecies childhood", which, they argue, must "embrace the tensions and troubles of contemporary global existence" (13) (see also Nxumalo and Pacini-Ketchabaw 2017). Instead, a common world approach, for Taylor and Giugni (2012, 117), involves considering "how to be responsible in and for our common worlds; how to bring others into our common worlds; how to form

'questioning relationships' with these others; how to negotiate common interests in common worlds; and how to practise a relational ethics".

9.5.5. Other posthuman pedagogies

The orientations described above, while important in relation to this overarching finding, are not limited to "common world" pedagogies. Rautio's (2013a) work, for example, is similar in theoretical orientation to that of the common world research collective (albeit with small differences that I will return to in the following sub-section). Most importantly at this stage, similarly to Taylor, Rautio stresses the need in environmental education to "decentralize the human agent as the sole author of his/her self-environment relation" (2013a, 453). This recalls Clarke and McPhie's (2016) call for "education for sustainability" to be reconceptualised along new materialist lines, arguing that the resultant new ways of seeing would "eschew dualisms of nature/culture and subject/object and, we claim, may directly result in actions of care, judgement and sensitivity to the flux of the world" (1020). Also similar in its theoretical underpinnings is the work of Sonu and Snaza (2015), who propose "pedagogies inspired by posthumanist and new materialist ontologies (that) are situational encounters made up of entanglements and interweavings" (274). Rather than pedagogies that are driven by a particular agenda or set of learning points, these authors suggest a focus on more-than-human elements that enables learners to "share freely about their experience in different kinds of communities, to write descriptively about the landscapes that abound, to think of their entanglement with human and non-human entities" (Sonu and Snaza 2015, 271).

There are also resonances here with Karrow and Fazio's (2010) suggested approach of "learning-within-place". These authors also propose eschewing the dualisms between humans and a passive 'environment', as well as helping young people to develop a sustainable relationship with their local environment through "nontechnical forms of engagement" (210). Their proposed approach builds on the large body of work around "place-based education" (PBE), a field of practice that aims to relate learning to local phenomena and students' own lived experience (Smith 2002; Gruenewald 2003).

For Karrow and Fazio (2010), earlier place-based approaches still tended to focus on learning *about* the environment, thereby reinforcing the "distinctions between subject

and object" (193) inherent in stewardship pedagogies. These authors instead propose approaches that "ameliorate these binary distinctions" (193), illustrating this with reference to a citizen science project involving young people. With the project in Karrow and Fazio's study initially centred purely around data collection and the "correct identification" of worms, these authors refer to cases in which it was later extended to include writing from the point of view of worms, simply describing worms and their environments as they encountered them, and "vocalizing wonder, awe, or amazement" (198). These examples, they contend, highlight the "primordial capacities of care" that are demonstrated "when students are given license to consider nontechnical ways of being with worms" (198).

Finally, also building upon the field of place-based education, and with strong resonances with the approaches described above, are the "place-responsive" pedagogies proposed by Mannion, Fenwick, and Lynch (2013). These authors draw upon Karrow and Fazio (2010) and Ingold (2003) to form a conception of 'place' that considers "the natural and cultural as intermingled and co-emergent" (794). Similarly to the approaches cited above, they also recommend "slow(ing) down the pace of pedagogy" (803) to enable the development over time of pupils' relationships with a place and the more-than-human elements within it. In keeping with discussion of Finding 2, these authors highlight the importance of flexibility and allowing for contingent events.

These alternative pedagogical approaches have the following features in common. Firstly, they all emphasise the inextricable entanglements between humans and other species, rather than viewing the environment as a passive, separate entity. Secondly, they emphasise (or at last imply) the importance of "slowing down" and enabling young people to respond in their own ways to develop new relationships with other species. Thirdly, they are characterised by enabling learning that is co-shaped by the elements comprising a specific place, including more-than-human elements, rather than full adherence to a curriculum-as-plan. Of the approaches discussed above, common world pedagogies share all of these orientations, yet stand out due to their persistent emphasis on avoiding any promotion of a "stewardship" perspective, as well as on resisting the temptation to find and promote immediate solutions to environmental issues.

Finding 3, in highlighting the enactment of lived curricula that reflect "a form of thinking collectively with the more-than-human world" that went "beyond stewardship" (Taylor 2017, 1456), clearly points to the potential of common world and other posthumanist pedagogies. There are, however, considerable practical challenges associated with implementing such approaches in formal educational contexts. I explore these in the following sub-section.

9.5.6. Challenges: changing the discourses underlying environmental education

The pedagogical approaches outlined in this section represent overarching re-orientations reflecting fundamental shifts in the discourses underlying environmental education. Perhaps related to this is the lack of any clear indications of what such pedagogies actually look like on the ground – that is, *how* does one teach in a manner that reflects these posthuman orientations, and how does one avoid framing environmental education in an anthropocentric manner? This is an especially difficult question given that the whole concept of environmental education, through agreements such as the Tblisi Declaration, and Agenda 21 of the 1992 World Conference on Environment and Development in Rio de Janeiro (Stevenson et al. 2013) developed as a response to the human-created environmental problems the world faces. Indeed, Rautio (2013a, 451) accepts that "environmental education is, by definition, anthropocentric. By this, I mean that it is executed with a necessary mindset of human beings as the subjects of education". The disruption of dichotomies such as that between humans and an exteriorised 'nature', then, provokes existential questions for the field. As Duhn, Malone, and Tesar (2017, 1358) reflect:

"The unsettling of dichotomies such as culture and nature, or human and non-human, then, continues to create turbulences, intensifications and resistance…. because it further destabilises the very ground beneath our feet. If there is no nature outside of culture and vice versa, then how do we educate our children to care for the earth?"

Such existential questions might also be extended specifically to practical conservation and citizen science. That is, are these activities compatible with pedagogies that emphasise challenging "stewardship" perspectives and resisting the temptation to search for immediate 'solutions' to environmental problems? Certainly, there is

potential for these activities to reinforce such perspectives. Indeed, for Fletcher (2017, 230), the perceived physical separation of humans and nature is "most commonly expressed in the realm of biodiversity conservation". With reference to the citizen science project cited in the previous section, meanwhile, Karrow and Fazio (2010, 203) report that "assum(ing) the role of a detached, objective, and impartial 'scientist'" gave young people "little or no opportunity to develop a sustainable and meaningful relationship with their local environment". In the case of Polli:Nation, the data collected through the initial biodiversity survey steered pupils towards concluding that they themselves would need to make changes to their school grounds in order to attract more pollinators. On the surface, this clearly reflects the pedagogies critiqued by Taylor (2017) and others, in that it positioned pupils as agents of change acting upon an exteriorised environment, and promoted an immediate 'quick fix' to the problem identified.

For the following reasons, however, it is not my contention that practical conservation and citizen science activities should be abandoned as educational endeavours. Firstly, as highlighted earlier in this section, although the curriculum-as-plan reflected stewardship pedagogies and a utilitarian view of other species, these activities nonetheless allowed for the enactment of a lived curricula that differed significantly from this. This was enabled by human/more-than-human encounters, spontaneous imparting of information, free exploration, and other contingent moments that characterised the informality discussed in the previous section.

Secondly, the work of Taylor (2013, 2017), Rautio (2013a) and others makes no clear suggestions for specific activities that *would* reflect these new pedagogical orientations - the implication is that children are simply allowed to freely play and explore. Their work, however, focuses on children within the "early years" age range. With young people of the age and stage of their school careers as those participating in Polli:Nation, adopting an approach where there are no clear tasks or desired outcomes would simply be impractical. It is tempting to argue that the contingent moments valued by young people occurred in spite of these planned activities rather than because of them, and that to further enable the enactment of the sort of lived curricula highlighted by Finding 1, such structured activities that emphasise 'solutions' should be abandoned. My suggestion, however, is that given the greater need for more structured activities when

working with young people belonging to the age groups participating in Polli:Nation, practical conservation and citizen science activities can act as "containers" for the contingent moments and unpredictable learning possibilities that are enabled by them.

Perhaps, instead, a subtle reorientation of these activities is more realistic, and more desirable, than abandoning them altogether. In practical terms, this would essentially amount to the same orientations given at the end of the previous section – maintaining the flexibility *within* these activities to enable contingent moments, unpredictable learning possibilities, and the enactment of young people's own lived curricula. This orientation is reflected in Mannion, Fenwick, and Lynch's (2013) work on "place-responsive" pedagogies, in which they recommend the use of "pupil-directed, fun, less time-limited, open-ended, *yet purposeful* tasks" (803, emphasis added). It also resonates with the nuanced view of human-environment relations espoused by Rautio (2013a), which appears to acknowledge the "human intentional action" (Bowden 2015, 78) that is nonetheless bound up in assemblages of human and more-than-human elements. The passage below appears to accept that there is a place for humans altering their surroundings, as long as there is a recognition of our inextricable entanglement with the more-than-human elements comprising them, and that these more-than-human elements have a degree of agency in co-shaping our relationship with them:

"The logic of this unfolds roughly as follows: the relation that I have to my surroundings, the ways in which I am nature, are relative to the actions and existence of all of the other things that share this relation with me. As I am not the sole author of my relationship with my surroundings, yet as this relationship is a significant source of well-being and balance in my daily life, it is both my interest and my responsibility to make sure that the beings in my surroundings are able to uphold their part of our relations. In other words, I am to act in ways that uphold and preserve the independent and unique nonhuman entities that condition my existence. This is a view to sustainable behavior that does not yield the human as the only agent, capable of through her actions alone either sustaining or destroying her environment" (Rautio 2013a, 453).

In simpler terms, Rautio (2013b, 402) writes elsewhere that from a human perspective, "(w)e are as responsible for our behavior as ever, we just no longer have illusions that our part is any grander than it is".

Clearly, as demonstrated ethnographically by this study, there are a far greater range of "concepts" in circulation within a project involving practical conservation and citizen science activities than the simple promotion and enactment of a "stewardship pedagogies". In Chapter 3, I explained how existing qualitative methods came to be re-oriented through attendance to new materialist theories. Similarly, instead of abandoning these activities, I am arguing for their (re)orientation in ways that resonate with the posthumanist pedagogical approaches explored in this section, and that allow for the enactment of young people's own lived curricula.

9.5.7. Summary of pedagogical orientations

Based on this study's overarching findings (particularly Findings 2 and 3), as well as the related literature drawn upon in this chapter, Figure 9a now provides an empirically grounded list of the pedagogical orientations that these findings point towards. Whilst the list considerably overlaps with the co-produced curricula advocated in section 9.3, it expands upon these to provide further orientations for the delivery of practical conservation and citizen science activities in formal education contexts.

Pedagogical orientations for delivery of practical conservation and citizen science:

- **Structured and purposeful yet open-ended tasks** – that is, avoiding a narrow focus on the completion of tasks within a limited timeframe, in order to enable the following point.

- Opportunities for and **openness to contingent events**, including those arising from specific features of the place in which the activity is taking place.

- **Linking to current local and/or wider issues** of relevance to young people.

- **Sustained over time**, rather than one-off activities.

- Tasks/projects taking place within **small groups** (at least within a larger class), with each group given "ownership" of a unique task.

- Practical tasks that encourage **non-cognitive forms of engagement** with a topic.

- **"Non-technical forms of engagement"** (Karrow and Fazio 2010) as well as activities following standard processes of scientific data collection – for example, drawing or writing about the species under study.

- Opportunities for **young people to co-shape their own engagement** with a given place or topic.

- Openness to input from **people or organisations from outside the school system**, ideally through long-term partnerships.

- Openness to the co-shaping of young people's engagement with a place or topic by **more-than-human elements** – for example, through providing opportunities for close-up encounters within these.

- An **ontologically sound framing of human-nature entanglements** that positions humans as responsible for our actions, but not as the sole authors of our relationship with our environment and the other species within it.

- Openness to the **enactment of discourses other than a "stewardship" perspective**, including ways of "thinking collectively" with the more-than-human world.

- Engagement with and openness to the **complexities of contemporary existence and environmental issues** – that is, "staying with the trouble" (Haraway 2016).

Figure 9a: List of pedagogical orientations for the delivery of practical conservation and citizen science activities, based on this study's findings and related literature that is signposted by these.

9.6. Discussion of Finding 4

Finding 4: **Key features within Polli:Nation gained greater significance from their relations with *other* key features within the project. While pointing to the highly situated nature of young people's experience of the project, these relations also highlight the synergies that were created when these features were combined.**

9.6.1. Related chapter conclusions

This finding is a repetition of conclusion 9 in Chapter 8.

9.6.2. Synergies and situated findings

Discussion of this finding relates primarily to the previous exploration of the nature of relations between significant features of the Polli:Nation project, in section 8.4.4. As highlighted there, the nature of relations between elements demonstrated strong entanglements among key features within Polli:Nation. I made two points in relation to this. Firstly, I argued that the strong links between these elements can, when combined, create synergies in terms of young people's experience of the project. For example, it appeared that human/more-than-human encounters were given greater significance for pupils by their prior learning about the ecological importance of pollinators, their sense of purpose and ownership of a project that contributed to pollinator conservation, and the presence of external experts who could readily answer their questions. As a result, it is insufficient to conclude that these encounters create significant experiences in and of themselves, but instead, do so to an even greater extent when combined with *other* key features within the project. This has already been kept in mind throughout the previous discussions and recommendations in this chapter. For example, I argue not only that opportunities should be made for curricula to be co-shaped by people and organisations from outside the school system, but also that more-than-human elements, teachers, and young people themselves, should be involved in curriculum making processes (see 9.3.2). Similarly, in the previous section (9.5.7), I provided a list of pedagogical orientations for the delivery of practical conservation and citizen science activities. This list served to *combine* elements discussed in relation to related literature and the empirical evidence from this research, where otherwise these may be viewed in isolation.

The second, closely related point made in section 8.4.4 regarding this finding was that the relations between elements highlighted here illustrate the illustrate the situatedness of pupils' responses when asked what they considered to be the significant features of the Polli:Nation project. This is primarily a reflexive point running throughout the research rather than a substantive finding, and also relates to my ongoing acknowledgements of the unique "hybrid assemblage" (Fox and Alldred 2018) produced by this research and the particular environmental education project it seeks to explore (see especially sections 3.8 and 8.5). Nonetheless, it is a point that raises an important question regarding the generalisability of the findings outlined in this chapter. That is, if these findings stem from a unique and situated "hybrid assemblage", then how can they be said to have implications beyond the immediate context to which they refer? In the following sub-section, I argue that whilst researcher reflexivity (Clarke, Friese, and Washburn 2017) must be upheld, this research is still well-positioned for its findings to be considered in environmental education practice more widely, as well as in relation to other projects involving practical conservation and/or citizen science in formal education contexts.

9.6.3. "If we don't do it, somebody else will"

In response to the challenge of generalisability cited above, Flyvbjerg (2011) mounts a convincing defence of case study research. He does accept that "(o)ften it is not desirable to summarise and generalize case studies" given the nuances of that particular case, and that "(g)ood studies should be read as narratives in their entirety" (313). There is, he contends, too high a value placed on conclusions that can be easily summarised. He accepts, however, that there is often a need to communicate findings in such an abridged manner, and contends that generalisations, to a large extent, *can* be made from individual case studies. He usefully distinguishes between the notion of 'proving' something, and 'learning' about something, accepting that while the former is difficult (perhaps even impossible, but not necessarily desirable) in social science, an over-emphasis on it often leads the latter to be overlooked. He cites Eysenck (1976, 9), who initially criticised the notion of case study research, but later realised:

"sometimes we simply have to keep our eyes open and look carefully at individual cases - not in the hope of proving anything, but rather in the hope of learning something!"

Flyvbjerg goes on to contend that the "force of example", and the extent to which what we learn from it may apply to other contexts, is underestimated (2011, 305). Essentially, his argument is that when attempting to apply the findings of an in-depth case study elsewhere, we may not be able to draw any definite conclusions, but we will certainly know *something* about it based on our previous case study. Drawing upon Mason (2002), Beames and Ross (2010) apply this thinking in an outdoor learning context, with reference to a case study of pupils' participation in a programme with particular pedagogical orientations:

"Our deep and particular case understanding can be used as a basis for hypothesizing into the more general context of schooling and outdoor learning… Ultimately, the aim is to develop what Mason (2002) calls 'well-founded cross-contextual generalities' *(p. 1, original emphasis), in contrast to 'flimsy' de-contextual generalities… divorced from the experiential context by standardized means of reporting* (Beames and Ross 2010, 100).

I adopt this position with regard to the findings shared in this chapter. Additionally, I would emphasise that these findings are based on research that took place in a relatively high number of schools (thirty participant-observation sessions in twelve different schools, and twenty focus groups in eleven new schools as well as seven of those already visited). Following Thomas (2011), and accepting that the amount of time I spent in any one school was relatively limited, I chose to characterise these as "nested units" within the wider case study of the Polli:Nation project, which I approached as a "relational ethnography" (Desmond 2014). I argue, however, that these nested units are sufficient in number, as well as clearly grounded in the context to which they refer, to mean that a considerable amount can be learned from them that can potentially be applied elsewhere.

I recognise that some researchers using post-qualitative methodologies, and advocating the holistic application of new materialist theories, will disagree with any attempt to apply findings elsewhere (indeed they would avoid using the term 'findings'). For these researchers, recognising the co-constitution of humans and materials (Jackson 2013) requires a rejection of the idea of the "knowing subject", the "academic researcher producing knowledge" (St. Pierre 2014, 15). This in turn necessitates an attempt to

think and write in ways that constantly acknowledge the situatedness of the forms of 'knowledge' we are engaging, and as St. Pierre (2014, 15) admits, "seem only to leap from question to question". In related literature, then, there is a clear emphasis on the avoidance of drawing "conclusions". Pacini-Ketchabaw, Taylor, and Blaise (2016), for example, in their key text on multi-species ethnography, describe it as a "radically open methodological experiment" from which "(t)here are no grandiose research findings..., nothing to prescribe, nothing to apply universally" (165). Gough (2013, 2009), meanwhile, also makes a point of ending articles and chapters without a "conclusion", citing Kappeler's (1986, 212) discomfort with *"rounding off the argument so as to dump it in a nutshell on the reader"* (in Gough 2013, 1227).

Clarke, Friese, and Washburn (2017, 367-8), however, take a pragmatic approach to this, which I am inclined to agree with. In relation to their emphasis on researcher reflexivity, they admit that it raises "existential" questions for social research:

"Given the partialities of methods and other problems, might it be better to stop doing social science research altogether? Is reflexivity really enough?. (T)hese questions are integral to the postmodern, poststructural, and interpretive turns. Aware and reflexive researchers can not avoid confronting such existential angst… In these efforts, we share many if not most of the epistemological commitments and existential unease of 'postqualitative' research as framed by Lather, St. Pierre, MacLure and others".

Essentially, however, their argument is that if researchers of a relational and reflexive persuasion choose to avoid sharing the implications of their findings, then this will not stop others – most likely those employing more positivist approaches – from doing so. They therefore choose to continue participating in what they call the "research machine".

"regardless of our own contributions, the 'research machine' – the vast and increasingly transnational technologies of knowledge production – will keep on turning… And paraphrasing New Orleans bluesman Dr John, 'if we don't do it, somebody else will'" (Clarke, Friese, and Washburn 2017, 368).

This, of course, echoes discussions in Chapter 3, where I pointed to the difficulty of carrying out research that was entirely "post-qualitative" given the structured, time-bound nature of doctoral study, and the links between this PhD and the evaluative requirements of the Polli:Nation project. I argued for the reorientation of existing research methods in ways that brought about "micro transformations" (Strom 2018) to the way education research is carried out. Here, I extend this argument to the communication of findings. As in Chapter 3, I argue that the parallel requirement to provide an evaluation of the Polli:Nation project can be seen as indicative of trends in academia towards an increased emphasis on "impact" (Bannister and Hardill 2016; Hammersley 2018), and what Denzin and Giardina (2017, 1) call the "contemporary audit culture". This continues to apply to environmental education research, which has long been linked to "program evaluation", and the gathering of evidence to determine "best practice" (Stern, Powell, and Hill 2014, Carleton-Hug and Hug 2010). In the context of this study, then, Clarke, Friese, and Washburn's (2017) argument above clearly applies.

9.7. Summary

In this chapter, I have identified four overarching findings drawn from the chapter conclusions in chapters 7 and 8. I have also placed these findings in a wider context, examining alternative curricular and pedagogical approaches that resonate with them, as well as the practical challenges that arise when attempting to employ these approaches in practice. In this section, I briefly summarise these findings and the discussions provoked by them.

Finding 1 highlighted the ways in which the Polli:Nation project provided opportunities for people and organisations outside the school system, more-than-human elements, teachers, and young people themselves, to shape the curriculum making process, suggesting the educational value of such "co-produced curricula". It also showed that young people appeared to consider this a significant feature of the project. This led to discussions around alternative ways to assemble curricula, most notably "community curriculum making" (CCM) – an approach that encourages long-term partnerships with people and organisations outside of the school system (Leat and Thomas 2016a, 2016b, 2018; Peacock and Pratt 2011). This finding from the Polli:Nation project has strong

resonances with this approach. Involving external people and organisation in curriculum making processes should not, however, be viewed in isolation, but alongside the importance of involving more-than-human elements, young people, and teachers in this. Importantly, CCM and other suggested alternative approaches should not be seen as being in opposition to traditional subject-based teaching, and schools/teachers need only experiment with projects using this approach in order to begin the process of "cultural change" required to normalise its use.

Finding 2 demonstrated the tendency for practical conservation and citizen science – activities usually associated with informal contexts – to retain a degree of this informality when introduced to *formal* education contexts, as well as the value placed on this informality by participants. This gives rise to practical challenges with regard to "mainstreaming" practical conservation ad citizen science activities within schools. That is, questions around how to retain this informality (and its attendant "relaxed atmosphere") when working with larger groups of pupils, or closer links to the curriculum-as-plan, than were the case during Polli:Nation. The key, I argued, is in not seeing these activities as alternatives to the curriculum-as-plan, but rather, ensuing that a degree of informality is retained in the small portions of the timetable that *are* devoted to these activities.

Finding 3 emphasises the lived curricula that were enacted by young people alongside the "stewardship pedagogies" (Taylor 2017) that were a major influence on the curriculum-as-plan. Especially through embodied practices, contingent moments and human/more-than-human encounters, young people enacted perspectives that, in Taylor's (2017, 1456) words, went "beyond stewardship" to demonstrate "a form of thinking collectively with the more-than-human world". This points to the potential of posthumanist pedagogies such as "common world pedagogies" (Taylor and Giugni 2012), which encourage a move towards this form of thinking collectively with more-than-human elements comprising young people's "common worlds". I also, however, highlighted the practical challenges associated with employing such pedagogies, in particular changing the discourses underlying environmental education as a whole. I argued that practical conservation and citizen science, despite potentially reinforcing the "stewardship" perspective criticised by Taylor (2017), can nonetheless act as a "container" for the sort of contingent processes that enable the enactment of these

alternative lived curricula. I also provided a list of pedagogical orientations for the delivery of practical conservation and citizen science activities.

Finally, Finding 4 re-emphasised the synergies that arose from *combinations* of the significant features of the Polli:Nation project identified by young people, but also demonstrated the highly situated nature of the previous findings. This raised questions around the generalisability of the findings from this thesis. Following Flyvbjerg's (2011) arguments around case study research, however, I contended that the "force of example" is nonetheless powerful in helping us to understand *something* about (in this case) practical conservation and citizen science initiatives, and environmental education practice more widely. The following chapter provides a summary of this thesis as a whole, as well as a series of recommendations for schools, and environmental education practitioners working with schools, based on these findings.

10. Summary and Implications

10.1. Introduction

This chapter provides a summary of this thesis as a whole, with a particular focus on its contributions to the field of educational research, and the practical implications of its findings. I begin this chapter by re-visiting this study's central research questions, summarising how each has been addressed, and re-stating the overarching findings that stem from them (section 10.2). I then summarise the contributions this research makes to the field of educational research (10.3), before acknowledging the limitations of this study, and the gaps that therefore remain for future research to address (10.4). I end with a summary of this study's key implications, and a series of subsequent orientations for environmental education practice, for practical conservation and citizen science in formal education contexts, and for organisations and practitioners working with schools (10.5).

10.2. Research questions and findings re-visited

10.2.1. Research questions

1. What are the common activities and features within the Polli:Nation project?

This question was addressed in Chapter 6, with reference to project resources such as the Polli:Nation Activity Plan (LTL 2014), and the early stages of my own participant-observation. In setting the scene for the two chapters that followed, Chapter 6 outlined in three sections the common activities and features identified in these early stages. These were, firstly, common activities across all schools such as "baseline surveys" and practical conservation tasks. Secondly, underlying ideas and discourses, such as a utilitarian view of other species and a related "stewardship" perspective on human-environment relations (Taylor 2017). Thirdly, common features in terms of the project's position in relation to school timetables and curricula, namely that it tended to involve small groups of young people and take place largely outside of the core, subject-based curriculum. These last two features began to hint at the importance of a sense of informality in terms of young people's experience of the Polli:Nation project.

2. How are curricula produced through the common activities and features within the Polli:Nation project?

This question was addressed in Chapter 7, which drew principally upon fieldnotes and memos produced during and after participant-observation sessions. The processes identified by which curricula were produced included the "invention in practice" of "concepts" (Semetsky 2015), the planned and spontaneous imparting of information, practical tasks and physical sensations, free play and exploration, (usually unplanned) encounters with more-than-human elements, and the responses (or perceived responses) made by these more-than-human elements. Four themes were identified as running through these processes. These were, firstly, the tendency for key curriculum making processes to be unplanned and centred on contingent moments. Secondly; the prevalence of practical tasks and physical sensations through which the production of curricula occurred. Thirdly, the Polli:Nation project, and especially the practical tasks, contingent moments and human/more-than-human encounters within it, appeared to enable the enactment of a lived curricula that differed considerably from the "stewardship" perspective underlying the project. This had strong resonances with the "form of thinking collectively with the more-than-human world" described by Taylor (2017, 1456). Finally, this chapter highlighted the extent to which curricula were co-shaped by more-than-human elements, visiting experts, and young people themselves, as well as teachers, which pointed to the value of such "co-produced" curricula.

3. What do young people see as the significant activities and features within the Polli:Nation project?

This question was directly addressed in Chapter 8, with reference to focus groups in which young people had selected from a series of flashcards showing key activities and features within Polli:Nation. These flashcards stemmed from fieldnotes and situational maps produced during and after participant-observation sessions. As a starting point, I identified five features that were most commonly selected by young people. These were "close-up encounters with other species", "working with experts from outside school", "doing practical conservation tasks", "working in a small group", and "relaxed atmosphere". Collectively, these (and young people's stated reasons for choosing them) added further weight to my observations on the importance of informality, the value of practical tasks and physical sensations, and the value of "co-produced" curricula.

4. What is the nature of the relations between these significant features and processes?

Having identified the features most commonly selected by young people during focus groups, I went on in Chapter 8 to explore the relations between these and *other* elements within the Polli:Nation project. With reference to relational maps and accompanying memos, I demonstrated that the nature of relations between these significant features and processes is one of strong entanglement and, importantly, synergies. While the strong links between these elements demonstrate the highly situated nature of pupils' focus group responses, they also highlight the ways in which the nature of relations between different "significant activities and features" served to enhance young people's experience of the Polli:Nation project.

5. How do young people describe the learning that is produced by the Polli:Nation project?

This question was addressed at the end of Chapter 8, drawing upon young people's responses to questions, around what they had 'learned' through the project. This question was primarily intended for the evaluative report written for this research, and is addressed more fully there (Ruck and Mannion 2019a). Young people invariably reported knowledge relating to the ecological function performed by pollinators, which highlighted ways in which the "hybrid assemblage" in operation produced responses largely reflecting the "curriculum-as-plan". I pointed to occasional responses hinting at the enactment of differing perspectives, although such perspectives were better evidenced through the participant-observation explored in Chapter 7.

6. What are the implications of these findings for school-linked environmental education initiatives, in particular the use practical conservation and citizen science within these?

This final question was addressed extensively in the previous chapter, based on the four overarching findings drawn from this research. Section 10.5 in this chapter re-visits the implications drawn from the discussions in that chapter.

10.2.2. Findings

Before discussing the contributions made by this thesis, its limitations, and the key implications to be drawn from it, it is beneficial to re-state this study's four overarching findings. These are:

Finding 1: **This research demonstrates the value of a process of curriculum making involving people and organisations from outside the school system, more-than-human elements, and young people themselves. Indeed, young people considered the manner in which these elements came together to be a key feature of the Polli:Nation project.**

Finding 2: **The informality that characterised young people's participation in practical conservation and citizen science within formal education contexts appeared to add value to their experience of the Polli:Nation project.**

Finding 3: **The practical tasks, contingent moments and human/more-than-human encounters within Polli:Nation enabled the enactment of lived curricula that indicated a form of "collective thinking" with more-than-human elements, and which differed considerably from the "stewardship" perspective underlying the project.**

Finding 4: **Key features within Polli:Nation gained greater significance from their relations with *other* key features within the project. While pointing to the highly situated nature of young people's experience of the project, these relations also highlight the synergies that were created when these features were combined.**

10.3. Key contributions

The core contribution made by this thesis has been to qualitatively demonstrate the power, significance, or affect-producing capacities, of key aspects of a unique environmental education initiative that enabled a "co-produced" approach to curriculum making. Through ethnographic "thick description" and through conversations with young people themselves, I have highlighted the significance of allowing more-than-human elements, young people themselves, and individuals and organisations from

outside the school system, into the curriculum making process. I have also demonstrated the value of physical activities such as practical conservation tasks, and of contingent moments stemming from loosely structured tasks and an associated "relaxed atmosphere". In doing so, I have provided a clear response to Rickinson, Lundholm, and Hopwood's (2009, 97) call to explore what participation in environmental education projects "looks and feels like to the learners concerned". The specific contributions made by this research are summarised below.

Firstly, I have provided ethnographic insight into a "co-produced" approach to curriculum making – that is, one that involved a unique range of human and more-than-human elements. Where previous studies have often focused on these elements separately – say, organisations and individuals from the wider community (Leat and Thomas 2016a), or more-than-human elements (Gough 2018) – this study has highlighted how curriculum making processes can involve the coming together of more-than-human elements, organisations and individuals from outside the school system, young people, and teachers. I have also demonstrated that young people themselves appear to recognise the value of this co-produced approach – for example, in pointing to "working with experts from outside school" and "close-up encounters with other species" as significant elements of the project.

Secondly, I have provided insights into young people's experience of practical conservation and citizen science, and the importance of a degree of informality within this. These are two activities whose use has been so far limited in formal education contexts, but with citizen science especially, is now growing in popularity. I have demonstrated that these activities can be valuable within environmental education more widely, not only as a means of delivering specific curricular areas, but in terms of providing a "container" for the human/more-than-human encounters and other contingent moments that appeared particularly significant within Polli:Nation. In short, they can be examples of the "pupil-directed, fun, less time-limited, open-ended, yet purposeful tasks" advocated by Mannion, Fenwick, and Lynch (2013, 83).

Thirdly, I have highlighted the enactment of lived curricula that differ from the "stewardship perspective" underlying the project, in particular through embodied activities such as practical conservation tasks and encounters with more-than-human

elements. While multiple and indicative of a range of attitudes and perspectives, these lived curricula suggest forms of "thinking collectively with the more-than-human world" (Taylor 2017, 1456). A key contribution of this finding is to demonstrate that such perspectives are enacted by young people from an older age range than the "early years" children who are the main focus of studies by Pacini-Ketchabaw, Taylor, and Blaise (2016), Taylor (2017), and others within the "common world" research collective.

Finally, this thesis also makes a key methodological contribution. It does this through its engagement with the tensions between methodologies that aim to be fully sensitive to new materialist theories, and the use of these in structured, time-bound studies where there is an emphasis on "demonstrable impact" (Hammersley 2018). In Chapters 3 to 5, as well as in a recent journal article (Ruck and Mannion 2019b), I have provided insights into a methodological approach that aimed to mitigate these tensions, and highlighted the re-orientations to existing qualitative research methods produced by the "research assemblage" thereby created (Fox and Alldred 2015, 2017, 2018).

Running throughout this doctoral study has been the parallel requirement to provide a summative evaluation of the Polli:Nation project as a whole for its funders and partner organisations. This gives context to the contribution made by this chapter specifically. Carrying out interviews with teachers and facilitators, as well as the requirement that I make recommendations based on my findings at regular Polli:Nation Board meetings and in the final evaluation report (Ruck and Mannion 2019a), gave me an acute sense of the importance of translating rather generalised re-framings and new orientations into practical, achievable recommendations. To my mind, then, this gives even greater importance to this final chapter, which summarises the implications of this study's key findings for teachers, facilitators, and researchers (see 10.5).

10.4. Limitations of the research and potential future studies

Before providing a final summary of the implications of this study's key findings, it is important to first note the limitations of this particular "research assemblage" (Fox and Alldred 2015, 2017, 2018). With these limitations in mind, it is also important to consider further insights that may have been possible had this study been assembled

differently, and opportunities for future research that may enable such insights. These considerations are outlined below.

10.4.1. "Substantive depth" of ethnographic engagement

The requirement that this research take place in schools participating in Polli:Nation significantly influenced the level of ethnographic engagement I was able to maintain in this study (see 4.2.2). While Polli:Nation was useful for negotiating access to a relatively large number of schools, these schools tended to be relative newcomers to practical conservation, citizen science, and outdoor learning more widely, as educational processes. The research assemblage may therefore have been different if I had, for example, been able to conduct in-depth case studies in two schools in which these activities were already strongly embedded and occurring with greater regularity. Related to this is the lack of "substantive depth" often cited as a disadvantage of relational ethnographic approaches such as the one taken in this study (Desmond 2014, see 4.6.1). Desmond (2014, 571) defines substantive depth as "intimacy with a single group or place", and distinguishes it from "relational depth", which refers to "intimacy with the dynamics of a network of relations". In this study, while a high degree of relational depth was achieved, a greater degree of substantive depth may have been possible had I been able to maintain more regular ethnographic engagement in a smaller number of schools. Again, this would have altered the research assemblage and potentially influenced my observations, and responses given by young people, in different ways. Future research, then, might aim for more in-depth and long-term insight into a particular instance in which young people are involved in practical conservation and citizen science, in order to expand upon the observations made during this study.

10.4.2. Limits of human/adult perspective

In Chapter 5, I referred to the difficulty in truly "gaining the perspective" of young people (see 4.3.1), and in resisting the humanist "pull towards meaning making" (Pacini-Ketchabaw, Taylor, and Blaise 2016, 156) when trying to sense the "knowledgeabilities" of more-than-human elements (see 4.3.6). The first of these was obvious during participant-observation, where I seemed to be viewed more as a teacher or helper in the project. Similarly, I have noted previously that my fieldnotes,

situational maps, and the subsequent prompts used to initiate conversation in focus groups, were all strongly influenced by my own thoughts and interpretations. Similarly to the previous section, more regular ethnographic engagement *may* have enabled me to change the way I was viewed by young people, although this would be challenging given my obvious difference from them in terms of age, size and mannerisms.

With regard to sensing the knowledgeabilities of more-than-human elements, I have reflected elsewhere that I was only at the beginning of what may turn out to be a "dedicated apprenticeship" in multi-species research (Taylor 2017, 1455). I have also reflected on my initial lack of familiarity with new materialist theories, which combined with evaluative requirements of this study and the structured, time-bound nature of a PhD, created a felt need for early clarity around research methods and design that created tensions with "post-qualitative" approaches (St. Pierre 2017, see 4.5.2). It is possible, then, that had I been more familiar with these theories at the outset, or been less tied to these parallel requirements, I would have been more able to resist the "rush to application" St. Pierre (2017, 2) refers to, and/or to be more attuned to the "knowledgeabilities" of more-than-human elements. It is my sense, however, that it will never be entirely possible to think 'outside of' this adult, human perspective. That is, as humans, we will always to some degree retain the "performative privilege" that, for Petersen (2018, 11), means it is still ultimately us who decide what is written down and included in our studies. Only through future studies, however, will I be able to say whether my sense is correct or not, or whether I really can suspend that "pull towards meaning-making" for longer than I have managed to here.

10.4.3. 'Young people' as a single category

Polli:Nation took place across an age range of around four years (involving pupils mostly aged 9-13), as well as across both primary and secondary schools, and a variety of locations from rural to large city. In trying to provide ethnographic and in-depth explorations of the ways these pupils engaged in particular activities, however, I have referred throughout to 'young people' as a generic demographic. Future studies might attempt to make distinctions between pupils' perspectives based on, for example, age, gender, ethnicity, or location on a rural-urban spectrum. A study of this nature may require either a larger number of responses from pupils across multiple focus groups or

surveys, or more regular and in-depth ethnographic engagement with a small number of schools that are chosen carefully for – for example - their location or ethnic make-up. The limitations of the Polli:Nation project, as well as the requirement that schools were relatively close to my home, did not enable me to make such careful choices in this study.

10.5. Summary of implications

This section summarises the implications of this study's key findings. Since this was a largely ethnographic study that sought to capture the lived experience of participants, these findings speak most clearly to the teachers and facilitators who clearly influenced the on-the-ground curriculum making processes demonstrated during Polli:Nation. I therefore choose to focus primarily on the implications for these practitioners rather than those operating at a more 'macro' level, such as headteachers, policy officers, and curriculum designers. This section is split into several sub-sections. These focus on the implications for teachers and facilitators running environmental education projects more generally, for those running practical conservation and citizen science projects in formal education contexts, and for external organisations and practitioners looking to set up projects with schools. Finally, I also include a section reflecting on the methodological implications of this study for those undertaking research with similar orientations.

10.5.1. Implications for environmental education practice

i) Consider experimenting with approaches that enable the co-production of curricula:

An important point to keep in mind when considering all subsequent implications is that adopting the alternative approaches suggested here need not be viewed in opposition to traditional subject or classroom-based approaches to teaching. Leat and Thomas (2016a, 2018) and Fraser (2013) both make this point with regard to community curriculum making and curriculum integration respectively. Instead, with Leat and Thomas (2016a), I argue that an important first step for teachers would be to run a project that follows any of the orientations outlined here, even if this only accounts for a small part of the timetable, and learn from it.

ii) Consider maximising practical aspects of environmental education projects:

This research has added to previous studies in demonstrating the significance of direct, hands-on experience, rather than simply learning 'about' a particular topic, in environmental education projects. In Polli:Nation, such experiences included carrying out practical conservation tasks, close-up encounters with other species, and free play and exploration in-between loosely structured tasks. This research has demonstrated that these aspects of the Polli:Nation project were valued by young people. It has also demonstrated that such activities enable the enactment, and perhaps further development of, lived curricula that reflect "a form of thinking collectively with the more-than-human world" (Taylor 2017, 1456). These practices also provide more opportunities for more-than-human elements and young people themselves to co-shape the curriculum making process, as per the following two points.

iii) Enable opportunities for young people to co-shape curriculum making processes:

This point draws upon the "relaxed atmosphere" identified during participant-observation, and later identified by young people as an important feature of the project. A major aspect of this perceived relaxed atmosphere was the increased input young people had into shaping their own experience of the project – for example, through asking spontaneous questions prompted by encounters with more-than-human elements, and through contingent moments occurring during periods of free play and exploration. This recommendation also resonates with Fraser's (2013) work on "curriculum integration" – an approach that begins with young people themselves identifying an issue of concern. Following this, I suggest that environmental education would be a particularly suitable curricular area within which to experiment with projects that begin with a particular "issue" identified by young people themselves.

iv) Enable opportunities for more-than-human elements to co-shape curriculum making processes:

As well as the value placed on direct contact with other species by young people, this research has demonstrated ways in which more-than-human elements can co-shape the curriculum making process in powerful ways. This included their appearance prompting questions from young people and/or the spontaneous imparting of information by teachers or visiting experts, as well as their perceived 'responses' to landscape changes that young people had carried out (for example, bees landing on flowers that young

people had planted). Somerville (2017, 23) sums up the power of moments that are co-shaped by more-than-human elements, describing them as "generative encounters with others, shared events that have mutually transformative effects".

v) Enable opportunities for organisations and people from outside of school to co-shape curriculum making processes:

"Working with experts from outside school", and the subsequent chance to "hear new voices", were often cited by young people as important features of Polli:Nation, and these people's role in co-producing curricula through the project had strong resonances with the community curriculum making approach advocated by Leat and Thomas (2016a, 2018). I argue, then, that environmental education projects should maximise the role played by people and organisations from outside of school, and preferably involve sustained long-term contact with a given person or organisation (see 10.5.3).

vi) Practical conservation and citizen science are well-placed to enable the orientations outlined above within environmental education projects:

As this study has highlighted, practical conservation and citizen science are activities that can enable the co-shaping of curricula by more-than-human elements, experts from outside of school, and young people themselves. Practical conservation in particular is also an embodied activity in which humans interact with their environment "through the ongoing interactivity of mind, body and environment through time" (Cooke, West, and Boonstra 2016, 831). With regard to young people, the contingent moments enabled by these activities allowed the enactment of lived curricula that went significantly "beyond stewardship" (Taylor 2017, 1456). I have argued that at least with young people within the upper primary and lower secondary age groups, these activities can act as "containers" for the contingent moments and unpredictable learning possibilities that are enabled by them. There are, however, potential caveats with regard to the use of these activities in formal education contexts, which are considered in the sub-section below.

10.5.2. Implications for practical conservation and citizen science in formal education contexts

i) Consider combining citizen science with activities enabling other forms of 'knowledge':

This point relates to Karrow and Fazio's (2010) suggestion that citizen science projects ought to provide opportunities for the enactment of forms of knowledge other than "scientific-technical knowledge". Simply "assum(ing) the role of a detached, objective, and impartial 'scientist'", these authors argue, gives young people "little or no opportunity to develop a sustainable and meaningful relationship with their local environment" (Karrow and Fazio 2010, 203). Adding to this, Polli:Nation has provided a unique example of a citizen science study that takes place in combination with a variety of other activities, all within the same overarching project. As suggested above, aspects of this project have enabled the enactment of lived curricula that indeed suggest the circulation of concepts going beyond this "scientific-technical knowledge" – following Taylor (2017), I labelled these "collective thinking with the more-than-human world".

On the evidence of the Polli:Nation project, I would suggest that there is value in combining citizen science studies with practical conservation tasks – that is, to encourage and enable young people to take action in response to data they have collected. As highlighted elsewhere, however, this combination of citizen science and conservation action potentially serves to reinforce the "stewardship" perspective critiqued by Taylor (2017). I have argued, however, that this can be remedied by continuing to enable the contingent moments, and enactment of lived curricula that went "beyond stewardship", that appeared so important within the Polli:Nation project. This is reflected in the following implication.

ii) Allow a degree of informality within practical conservation and citizen science activities:

As noted in the previous chapter, practical conservation and citizen science are activities most commonly associated with informal contexts. This research, however, demonstrated a tendency for the feeling of informality associated with these activities to be replicated when they were used in *formal* education contexts. This was closely linked to the tendency for the project to be carried out in small groups of young people, and to take place at the margins of the curriculum. This research has also demonstrated that this informality appeared to be valued by young people. I have therefore pointed to the importance of retaining a degree of this informality when running these activities in formal education contexts. With both activities, this essentially means taking care not to

run them in a prescriptive manner that places too great an emphasis on – for example - correctly counting or identifying particular species, or completing a conservation task in a limited timeframe. Instead, it is important to ensure that such activities remain open to the contingent moments that, in turn, enable young people and more-than-human elements to co-shape the curriculum making process in ways that extend beyond the "scientific-technical knowledge" (Karrow and Fazio 2010, 203), or the "stewardship" perspective (Taylor 2017), that can be overemphasised in such activities.

10.5.3. Implications for organisations and practitioners working with schools

Here, I outline implications for organisations and individual practitioners looking to establish projects within schools that carry the orientations described here.

i) Schools/teachers require extensive engagement and support:

During Polli:Nation, I was constantly reminded of the time pressures teachers were under, the already-crowded school timetables, and the subsequent challenges experienced by LTL facilitators in encouraging schools to engage with the project in a sustained and meaningful manner. As Leat and Thomas (2016, 378) remind us, "(s)enior leaders and classroom teachers have a 'budget' of time and mental energy", and require a great deal of support if approaches enabling the co-production of curricula are to become normalised within their practice. In interviews, LTL facilitators suggested that working with fewer schools, more often and more intensively, would have been more effective in increasing these schools' level of engagement with the project. The key implication for outside organisations looking to work with schools, then, is to avoid being "spread too thinly" across a large number of schools, and ensure that individual schools are engaged with closely and frequently.

ii) Create sustained and long-term engagement between schools and partner organisations:

Closely related to the above point is the importance of sustained engagement over a significant period of time between schools and partner organisations, rather than engagement on a one-off basis. This research has demonstrated not only the value placed on working with organisations and individuals from outside the school system, but also the ways in which this was given added value by the context in which it took

place – that is, as part of a long-term practical conservation and citizen science project that was valued in other ways by young people. This suggests that simply the novelty of engaging with organisations and individuals on a one-off basis is insufficient to achieve the full benefits of a co-produced approach to curriculum making, and instead, partnerships should be built up and sustained over time. This resonates with Falk et al.'s (2012) critique of approaches taken by the informal education sector that focus on "stimulation of interest as opposed to sustaining or building interest" (48), as well as the importance of regular engagement in citizen science cited by Ballard, Dixon, and Harris (2017).

10.5.4. Methodological implications

Below, following the key methodological contribution highlighted in section 10.3, I outline three key implications for researchers engaging with the tensions explored in this thesis.

i) Focus on what research **does***, not what it* **is***:*

As explored in Chapter 3, post-qualitative methodologies emerged during my exploration of new materialist theories as something of a "gold standard" in terms of their comprehensive adherence to these theories. I had, however, already unwittingly excluded this study from being truly post-qualitative, by planning my intended research methods in advance, and being caught up in what St. Pierre (2017, 2) "the *rush to application*, to methodology". Drawing upon Fox and Alldred's (2015, 2017, 2018) work, however, I realised that instead of worrying about whether my approach was truly post-qualitative or not, I could acknowledge what was *produced* by the unique "research assemblage" created through attempts to re-orient existing methods in a manner sensitive to new materialist theories. That is to say, I found it more useful to focus on what a given approach *does,* rather than what it *is.*

This consideration, I feel, enables researchers to experiment with the use of new materialist theories in research, and continue to conduct research in a reflexive manner, without worrying about whether they "get it right", or whether their study is "post-qualitative" enough. While perhaps not entirely post-qualitative, examples of new orientations produced by this particular research assemblage included an approach to

writing fieldnotes that involved responding to theoretically-sensitive questions, a greater focus on more-than-human elements enabled by multi-species ethnography, and a way of thinking in a more entangled, relational manner through the creation of situational and relational maps.

ii) Drawing upon aspects of new materialist theories can bring about "micro transformations" to mainstream education research:

For some researchers of a post-qualitative persuasion, the approach taken by this study will be insufficient in terms of its adherence to the ontological assumptions of new materialist theories. With Strom (2018, 109), however, it is my contention that drawing upon aspects of new materialist theories within conventional qualitative methods can result in "micro transformations" that serve to introduce new ways of thinking into "mainstream" educational research.

iii) Researchers should not be afraid to share findings and implications:

Finally, I also argue that researchers drawing upon relational and reflexive approaches should not be afraid to share findings from our research, and to make recommendations based on these. This follows Flyvbjerg's (2011, 305) emphasis on the "force of example" in case study research, and Clarke, Friese, and Washburn's (2017) pragmatic view that the "research machine" will continue turning regardless of the contributions of researchers of a post-qualitative, posthumanist, relational, materialist, or reflexive persuasion. As mentioned in section 10.3, I also felt that this study's links to the evaluative requirements of the Polli:Nation project gave me a sense of the importance of translating findings into implications that can be applied in practice. After all, Polli:Nation was a project unique in scale, scope, and constituent activities, and there is surely much to be learned from it in this respect.

References

Akkerman, S, and M. van Eijck. 2013. "Re-theorising the Student Dialogically across and between Boundaries of Multiple Communities". *British Educational Research Journal* 39(1): 60-72. doi: 10.1080/01411926.2011.613454.

Alexander, R. 2004. *Towards Dialogic Teaching: Rethinking Classroom Talk*. Cambridge: Dialogos.

Anderson-Butcher, D, H.A. Lawson, J. Bean, P. Flaspohler, B.Boone, and A. Kwiatkowski. 2008. "Community Collaboration to Improve Schools: Introducing a New Model from Ohio." *Children & Schools* 30: 161-172. doi: 10.1093/cs/30.3.161.

Aoki, T.T. 1991/2004. "Teaching as In-dwelling Between Two Curriculum Worlds". In *Curriculum in a New Key: The Collected Works of Ted T. Aoki.* Routledge.

Aoki, T. T. 1993a. "Legitimating Lived Curriculum: Towards a Curricular Landscape of Multiplicity*". Journal of Curriculum and Supervision* 8 (3): 255–268.

Aoki, T.T. 1993b/2004. "In the Midst of Slippery Theme Words: Living as Designers of Multicultural Curriculum". In *Curriculum in a New Key: The Collected Works of Ted T. Aoki.* Routledge.

Arvidsen, J. 2018. Growing dens. On Re-grounding the Child–Nature Relationship through a New Materialist Approach to Children's Dens. Children's Geographies 16 (3): 279-291. doi: 10.1080/14733285.2018.1425371.

Ashley, M. 2000. "Science: an Unreliable Friend to Environmental Education?". *Environmental Education Research* 6 (3): 269-280. doi: 10.1080/713664678.

Bagnoli, A., and A. Clark. 2010. "Focus Groups with Young People: a Participatory Approach to Research Planning". *Journal of Youth Studies* 13(1): 101-119. doi: 10.1080/13676260903173504.

Ballard, H.L., C.G. Dixon, and E.M. Harris. 2017. "Youth-focused Citizen Science: Examining the Role of Environmental Science Learning and Agency for Conservation". *Biological Conservation* 208: 65-75. doi: 10.1016/j.biocon.2016.05.024.

Baker, M. 2005. "Landfullness in Adventure-Based Programming: Promoting Reconnection to the Land". *Journal of Experiential Education* 27 (3): 267-276. doi: 10.1177/105382590502700306.

Banerjee, B., and M. Blaise. 2013. "There's something in the air: Becoming-with Research Practices". *Cultural Studies, Critical Methodologies* 13(4): 240-245. doi: 10.1177/1532708613487867

Bannister, J., and I. Hardill, eds. 2016. *Knowledge Mobilisation and Social Sciences: Research Impact and Engagement*. Routledge.

Barad, K. 2007. *Meeting the Universe Half way: Quantum Physics and the Entanglement of Matter and Meaning.* Durham: Duke University Press.

Beames, S., and H. Ross. 2010. "Journeys Outside the Classroom". *Journal of Adventure Education and Outdoor Learning* 10 (2): 95-109. doi: 10.1080/14729679.2010.505708.

Beames, S., P. Higgins, and R. Nicol. 2012. *Learning Outside the Classroom: Theory and Guidelines for Practice*. Abingdon: Routledge.

Becker, H.S. 1982. *Art Worlds.* Berkeley: University of California Press.

Bell, D.M., and K. Pahl. 2018. "Co-production: Towards a Utopian Approach". *International Journal of Social Research Methodology*, 21 (1), 105-117, doi: 10.1080/13645579.2017.1348581

Bennett, J. 2010. *Vibrant Matter: A Political Ecology of Things*. Duke University Press.

Beery, T.H., and K. A. Jørgensen. 2018. "Children in Nature: Sensory Engagement and the Experience of Biodiversity". *Environmental Education Research* 24 (1): 13-25. doi: 10.1080/13504622.2016.1250149.

Beery, T.H and K.S. Lekies. 2018. "Childhood Collecting in Nature: Quality Experience in Important Places". *Children's Geographies* 17 (1): 118-131. doi: 10.1080/14733285.2018.1463431.

Biesta, G., 2007. "Why 'What Works' Won't Work: Evidence-based Practice and the Democratic Deficit in Educational Research". *Educational theory* 57 (1): 1-22. doi: 10.1111/j.1741-5446.2006.00241.x.

Biggs, J. B. 1996. "Enhancing Teaching through Constructive Alignment". *Higher Education*
32 (3): 347–364.

Boas, F. 1901. "The Mind of Primitive Man". *Science*: 281-289.

Bobbitt, F. 1918. *The Curriculum*. New York: Houghton Mifflin.

Bobbitt, F. 1928. *How to Make a Curriculum*. New York: Houghton Mifflin.

Bodzin, A.M. 2008. "Integrating Instructional Technologies in a Local Watershed Investigation with Urban Elementary Learners". *The Journal of Environmental Education* 39 (2): 47-58. doi: 10.3200/JOEE.39.2.47-58.

Bogner, F.X. 1998. "The Influence of Short-term Outdoor Ecology Education on Long-term Variables of Environmental Perspective". *The Journal of Environmental Education* 29 (4): 17-29. doi: 10.1080/00958969809599124.

Bonnett, M. 2007. "Environmental Education and the Issue of Nature". *Journal of Curriculum Studies* 39 (6): 707-721. doi: 10.1080/00220270701447149.

Bonney, R., C.B. Cooper, J. Dickinson, S. Kelling, T. Phillips, K.V. Rosenberg, and J. Shirk. 2009. "Citizen Science: a Developing Tool for Expanding Science Knowledge and Scientific Literacy". *BioScience* 59 (11): 977-984. doi: 10.1525/bio.2009.59.11.9.

Boreham, N. 2009. "Orienting the Work-based Curriculum Towards Work Process Knowledge: a Rationale and a German Case Study". *Studies in Continuing Education* 26 (2): 211-227. doi: 10.1080/158037042000225227.

Bowden, S. 2015. "Human and Nonhuman Agency in Deleuze". In *Deleuze and the Non/Human*, edited by Stark, H. and J. Roffe, 60-80. Hampshire: Palgrave Macmillan UK.

Braidotti, R. 2013. "Posthuman Humanities." *European Educational Research Journal* 12 (1): 1–19. doi: 10.1177/0263276407085156.

Braun, T., and P. Dierkes. 2017. "Connecting Students to Nature – How Intensity of Nature Experience and Student Age Influence the Success of Outdoor Education Programs". *Environmental Education Research* 23 (7): 937-949. doi: 10.1080/13504622.2016.1214866.

Breiting, S. 2018. "School Development and Engagement – is Mental Ownership the Holy Grail of Education for Sustainable Development?" In *Environment and school Initiatives. Lessons from the ENSI Network -Past, Present and Future*, edited by Afollter, C. and A. Varga, 179-182. ENSI: Vienna.

Brewer, J.D. 2000. *Ethnography*. Philadelphia, PA: Open University Press.

Bridges-Rhoads, S. 2015. "Writing Paralysis in (Post) Qualitative Research". *Qualitative Inquiry* 21 (8): 704-710. doi: 10.1177/1077800414566690.

Bridges-Rhoads, S. 2018. "Philosophical Fieldnotes". *Qualitative Inquiry* 24 (9): 646-660. doi: 10.1177/1077800417733498.

Brinkmann, S. 2014. "Doing Without Data". *Qualitative Inquiry* 20 (6): 720-725. doi: 10.1177/1077800414530254.

Brossard, D., B. Lewenstein, and R. Bonney. 2005. "Scientific Knowledge and Attitude Change: The Impact of a Citizen Science Project". *International Journal of Science Education* 27 (9), 1099-1121. doi: 10.1080/09500690500069483.

Burnett, E., M. N. Peterson, and C. DePerno. 2016. "Impacts of the Conservation Education Program in Serra Malagueta Natural Park, Cape Verde". *Environmental Education Research* 22 (4): 538-550. doi: 10.1080/13504622.2015.1015497.

Carey, P. 2013. "Student as Co-producer in a Marketised Higher Education System: a Case Study of Students' Experience of Participation in Curriculum Design". *Innovations in Education and Teaching International* 50 (3): 250-260. doi: 10.1080/14703297.2013.796714.

Carleton-Hug, A. and J.W. Hug. 2010. "Challenges and Opportunities for Evaluating Environmental Education Programs". *Evaluation and Program Planning* 33 (2): 159-164. doi: 10.1016/j.evalprogplan.2009.07.005.

Carpiano, R.M., 2009. "Come Take a Walk with Me: The 'Go-Along' Interview as a Novel Method for Studying the Implications of Place for Health and Well-being". *Health and Place* 15 (1): 263-272. doi: 10.1016/j.healthplace.2008.05.003.

Carrier, S.J. 2009. "Environmental Education in the Schoolyard: Learning Styles and Gender". *The Journal of Environmental Education* 40 (3): 2-12. doi: 10.3200/JOEE.40.3.2-12.

Carrier, S.J., L.P. Tugurian, and M.M. Thomson. 2013. "Elementary Science Indoors and Out: Teachers, Time, and Testing. *Research in Science Education* 43(5): 2059-2083. doi: 10.1007/s11165-012-9347-5.

Chawla, L., and V. Derr. 2012. ''The Development of Conservation Behaviors in Childhood and Youth.'' In *Oxford Handbook of Environmental and Conservation Psychology*, edited by Clayton, S. New York: Oxford University Press.

Chawla, L. 2015. "Benefits of Nature Contact for Children". *Journal of Planning Literature* 30 (4): 433-452. doi: 10.1177/0885412215595441.

Childers, S. M. 2013. "The Materiality of Fieldwork: an Ontology of Feminist Becoming". *International Journal of Qualitative Studies in Education* 26(5): 599-609. doi: 10.1080/09518398.2013.786845.

Christie, B., and P. Higgins. 2012. *The Impact of Outdoor Learning Experiences on Attitudes to Sustainability: a Brief Review of Literature*. Field Studies Council/University of Edinburgh.

Cho, Y., and D. Lee. 2018. "'Love Honey, Hate Honey Bees': Reviving Biophilia of Elementary School Students through Environmental Education Program. *Environmental Education Research* 24 (3): 445-460. doi: 10.1080/13504622.2017.1279277.

Clark, A. 2005. "Ways of Seeing: Using the Mosaic Approach to Listen to Young Children's Perspectives". In *Beyond listening: Children's Perspectives on Early Childhood Services*, edited by Clark, A., A.T. Kjørholt, and P. Moss, 29-49. Policy Press.

Clarke, A. E. 2005. *Situational Analysis: Grounded Theory After the Postmodern Turn*. Sage.

Clarke, A. E., C. Friese and R. Washburn. 2015. *Situational Analysis in Practice: Mapping Research with Grounded Theory*. Left Coast Press.

Clarke, A. E., C. Friese and R. Washburn. 2017. *Situational Analysis: Grounded Theory After the Interpretive Turn*. Sage Publications.

Clarke, D.A.G. 2015. "Outdoor Learning and the UNESCO ESD Agenda: Could we do More?" *Horizons* 71: 30-31.

Clarke, D. A. G., and J. Mcphie. 2014. "Becoming Animate in Education: Immanent Materiality and Outdoor Learning for Sustainability". *Journal of Adventure Education and Outdoor Learning* 14 (3): 198-216. doi: 10.1080/14729679.2014.919866.

Clarke, D. A. G., and J. Mcphie. 2016. "From Places to Paths: Learning for Sustainability, Teacher Education and a Philosophy of Becoming." *Environmental Education Research* 22 (7): 1002-1024. doi: 10.1080/13504622.2015.1057554.

Colebrook, C. 2002. *Understanding Deleuze.* Allen and Unwin.

Common Worlds Research Collective. 2019. "About the Collective". Accessed April 10, 2019. http://commonworlds.net/about-the-collective/

Cooke, B., S. West, and W.J. Boonstra. 2016. "Dwelling in the Biosphere: Exploring an Embodied Human–environment Connection in Resilience Thinking". *Sustainability Science* 11 (5): 831-843. doi: 10.1007/s11625-016-0367-3.

Coole, D., and S. Frost. 2010. "Introducing the New Materialisms". In *New Materialisms: Ontology, Agency and Politics,* edited by Coole, D. and S. Frost, 1-43. Duke University Press.

Cooper, C. B., J. Dickinson, T. Phillips, and R. Bonney. 2007. "Citizen Science as a Tool for Conservation in Residential Ecosystems". *Ecology and Society* 12 (2): 11. URL: http://www.ecologyandsociety.org/vol12/iss2/art11/.

Cutter-Mackenzie, A., and R. Smith. 2003. "Ecological Literacy: The 'Missing Paradigm' in Environmental Education (part one)". *Environmental Education Research* 9 (4): 497-524. doi: 10.1080/1350462032000126131.

Deleuze, G., and F. Guattari. 1987. *A Thousand Plateaus: Capitalism and Schizophrenia.* London: Bloomsbury Publishing.

Deleuze, G., and C. Parnet. 1987. *Dialogues.* Translated by Tomlinson, H. and B. Habberjam. London: Athlone.

Deleuze, G. 1990. *The Logic of Sense.* New York, NY: Columbia University Press.

Denzin, N.K. and M.D. Giardina, eds. 2017. *Qualitative Inquiry in Neoliberal Times*. New York, NY: Routledge.

Desmond, M. 2014. "Relational Ethnography". *Theory and Society* 43 (5): 547-579. doi: 10.1007/s11186-014-9232-5.

Dewey, J. 1916/1944. *Democracy and Education*. New York: The Free Press.

Dewey, J. 1938. *Logic: The Theory of Inquiry*. New York: H. Holt.

Dickinson, J.L. and R. Bonney, eds. 2012. *Citizen Science: Public Participation in Environmental Research*. Ithaca: Cornell University Press.

Dillon, J., R.B. Stevenson, and Wals, A. E. J. 2016). "Introduction". *Conservation Biology* 30: 450–455. doi: 10.1111/cobi.12689.

Dobson, A. and D. Bell, eds. 2007. *Environmental Citizenship*. M.I.T Press.

Duerden, M.D., and P.A. Witt. 2010. "The Impact of Direct and Indirect Experiences on the Development of Environmental Knowledge, Attitudes, and Behavior". *Journal of Environmental Psychology* 30 (4): 379-392. doi: 10.1016/j.jenvp.2010.03.007.

Druschke, C.G., and C.E. Seltzer. 2012. "Failures of Engagement: Lessons Learned from a Citizen Science Pilot Study". *Applied Environmental Education and Communication* 11 (3-4): 178-188. doi: 10.1080/1533015X.2012.777224.

Duhn, I., K. Malone and M. Tesar. 2017. "Troubling the Intersections of Urban/Nature/Childhood in Environmental Education. *Environmental Education Research* 23 (10): 1357-1368. doi: 10.1080/13504622.2017.1390884.

Durose, C., Y. Beebeejaun, J. Rees, J. Richardson, and L. Richardson. 2011. "Towards Co-Production in Research with Communities". Available: https://ahrc.ukri.org/documents/project-reports-and-reviews/connected-communities/towards-co-production-in-research-with-communities/

Eames, C., B. Cowie, and R. Bolstad. 2008. "An Evaluation of Characteristics of Environmental Education Practice in New Zealand Schools". *Environmental Education Research* 14 (1): 35-51. doi: 10.1080/13504620701843343.

Education Scotland. 2019. "What is Curriculum for Excellence?" Accessed July 17, 2019. https://education.gov.scot/scottish-education-system/policy-for-scottish-education/policy-drivers/cfe-%28building-from-the-statement-appendix-incl-btc1-5%29/What%20is%20Curriculum%20for%20Excellence?

Emerson, R. M., R. I. Fretz, and L. L. Shaw. 1995. *Writing Ethnographic Fieldnotes*. University of Chicago Press.

Erickson, F. 2011. "A History of Qualitative Inquiry in Social and Educational Research. In *The SAGE Handbook of Qualitative Research*: *Fourth Edition*, edited by Denzin, N.K, and Y.S. Lincoln, 43-59. Thousand Oaks, CA: SAGE Publications.

Falk, J., J. Osborne, L. Dierking, E. Dawson, M. Wenger, and B. Wong. 2012. *Analysing the UK Science Education Community: The Contribution of Informal Providers*. London: Wellcome Trust.

Fazio, X.E. 2016. *Science Learning With and In Communities: Engaging Students through Authentic Community-based Science*. Canadian Education Association. URL: https://www.researchgate.net/publication/301244033_Science_Learning_With_and_In_Communities_Engaging_students_through_authentic_community-based_science

Fenwick, T., S. Doyle, M. K. Michael, and J. Scoles. 2015. "Matters of Learning and Education: Sociomaterial Approaches in Ethnographic Research". In *MultiPluriTrans in Educational Ethnography: Approaching the Multimodality, Plurality and Translocality of Educational Realities*, edited by Bollig, S., M-S. Honig, S. Neumann, and C. Seele, 141-162. Bielefeld: Transcript Verlag/Columbia University Press.

Fletcher, R. 2017. "Connection with Nature is an Oxymoron: A Political Ecology of "Nature-Deficit Disorder". *The Journal of Environmental Education* 48 (4): 226-233. doi: 10.1080/00958964.2016.1139534.

Flyvbjerg, B., 2011. "Case Study". In *The SAGE Handbook of Qualitative Research*: *Fourth Edition*, edited by Denzin, N.K, and Y.S. Lincoln. Thousand Oaks, CA: SAGE Publications.

Fontana, A., and J. Frey. 1994. Interviewing: The Art of Science. In *The SAGE Handbook of Qualitative Research*: *First Edition*, edited by Denzin, N.K, and Y.S. Lincoln. Thousand Oaks, CA: SAGE Publications.

Fox, N.J., and P. Alldred. 2015. "New Materialist Social Inquiry: Designs, Methods and the Research-Assemblage". *International Journal of Social Research Methodology* 18 (4): 399-414. doi: 10.1080/13645579.2014.921458.

Fox, N.J., and P. Alldred. 2017. *Sociology and the New Materialisms.* London: SAGE Publications.

Fox, N.J., and P. Alldred. 2018. "Mixed Methods, Materialism and the Micropolitics of the Research-Assemblage". *International Journal of Social Research Methodology* 21 (2): 191-204. doi: 10.1080/13645579.2017.1350015.

Fraser, D. 2013. Curriculum integration. In *Connecting Curriculum Linking Learning*, edited by Fraser, D, Aitken, V, and B. Whyte, 18-33. NZCER Press.

Gallagher, M. 2008. "'Power is Not an Evil': Rethinking Power in Participatory Methods". *Children's Geographies* 6 (2): 137-150. doi: 10.1080/14733280801963045.

Gannon, S. 2015. "Saving Squawk? Animal and Human Entanglement at the Edge of the Lagoon". *Environmental Education Research* 23 (1): 91-110. doi: 10.1080/13504622.2015.1101752.

Geertz, C. 1973. *The Interpretation of Cultures*. Basic Books.

Gibbs, A. 2012. "Focus Groups and Group Interviews". In *Research Methods and Methodologies in Education,* edited by J. Arthur, 186-192. London: SAGE publications.

Gibbs, G.R. 2007. *Analysing Qualitative Data*. London: SAGE publications.

Glaab, S., and T. Heyne. 2018. "Green Classroom vs. Classroom – Influence of Teaching Approaches, Learning Settings, and State Emotions on Environmental Values of Primary School Children. *Applied Environmental Education and Communication* 18 (2): 179-190. doi: 10.1080/1533015X.2018.1450169.

Glaser, B.G. 1992. *Basics of Grounded Theory Analysis: Emergence vs Forcing*. Sociology press.

Golick, D., J. Dauer, L. Lynch and E. Ingram. 2017. "A Framework for Pollination Systems Thinking and Conservation". *Environmental Education Research* 24 (8): 1143-1158. doi:10.1080/13504622.2017.1349878.

Gough, A. 2008. "Towards More Effective Learning for Sustainability: Reconceptualising Science Education". *Transnational Curriculum Inquiry* 5(1): 32-50. URL:http://nitinat.library.ubc.ca/ojs/index.php/tci.

Gough, A. 2013. "The Emergence of Environmental Education Research". In *International Handbook of Research on Environmental Education,* edited by Stevenson, R.B, M. Brody, J. Dillon, and A.E. Wals, 13-14. New York: Routledge.

Gough, A. 2018. Working With/In/Against More-than-human Environmental Sustainability Education". *On Education. Journal for Research and Debate*, 1 (2): 1-5. doi: 10.17899/on_ed.2018.2.3.

Gough, D., S. Oliver, and J. Thomas. 2012. *Introducing Systematic Reviews*. SAGE publications.

Gough, N. 2006. "Shaking the Tree, Making a Rhizome: Towards a Nomadic Geophilosophy of Science Education. *Educational Philosophy and Theory* 38 (5): 625-645. doi: 10.1111/j.1469-5812.2006.00216.x.

Gough, N. 2009. "Becoming Transnational: Rhizosemiosis, Complicated Conversation, and Curriculum Inquiry". In *Fields of Green: Restorying Culture, Environment, and Education*, edited by McKenzie, M, P. Hart, H. Bai, and B. Jickling, 67-83. Cresskill, NJ: Hampton Press Inc.

Gough, N. 2013. "Towards Deconstructive Nonalignment: A Complexivist View of Curriculum, Teaching and Learning". *South African Journal of Higher Education* 27 (5): 1213-1233. URL: https://hdl.handle.net/10520/EJC153525.

Gough, N. 2015. "Deleuze and Guattari and Curriculum". In *Encyclopedia of Educational Philosophy and Theory*, edited by Peters, 1-6. M.A. Springer.

Gordon, S., and I. Thomas. 2018. "'The Learning Sticks': Reflections on a Case Study of Role-playing for Sustainability". *Environmental Education Research* 24 (2), 172-190. doi: 10.1080/13504622.2016.1190959.

Goulson, D. 2014. *A Sting in the Tale: My Adventures with Bumblebees*. London: Jonathan Cape.

Green, M., and I. Duhn. 2015. "The Force of Gardening: Investigating Children's Learning in a Food Garden". *Australian Journal of Environmental Education* 31(1): 60–73. doi: 10.1017/aee.2014.45.

Green, M., and M. Somerville. 2015. "Sustainability Education: Researching Practice in Primary Schools. *Environmental Education Research* 21 (6), 832-845. doi: 10.1080/13504622.2014.923382.

Gruenewald, D.A. 2003. "The Best of Both Worlds: A Critical Pedagogy of Place. *Educational Researcher* 32 (4): 3-12. doi: 10.3102/0013189X032004003.

Guiney, M.S., and K.S. Oberhauser. 2009. "Conservation Volunteers' Connection to Nature". *Ecopsychology* 1 (4): 187-197. doi: 10.1089/eco.2009.0030.

Halpenny, E.A., and L. T. Caissie. 2003. "Volunteering on Nature Conservation Projects: Volunteer Experience, Attitudes and Values". *Tourism Recreation Research* 28 (3): 25-33. doi: 10.1080/02508281.2003.11081414.

Hammersley, M. 2018. "What is Ethnography? Can it Survive? Should it?" *Ethnography and Education* 13 (1): 1-17. doi: 10.1080/17457823.2017.1298458.

Hammersley, M., and P. Atkinson. 1983. *Ethnology: Principles in Practice*. New York: Routledge.

Hannerz, U. 2003. "Being There... and There... and There! Reflections on Multi-Site Ethnography". *Ethnography* 4(2): 201-216. doi: 10.1177/14661381030042003.

Haraway, D.J. 2008. *When Species Meet.* Minneapolis: University of Minnesota Press.

Haraway, D. 2016. *Staying With the Trouble: Making Kin in the Chtulucene*. Durham, NC: Duke University Press.

Hardman, M. 2016. "Time for a New Materialist Account of Learning?" Paper presented at the *Philosophy of Education Society of Great Britain Annual Conference*. Available: http://www.philosophy-of-education.org/dotAsset/9e07c697-478e-4a81-a281-c8b67650abbc.pdf

Haywood, B.K. 2016. "Beyond Data Points and Research Contributions: the Personal Meaning and Value Associated with Public Participation in Scientific Research". *International Journal of Science Education, Part B* 6 (3): 239-262. doi: 10.1080/21548455.2015.1043659.

Haywood, B.K., J.K. Parrish, and J. Dolliver. 2016. "Place-based and Data-rich Citizen Science as a Precursor for Conservation Action. *Conservation Biology* 30 (3): 476-486. doi: 10.1111/cobi.12702.

Higgins, P. 2009. "Into the Big Wide World: Sustainable Experiential Education for the 21st Century". *Journal of Experiential Education* 32 (1): 44-60. doi: 10.1177/105382590903200105.

Higgins, P. 2016. *Outdoor Learning in Scotland: Issues for Education.* Moray House Schooll of Education Election Briefings. Available: https://blogs.glowscotland.org.uk/glowblogs/public/lfsblog/uploads/sites/2744/2018/01/Holyrood-Briefing-Outdoor-Learning-in-Scotland-29-03-16.pdf.

Higgins, P., R. Nicol and H. Ross. 2006. *Teachers' Approaches and Attitudes to Engaging with the Natural Heritage through the Curriculum.* Scottish Natural Heritage. Available: http://www.docs.hss.ed.ac.uk/education/outdoored/teachers_approaches_snh.pdf.

Hine, R., J. Peacock, and J. Pretty. 2008. *Evaluating the Impact of Environmental Volunteering on Behaviours and Attitudes to the Environment: Report for the British Trust of Conservation Volunteers.* BTCV Cymru.

Hines, J.M., H.R. Hungerford, and A.N. Tomera. 1987. "Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta-Analysis". *Journal of Environmental education* 18 (2): 1-8. doi: 10.1080/00958964.1987.9943482.

Hohti, R. and T. Tammi. 2019. "The Greenhouse Effect: Multispecies Childhood and Non-Innocent Relations of Care. *Childhood*. doi: 10.1177/0907568219826263.

Hultman, K. and H. Lenz Taguchi. 2010. "Challenging Anthropocentric Analysis of Visual Data: a Relational Materialist Methodological Approach to Educational Research". *International Journal of Qualitative Studies in Education* 23 (5): 525-542. doi: 10.1080/09518398.2010.500628.

Illyich, I. 1971. *Deschooling Society*. London: Clader and Boyars.

Ingold, T. 2000. *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*. Routledge.

Ingold, T. 2008. "When ANT Meets SPIDER: Social Theory for Arthropods". In *Material Agency,* edited by Knappett, C, and L. Malafouris. Boston, MA: Springer.

Ingold, T. 2011. *Being Alive: Essays on Movement, Knowledge and Description*. Routledge.

Iversen, E., and G. Jónsdóttir. 2018. "'We Did see the Lapwing' – Practising Environmental Citizenship in Upper-Secondary Science Education. *Environmental Education Research*. doi: 10.1080/13504622.2018.1455075.

Jardine, D., S. Friesen, and P. Clifford. 1997. *Curriculum in Abundance.* Mahwah, NJ: Routledge.

Jackson, A.Y. 2013. "Posthumanist Ethnography of Mangling Practices". *International Journal of Qualitative Studies in Education* 26 (6): 741-748. doi: 10.1080/09518398.2013.788762.

Jenkins, E.W. 1999. "School Science, Citizenship and the Public Understanding of Science". *International Journal of Science Education* 21 (7): 703-710. doi: 10.1080/095006999290363.

Jensen, B.B., and K. Schnack. 1997. "The Action Competence Approach in Environmental Education. *Environmental Education Research* 3 (2): 163-178. doi: 10.1080/1350462970030205.

Jensen, B.B. 2002. "Knowledge, Action and Pro-Environmental Behaviour". *Environmental Education Research* 8 (3): 325-334. doi: 10.1080/13504620220145474.

Jensen, B.B. 2004. "Environmental and Health Education Viewed from an Action-Oriented Perspective: a Case from Denmark". *Journal of Curriculum Studies* 36 (4): 405-425. doi: 10.1080/0022027032000167235.

Jickling, B. 1992. "Why I Don't Want My Children to be Educated for Sustainable Development". *Journal of Environmental Education* 23 (4): 5-8. doi: 10.1080/00958964.1992.9942801.

Jickling, B., and A.E. Wals. 2008. "Globalization and Environmental Education: Looking Beyond Sustainable Development". *Journal of Curriculum Studies* 40 (1): 1-21. doi: 10.1080/00220270701684667.

Kamberelis, G., and G. Dimitriadis. 2011. "Focus Groups: Contingent Articulations of Pedagogy, Politics, and Inquiry. In *The SAGE Handbook of Qualitative Research*: *Fourth Edition*, edited by Denzin, N.K, and Y.S. Lincoln, 545-561. Thousand Oaks, CA: SAGE Publications.

Kappeler, S. 1986. *The Pornography of Representation*. Cambridge, MA: Polity Press.

Karrow, D., and X. Fazio, X. 2010. "Educating-Within-Place: Care, Citizen Science, and Ecojustice". In *Cultural studies and Environmentalism*: *The Confluence of EcoJustice, Place-Based (Science) Education, and Indigenous Knowledge Systems,* edited by Tippins, D.J, M.P. Mueller, M. van Eijck, and J.D. Adams, 193-214. Dordrecht: Springer Netherlands.

King, B., P. Higgins, and B. Christie. 2016. *Learning for Sustainability: Effective Pedagogies.* Learning for Sustainability Research into Action Briefings. Available: https://blogs.glowscotland.org.uk/glowblogs/public/lfsblog/uploads/sites/2744/2018/01/Learning-for-Sustainability-effective-pedagogies-LfS-Research-Briefings-No.4.pdf.

Kontoupes, D., and Oberhauser, K.S. 2008. Citizen Science and Youth Audiences: Educational Outcomes of the Monarch Larva Monitoring Project. *Journal of Community Engagement and Scholarship* 1(1): 10-20. URL: https://digitalcommons.northgeorgia.edu/jces/vol1/iss1/5.

Krasny, M.E., and K.G. Tidball. 2009. "Community Gardens as Contexts for Science, Stewardship, and Civic Action Learning". *Cities and the Environment* 2 (1): 1-19. URL: http://escholarship.bc.edu/cate/vol2/iss1/8.

Krasny, M.E., and K.G. Tidball 2012. "Civic Ecology: a Pathway for Earth Stewardship in Cities". *Frontiers in Ecology and the Environment* 10 (5): 267-273. doi: https://doi.org/10.1890/110230.

Krasny, M.E., P. Silva, C. Barr, Z. Golshani, E. Lee, R. Ligas, E. Mosher, and A. Reynosa. 2015. "Civic Ecology Practices: Insights from Practice Theory". *Ecology and Society* 20 (2): 1-12. doi: 10.5751/ES-07345-200212.

Kruse, C.K., and J.A. Card. 2004. "Effects of a Conservation Education Camp Program on Campers' Self-Reported Knowledge, Attitude, and Behavior". *Journal of Environmental Education* 35(4): 33-45. doi: 10.3200/JOEE.35.4.33-45.

Kurz, A., S.N. Elliott, J.H. Wehby, and J.L. Smithson. 2010. "Alignment of the Intended, Planned, and Enacted Curriculum in General and Special Education and its Relation to Student Achievement. *Journal of Special Education* 44 (3): 131-145. doi: 10.1177/0022466909341196.

Lather, P. 1993. "Fertile Obsession: Validity After Poststructuralism", *The Sociological Quarterly* 34 (4): 673-693. doi: 10.1111/j.1533-8525.1993.tb00112.x.

Lather, P. 2000. "Against Empathy, Voice and Authenticity". *Women, Gender and Research* 4: 16-25. doi: 10.7146/kkf.v0i4.28384.

Lather, P. 2016. "Top Ten+ List: (Re) Thinking Ontology in (Post) Qualitative Research". *Cultural Studies, Critical Methodologies* 16 (2): 125-131. doi: 10.1177/1532708616634734.

Latour, B. 1992. "One More Turn After the Social Turn: Easing Science Studies into the Non-Modern World. In *The Social Dimensions of Science*, edited by McMullin, E, 292-317. Notre Dame University Press.

Latour, B. 2004. *The Politics of Nature: How to Bring Science into Democracy*. Cambridge, MA: Harvard University Press.

Learning and Teaching Scotland. 2010. *Curriculum for Excellence through Outdoor Learning*. Available: https://education.gov.scot/Documents/cfe-through-outdoor-learning.pdf.

Learning through Landscapes. 2014. *Polli:Nation Activity Plan 2015 - 18*. Winchester, UK.

Leat, D. 2015. "'Turning schools inside out'. Developing Curriculum with Community Partners". British Educational Research Association. Available: https://www.bera.ac.uk/blog/turning-schools-inside-out-developing-curriculum-with-community-partners.

Leat, D., and U. Thomas. 2016a. "Productive Pedagogies: Narrowing the Gap Between Schools and Communities?" In *FORUM: For Promoting 3-19 Comprehensive Education* 58 (3): 371-384. doi: 10.15730/forum.2016.58.3.371.

Leat, D., and U. Thomas. 2016b. *Schools' and Partners' Guide to Community Curriculum Making through Inquiry and Project-based Learning.* Newcastle University. Available:

https://www.ncl.ac.uk/media/wwwnclacuk/cflat/files/Community%20Curriculum%20Making%20guide.pdf

Leat, D., and U. Thomas. 2018. "Exploring the Role of 'Brokers' in Developing a Localised Curriculum". *The Curriculum Journal* 29 (2): 201-218. doi: 10.1080/09585176.2018.1445513.

Lenz Taguchi, H. 2011. Investigating Learning, Participation and Becoming in Early Childhood Practices with a Relational Materialist Approach. *Global Studies of Childhood* 1 (1): 36-50. doi: 10.2304/gsch.2011.1.1.36.

Lewandowski, E.J., and K.S. Oberhauser. 2017. Butterfly Citizen Scientists in the United States Increase Their Engagement in Conservation. *Biological Conservation* 208: 106-112.
10.1016/j.biocon.2015.07.029.

Lloro-Bidart, T. 2016. "A Feminist Posthumanist Political Ecology of Education for Theorizing Human-Animal Relations/Relationships". *Environmental Education Research* 23 (1): 111-130. doi: 10.1080/13504622.2015.1135419.

Lorimer, J. 2010. "International Conservation 'Volunteering' and the Geographies of Global Environmental Citizenship". *Political Geography* 29 (6): 311-322. doi: 10.1016/j.polgeo.2010.06.004.

Louv, R. 2005. *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder*. Algonquin books.

Lutz, F.W. 1981. "Ethnography: The Holistic Approach to Understanding Schooling". In *Ethnography and Language in Educational Settings*, edited by Green, J.L. and C. Wallat, 51-63. Norwood, NJ: Ablex Publishing Corporation.

Lynch, J., and Mannion, G. 2016. Enacting a Place-Responsive Research Methodology: Walking Interviews with Educators. *Journal of Adventure Education and Outdoor Learning* 16 (4): 330-345. doi: 10.1080/14729679.2016.1163271.

Mack, N. C., C. Woodsong, K. M. MacQueen, G. Guest, and F. Namey, eds. 2005. *Qualitative Research Methods: A Data Collector's Field Guide.* Family Health International.

MacLure, M. 2013a. "Researching Without Representation? Language and Materiality in Post-Qualitative Methodology". *International Journal of Qualitative Studies in Education* 26 (6): 658-667. doi: 10.1080/09518398.2013.788755.

MacLure, M. 2013b. "Classification or Wonder? Coding as an Analytic Practice in Qualitative Research". In *Deleuze and Research Methodologies,* edited by Coleman, R. and J. Ringrose, 164-183. Edinburgh University Press.

Malinowski, B. 1922. *Argonauts of the Pacific*. New York: Holt, Reinhart and Winston.

Malone, K. 2016. "Theorizing a Child–Dog Encounter in the Slums of La Paz Using Post-Humanistic Approaches in Order to Disrupt Universalisms in Current 'Child in Nature' Debates". *Children's Geographies* 14 (4): 390-407. doi: 10.1080/14733285.2015.1077369.

Mannion, G., K. Sankey, L. Doyle, and L. Mattu, L. 2006. *Young People's Interaction with Natural Heritage through Outdoor Learning.* Scottish Natural Heritage Commissioned Report no. 225. Available: https://www.nature.scot/snh-commissioned-report-225-young-peoples-interaction-natural-heritage-through-outdoor-learning.

Mannion, G., C. Adey, and J. Lynch. 2010. *Intergenerational Place-Based Education: Where Schools, Communities and Nature Meet.* Generations Working Together. Available: https://generationsworkingtogether.org/downloads/504dec6769526-IG_Place-based_Education.pdf.

Mannion, G., A. Fenwick and J. Lynch. 2013. "Place-Responsive Pedagogy: Learning from Teachers' Experiences of Excursions in Nature". *Environmental Education Research* 19 (6): 792-809. doi: 10.1080/13504622.2012.749980.

Mannion, G., L. Mattu, and M. Wilson. 2015. *Teaching, learning, and play in the outdoors: a survey of school and pre-school provision in Scotland.* Scottish Natural Heritage Commissioned Report no.779.

Mannion, G. 2019. "Re-Assembling Environmental and Sustainability Education: Orientations from New Materialism". *Environmental Education Research.* doi: 1080/13504622.2018.1536926.

Mathar, T., 2008. "Review Essay: Making a Mess with Situational Analysis?". *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* 9(2), Art. 4. doi: 10.17169/fqs-9.2.432.

Mason, J. 2002. *Qualitative Researching*. London: Sage

Mazzei, L.A. 2014. "Beyond an Easy Sense: A Diffractive Analysis". *Qualitative Inquiry* 20 (6): 742-746. doi: 10.1177/1077800414530257.

McKinley, D.C., A.J. Miller-Rushing, H. Ballard, R. Bonney, H. Brown, D.M. Evans, R.A. French, J.K. Parrish, T.B. Phillips, S.F. Ryan, and L.A. Shanley. 2015. "Investing in Citizen Science Can Improve Natural Resource Management and Environmental Protection". *Issues in Ecology* (19): 1-27. URL: https://jmie.pure.elsevier.com/en/publications/investing-in-citizen-science-can-improve-natural-resource-managem.

Mead, M. 1928. *An Inquiry into the Question of Cultural Stability in Polynesia (Vol. 9).* Columbia University Press.

Merton, R.K., M. Fiske, and K. Merton. 1956. *The Focused Interview: A Manual of Problems and Procedures.* Free Press.

Middleton, N. 2013. *The Global Casino: An Introduction to Environmental Issues*. Routledge.

Mills, D. and M. Morton. 2013. *Ethnography in Education*. London: Sage.

Mogensen, F., and K. Schnack. 2010. The Action Competence Approach and the 'New' Discourses of Education for Sustainable Development, Competence and Quality Criteria. *Environmental Education Research* 16 (1): 59-74. doi: 10.1080/13504620903504032.

Nespor, J. 2008. Education and Place: A Review Essay. *Educational Theory* 58: 475–489. doi: 10.1111/j.1741-5446.2008.00301.x.

Nxumalo, F. and V. Pacini-Ketchabaw. 2017. "'Staying With the Trouble' in Child-Insect-Educator Common Worlds". *Environmental Education Research* 23 (10): 1414-1426. doi: 10.1080/13504622.2017.1325447.

Ogden, L. A., B. Hall, and K. Tanita. 2013. "Animals, Plants, People, and Things: A Review of Multispecies Ethnography". *Environment and Society* 4 (1): 5-24. doi: 10.3167/ares.2013.040102.

Orr, D.W., 1992. *Ecological Literacy: Education and the Transition to a Postmodern World*. Albany, NY: SUNY Press.

Osborne, J., and S. Collins. 2001. "Pupils' Views of the Role and Value of the Science Curriculum: a Focus-Group Study". *International Journal of Science Education* 23 (5): 441-467. doi: 10.1080/09500690010006518.

Overholt, E., and A.H. MacKenzie. 2005. Long-term Stream Monitoring Programs in US Secondary Schools. *The Journal of Environmental Education* 36 (3): 51-56. doi: 10.1080/00958964.2005.11433854.

Pacini-Ketchabaw, V., A. Taylor, and M. Blaise. 2016. "Decentring the Human in Multispecies Ethnographies". In *Posthuman Research Practices in Education*, edited by Taylor, C. and C. Hughes, 149-167. Palgrave Macmillan.

Palmberg, I.E., and J. Kuru. 2000. Outdoor Activities as a Basis for Environmental Responsibility. *The Journal of Environmental Education* 31 (4): 32-36. doi: 10.1080/00958960009598649.

Palmer, J.A., J. Suggate, B. Bajd, and E. Tsaliki. 1998. Significant Influences on the Development of Adults' Environmental Awareness in the UK, Slovenia and Greece. *Environmental Education Research* 4 (4): 429-444. doi: 10.1080/1350462980040407.

Parker-Jenkins, M. 2018. "Problematising Ethnography and Case Study: Reflections on Using Ethnographic Techniques and Researcher Positioning". *Ethnography and Education* 13 (1): 18-33. doi: 10.1080/17457823.2016.1253028.

Peacock, A., and N. Pratt. 2011. "How Young People Respond to Learning Spaces Outside School: A Sociocultural Perspective". *Learning Environments Research* 14 (1): 11-24. doi: 10.1007/s10984-011-9081-3.

Petersen, E. B. 2018. "'Data Found Us': A Critique of Some New Materialist Tropes in Educational Research." Research in Education 101(1): 5-16. doi:10.1177/0034523718792161.

Portelli, J.P. 1993. "Exposing the Hidden Curriculum". *Journal of Curriculum Studies* 25 (4): 343-358. doi: 10.1080/0022027930250404.

Priestley, M., G. Mannion, G. Biesta, and H. Ross. 2010. "Education in a Global Space: The Framing of' Education for Citizenship". In *Education in a Global Space: Emerging Research and Practice in Initial Teacher Education,* edited by Wisely, T, I. Barr, A. Britton and B. King, 27-36. Edinburgh: IDEAS/SCOTDEC.

Prince, H.E. 2017. "Outdoor Experiences and Sustainability", *Journal of Adventure Education and Outdoor Learning* 17 (2): 161-171. doi: 10.1080/14729679.2016.1244645.

Probyn, E. 2016. *Eating the Ocean*. Durham: Duke University Press.

Punch, S. 2012. Hidden Struggles of Fieldwork: Exploring the Role and Use of Field Diaries. *Emotion, Space and Society* 5 (2): 86-93. doi: 10.1016/j.emospa.2010.09.005.

Punch, K.F., and Oancea, A. 2014. *Introduction to Research Methods in Education*. SAGE publications.

Rautio, P. 2013a. "Being Nature: Interspecies Articulation as a Species-Specific Practice of Relating to Environment". *Environmental Education Research* 19 (4): 445–457. doi: 10.1080/13504622.2012.700698.

Rautio, P. 2013b. Children who Carry Stones in their Pockets: On Autotelic Material Practices in Everyday Life. *Children's Geographies* 11 (4): 394–408. doi: 10.1080/14733285.2013.812278.

Rautio, P., R.Hohti, R. Leinonen, and T. Tammi. 2017. Reconfiguring Urban Environmental Education with 'Shitgull' and a 'Shop'. *Environmental Education Research* 23 (10): 1379-1390. doi: 10.1080/13504622.2017.1325446.

Rennie, L., G. Venville, and J. Wallace. 2012. *Knowledge that Counts in a Global Community: Exploring the Contribution of Integrated Curriculum.* Abingdon: Routledge.

Richardson, L., and E.A. St. Pierre. 2005. "Writing: A method of inquiry". In *The SAGE Handbook of Qualitative Research*: *Third Edition*, edited by Denzin, N.K, and Y.S. Lincoln. Thousand Oaks, CA: SAGE Publications.

Rickinson, M. 2001. Learners and Learning in Environmental Education: A Critical Review of the Evidence. *Environmental Education Research* 7 (3): 207-320. doi: 10.1080/13504620120065230.

Rickinson, M., C. Lundholm and N. Hopwood. 2009. *Environmental Learning: Insights from Research into the Student Experience.* Springer.

Rios, C., and I. Menezes. 2017. "'I Saw a Magical Garden with Flowers that People Could Not Damage!': Children's Visions of Nature and of Learning About Nature In and Out of School". *Environmental Education Research* 23 (10): 1402-1413. doi: 10.1080/13504622.2017.1325450.

Robson, C. 2011. *Real World Research (Third Edition).* Chichester: Wiley.

Ross, H., and G. Mannion. 2012. Curriculum Making as the Enactment of Dwelling in Places". *Studies in Philosophy and Education* 31 (3): 303-313. doi: 10.1007/s11217-012-9295-6.

Rowan, B., E. Camburn, and R. Correnti. 2004. "Using Teacher Logs to Measure the Enacted Curriculum: A Study of Literacy Teaching in Third-Grade Classrooms". *The Elementary School Journal* 105 (1): 75-101. doi: 10.1086/428803.

Roy, H.E., M.J.O. Pocock, C.D. Preston, D.B. Roy, D, J. Savage, J.C Tweddle, and L.D. Robinson. 2012. *Understanding Citizen Science and Environmental Monitoring: Final Report on Behalf of UK Environmental Observation Framework.* Available: https://www.ceh.ac.uk/sites/default/files/citizensciencereview.pdf.

Ruck, A., and G. Mannion. 2019a. *Polli:Nation: An Educational Evaluation.* Available: https://www.researchgate.net/publication/332395874_PolliNation_An_Educational_Evaluation.

Ruck, A., and G. Mannion. 2019b. "Fieldnotes and Situational Analysis in Environmental Education Research: Experiments in New Materialisms". *Environmental Education Research*. doi: 10.1080/13504622.2019.1594172.

Sauvé, L. 2005. "Currents in Environmental Education: Mapping a Complex and Evolving Pedagogical Field". *Canadian Journal of Environmental Education* 10 (1): 11-37. Available: https://files.eric.ed.gov/fulltext/EJ881772.pdf.

Sauvé, L., and T. Berryman. 2005. "Challenging a "Closing Circle": Alternative Research Agendas for the ESD Decade". *Applied Environmental Education and Communication* 4 (3): 229-232. doi: 10.1080/15330150591004634.

Schusler, T.M., and M.E. Krasny. 2010. "Environmental Action as Context for Youth Development". *The Journal of Environmental Education* 41 (4): 208-223. doi: 10.1080/00958960903479803.

Scottish Government. 2012. *Learning for Sustainability: The Report of the One Planet Schools Working Group.* Available:

https://education.gov.scot/improvement/Documents/One-planet-schools-report-learning-for-sustainability.pdf.

Scottish Government. 2016. *Vision 2030+: Concluding Report of the Learning for Sustainability National Implementation Group*. Available: https://education.gov.scot/improvement/documents/res1-vision-2030.pdf

Schönfelder, M.L., and F.X. Bogner. 2018. How to Sustainably Increase Students' Willingness to Protect Pollinators. *Environmental Education Research* 24 (3): 461-473. doi: 10.1080/13504622.2017.1283486.

Semetsky, I. 2015. "Deleuze's Philosophy for Education". In *Encyclopedia of Educational Philosophy and Theory,* edited by Peters, M. Singapore: Springer.

Silva, C.G., A. Monteiro, C. Manahl, E. Lostal, T. Holocher-Ertl, N. Andrade, F. Brasileiro, P.G. Mota, F.S. Sanz, J.A. Carrodeguas, and R.M. Brito. 2016. "Cell Spotting: Educational and Motivational Outcomes of Cell Biology Citizen Science Project in the Classroom. *Journal of Science Communication* 15 (01): 1-20. doi: 10.22323/2.15010202.

Silvertown, J., 2009. A New Dawn for Citizen Science. *Trends in Ecology and Evolution* 24 (9): 467-471. Doi: 10.1016/j.tree.2009.03.017.

Simon, G. 2013. Relational Ethnography: Writing and Reading in Research Relationships. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* 14 (1), Art. 4. doi: 10.17169/fqs-14.1.1735.

Situational Analysis. 2018. "Frequently Asked Questions". Accessed October 15 2018. http://clarkessituationalanalysis. blogspot.com/.

Sjöblomm, P., and L. Wolff. 2017. "'It Wouldn't be the Same Without Nature'—The Value of Nature According to Finnish Upper Secondary School Students". *Journal of Environmental Education* 48 (5): 322-333. doi: 10.1080/00958964.2017.1367637.

Smith, G. 2002. "Place-Based Education: Learning to be Where We Are". *Phi Delta Kappan* 83 (8): 584–594. doi: 10.1177/003172170208300806.

Smith, J.G., B. DuBois, and M.E. Krasny. 2016. Framing for Resilience through Social Learning: Impacts of Environmental Stewardship on Youth in Post-Disturbance Communities. *Sustainability Science* 11(3): 441-453. doi: 10.1007/s11625-015-0348-y.

Sobel, D. 1996. *Beyond Ecophobia: Reclaiming the Heart in Nature Education*. Great Barrington, MA: The Orion Society.

Sobel, D. 2004. *Place-based Education: Connecting Classrooms and Communities*. Great Barrington, MA: The Orion Society.

Somerville, M., and M. Green. 2011. "A Pedagogy of 'Organized Chaos': Ecological Learning in Primary Schools". *Children Youth and Environments* 21 (1): 14-34. doi: 10.7721/chilyoutenvi.21.1.0014.

Somerville, M., and S. Powell. 2019. "Researching With Children of the Anthropocene: A New Paradigm?". In *Educational Research in the Age of Anthropocene,* edited by Reyes, V, J. Charteris, A. Nye, and S. Mavropoulou. IGI Global.

Sonu, D., and N. Snaza. 2015. "The Fragility of Ecological Pedagogy: Elementary Social Studies Standards and Possibilities of New Materialism". *Journal of Curriculum and Pedagogy* 12 (3): 258–277. doi: 10.1080/15505170.2015.1103671.

Sørensen, E. 2009. *The Materiality of Learning: Technology and Knowledge in Educational Practice*. Cambridge University Press.

Springgay, S., and S. E. Truman. 2018. "On the Need for Methods Beyond Proceduralism: Speculative Middles, (In) Tensions, and Response-ability in Research". *Qualitative Inquiry* 24 (3): 203-214. doi: 10.1177/1077800417704464.

Stake, R. E. 1995. *The Art of Case Study Research.* Thousand Oaks, CA: SAGE publications.

Stapp, W.B. 1969. "The Concept of Environmental Education". *Environmental Education* 1 (1): 30-31. doi: 10.1080/00139254.1969.10801479.

Steg, L., and C. Vlek. 2009. "Encouraging Pro-Environmental Behaviour: An Integrative Review and Research Agenda". *Journal of Environmental Psychology* 29 (3): 309-317. doi: 10.1016/j.jenvp.2008.10.004.

Stern, M.J., R.B.Powell, and D. Hill. 2014. "Environmental Education Program Evaluation in the New Millennium: What do we Measure and What Have We Learned?". *Environmental Education Research* 20 (5): 581-611. doi: 10.1080/13504622.2013.838749.

Stevenson, R.B., A.E. Wals, J. Dillon, and M. Brody. 2013. "Introduction: An Orientation to Environmental Education and the Handbook". In *International Handbook of Research on Environmental Education,* edited by Stevenson, R.B, M. Brody, J. Dillon, and A.E. Wals. New York: Routledge.

St. Pierre, E.A. 2011. "Post Qualitative Research: The Critique and the Coming After". In *The SAGE Handbook of Qualitative Research*: *Fourth Edition*, edited by Denzin, N.K, and Y.S. Lincoln, 611-626. Thousand Oaks, CA: SAGE Publications.

St. Pierre, E. A. 2014. "A Brief and Personal History of Post Qualitative Research: Toward 'Post Inquiry'". *Journal of Curriculum Theorizing* 30 (2): 2-19.

St. Pierre, E. A., and A. Y. Jackson. 2014. "Qualitative Data Analysis After Coding". *Qualitative Inquiry* 20 (6): 715-719. doi: 10.1177/1077800414532435.

St. Pierre, E. A. 2018. "Writing Post Qualitative Inquiry". *Qualitative Inquiry* 24 (9): 603-608. doi: 10.1177/1077800417734567

St. Pierre, E. A. 2019. "Post Qualitative Inquiry in an Ontology of Immanence". *Qualitative Inquiry* 25 (1): 3-16. doi: 10.1177/1077800418772634.

Strauss, A. 1978. A Social World Perspective. *Studies in Symbolic Interaction* 1 (1): 119-128.

Strauss, A., and Corbin, J. 1990. *Basics of Qualitative Research (Vol. 15)*. Newbury Park, CA: SAGE publications.

Strom, K. J. 2018. "'That's Not Very Deleuzian': Thoughts on Interrupting the Exclusionary Nature of 'High Theory'. *Educational Philosophy and Theory* 50 (1): 104-113. doi: 10.1080/00131857.2017.1339340.

Sund, P., and J.G. Lysgaard. 2013. "Reclaim 'Education' in Environmental and Sustainability Education Research". *Sustainability* 5 (4): 1598-1616. doi: 10.3390/su5041598.

Tauritz, R. 2012. "How to Handle Knowledge Uncertainty: Learning and Teaching in Times of Accelerating Change". In *Learning for Sustainability in Times of Accelerating Change*, edited by Wals, A.E.J. and P.B. Corcoran, 299-316. Wageningen Academic Publishers.

Taylor, A., and M. Giugni. 2012. "Common Worlds: Reconceptualising Inclusion in Early Childhood Communities". *Contemporary Issues in Early Childhood* 13 (2): 108-119. doi:10.2304/ciec.2012.13.2.108.

Taylor, A. 2013. *Reconfiguring the Natures of Childhood*. Abingdon: Routledge.
Taylor, A., and V. Pacini-Ketchabaw. 2015. "Learning with Children, Ants, and Worms in the Anthropocene: Towards a Common World Pedagogy of Multispecies Vulnerability". *Pedagogy, Culture and Society* 23 (4): 507-529. doi: 10.1080/14681366.2015.1039050.

Taylor, C. A. 2016. "Edu-Crafting a Cacophonous Ecology: Posthumanist Research Practices for Education". In *Posthuman Research Practices in Education*, edited by Taylor, C.A, and C. Hughes. London: Palgrave Macmillan.

Taylor, A. 2017. "Beyond Stewardship: Common World Pedagogies for the Anthropocene". *Environmental Education Research* 23 (10): 1448-1461. doi: 10.1080/13504622.2017.1325452.

Thomas, G. 2011. *How to Do Your Case Study*. SAGE publications.

Tyler, R.W. 1949. *Basic Principles of Curriculum and Instruction*. Chicago: University of Chicago Press.

Tsing, A. 2013. "More-than-Human Sociality". In *Anthropology and Nature*, edited by Hastrup, K, 37-52. New York: Routledge.

Tompkins, L.J., 2005. "A Case for Community-based Education". The Science Teacher 72 (4): 34-36. Available: https://search.proquest.com/docview/214616862?pq-origsite=gscholar.

Trumbull, D.J., R. Bonney, D. Bascom, and A. Cabral. 2000. "Thinking Scientifically During Participation in a Citizen-Science Project". *Science Education* 84 (2): 265-275. doi: 10.1002/(SICI)1098-237X(200003)84:2<265::AID-SCE7>3.0.CO;2-5.

UNESCO. 1980. *Environmental Education in the Light of the Tbilisi Conference.* Paris: UNESCO. Available: file:///C:/Users/atr1/Downloads/038550engb.pdf.

UNESCO. 2013. *Education for Sustainable Development (ESD) in the UK: Current Status, Best Practice and Opportunities for the Future*. London: UK National Commission for UNESCO.

Vannini, P. 2015. "Non-Representational Ethnography: New Ways of Animating Lifeworlds". *Cultural Geographies* 22 (2): 317-327. doi: 10.1177/1474474014555657.

Van Poeck, K., L. Ostman, and T. Block. "Opening up the Black Box of Learning-by-Doing in Sustainability Transitions". *Environmental Innovation and Societal Transitions*. doi: 10.1016/j.eist.2018.12.006.

Waterhouse, M., and D. Masny. 2017. "Rhizocurricular Processes of Dis-Identification and Becoming-Citizen". In *At the Intersection of Selves and Subject,* edited by Lyle, E, 115-123. Rotterdam: SensePublishers.

Wattchow, B., and M. Brown. 2011. *A Pedagogy of Place: Outdoor Education for a Changing World*. Monash University Publishing.

Wells, N.M., and K.S. Lekies. 2006. Nature and the Life Course: Pathways from Childhood Nature Experiences to Adult Environmentalism. *Children Youth and Environments* 16 (1): 1-24. doi: 10.7721/chilyoutenvi.16.1.0001.

Wiggins, A., and K. Crowston. 2011. "Goals and Tasks: Two Typologies of Citizen Science Projects". Paper presented at the *45th Hawaii International Conference on System Sciences*. Available: https://ieeexplore.ieee.org/abstract/document/6149239.

Wilkinson, C. 2017. "Going 'Backstage': Observant Participation in Research with Young People". *Children's Geographies* 15 (5): 614-620. doi: 10.1080/14733285.2017.1290924.

Winks, L. 2018: "Discomfort in the Field - The Performance of Nonhuman Nature in Fieldwork in South Devon". *Journal of Environmental Education* 49 (5): 390-399. doi: 10.1080/00958964.2017.1417219.

Woodhouse, J., and C. Knapp. 2000. *Place-Based Curriculum and Instruction*. ERIC Digest.

Youdell, D. 2015. "Assemblage Theory and Education Policy Sociology". In *Education Policy and Contemporary Theory: Implications for Research*, edited by Gulson, K.N, M. Clarke, and E.B. Petersen, 110-121. London: Routledge.

Zint, M., A. Kraemer, H. Northway, and M. Lim. 2002. "Evaluation of the Chesapeake Bay Foundation's Conservation Education Programs". *Conservation Biology* 16 (3): 641-649. doi: 10.1046/j.1523-1739.2002.00546.x.

Appendix 1 – Sample Fieldnote Extracts

Extract 1
The fieldnotes displayed here were written after the first day of participant-observation in this study. Using "jottings" (Emerson, Fretz, and Shaw 1995) written during the participant-observation itself, they were then expanded into a detailed descriptive narrative soon afterwards.

Date: 29th August 2016

Time: 10.30 – 12.30

Who: twelve pupils who have just started Primary 7 (aged 10-11), one primary school teacher, one visiting teacher from the cluster secondary school, the Project Officer from Grounds for Learning.

What: Visit from the Project Officer to carry out Baseline Survey – ie, completing a survey on the part of the school grounds identified as being part of the Polli project, to assess the type of plants, flowers etc. growing there now, and visiting pollinators. Most of these Baseline Surveys already took place in the spring, but the ones for this cluster were postponed. This was the Project Officer's first visit to this school.

Methods used: Participant-observation.

Fieldnotes

Everything was stressful today apart from the actual fieldwork! By the time I arrived, I'd already taken just about every possible wrong turn on the way there, and my car's front "wheel tub" had finally worked itself loose and fallen off in a Morrisons car park. I'd gone completely off route coming into this small town and pulled up in a side road to consult Google Maps. I finally got to the school with about ten minutes to spare, and C (Project Officer) hadn't arrived yet. I checked my emails to make sure I had the right school and right date. It's a new school – less than ten years old at least, with spacious corridors, colourful wall displays, and a car park with spare spaces. A sign on the door, in a strange mash-up of languages/dialects, bade me "Failte tae oor wee schuil".

C (project facilitator) arrived, always standing out with the home-made bamboo quadrat she carries everywhere. Mrs D, the teacher, came down to greet us, and we were welcomed into the staff room. We were offered a cup of tea, but "We've got all of five minutes!" We just spoke about what would be happening that day. In Mrs D's classroom, she pointed out of the window at the area the school had identified for the Polli project. This led to a conversation about the issues they've been having with the council. "Have they been maintaining the area?", asked C. "If by 'maintaining' you mean riding roughshod over it...", joked Mrs D, referring to this council workers to just do what they're told, and just mow grass as short as possible, with no thought to the biodiversity. The area we were going to actually had quite long grass though, so I wasn't sure which area she meant. Unless it had just been left to grow over the summer...

The pupils (all just starting Primary 7, so aged 10-11) arrived after break time. Mrs D told me she had already talked to them about the project and the research element. She also had all the consent forms printed out, ready for them to sign: "I know, how organised am I?!" It hinted at the time pressure teaches are under to fit this project in.

"You're taller than 6ft James!", was one of the first things a pupil said to me – a cheeky but bright girl, Alisa. She later told me this was an instructor on a residential they'd been on, also known as "Giant James". They all appeared incredibly well-behaved as they gathered round the large computer screen, all sitting on the floor, some with their backs against table legs. Should I be sitting on the floor with them? It just didn't seem right... Would it seem more natural over time? Will I be able to become more "participant" than "observer"? Do I need to? Does it matter?

C, a qualified primary school teacher, has a real primary school teacher manner about her when talking to the pupils. First, she asks if any of them know what pollination is. They did, more or less. C expanded on their definition: "Insect visits a flower... whilst it's feeding on... it flies off to another flower... some of the pollen drops off... that's how we get...".

I can't help but notice the anthropomorphism in a lot of what she says – this irresistible way of telling children about animals. "They're doing a job for us for free... If we had to pay people to do it, it would cost Scotland £4.5 million" (so there's an "ecosystem services"/utilitarian theme there too); "It's their lifestyle, they're happy doing it"; "The problem is, they don't have enough food, enough shelter". Also, the tendency to "like" certain creatures but not others, as C "introduced" the group to the different kinds of pollinators – how to identify them and so on: "Ah, when they're in the classroom, they're an enemy!" (Mr McG, the visiting secondary school teacher), "No that's wasps..." (C), "Naw, we don't like the wasps..." (Mr McG), and one pupil told a story about how he and his family had once had several wasps buzzing around in their car with them.

"You are ambassadors for pollinators!", C told them at the end of that introductory session, and Alisa did a silent, mock "yes!", hinting at the sense of purpose/importance this project potentially gives them.

They then did an activity where C put the pictures up around the classroom on the walls, and gave them clues as to which pollinator she was talking about. They had to go to the correct picture. Again, could I participate? I didn't feel like I could...

They then began filling out the survey document, before going outside. C basically told them what to write for each bit. Very standardised, very scientific. I guess it gives them the feeling of being "real scientists". Details included which cluster they were part of, the postcode of the school, etc.

On the way down there, I tried asking Alisa and a couple of other girls about the project, and whether they'd done anything like this before, but they just wanted to ask me about my height, and compare me to "Giant James"! "What feet are you?" Alisa did say they were doing something down the same grassy bank last year, though, and "my shoes were covered in pollen!" The group had trundle wheels with them, which prior to my one previous school (familiarisation) visit, I hadn't

Seen since my own primary school days!

At the corner of the site closest to the school building in a sort of "greenhouse" building. Its structure is made out of bamboo canes, and old plastic bottles make up the walls. On the wall of the "greenhouse", Alisa found a green spider. It was one of those impromptu moments I'd come to expect. This was while a couple of the pupils were measuring out the survey area with the trundle wheel. Alisa was keen to show as many people as possible. Several of them peered closely at it. "It's looking after its baby!", she said.

The survey site ran from the top of the bank down to the bottom, consisting largely of long grass. "This is wet!", exclaimed one pupil as she walked down the hill. For the ones not doing the measuring of them, it was basically free play and random chat, sometimes about their own experiences with insects. Greg, holding the camera I'd given to him, exclaimed "I saw a flying insect!... I tried to take a picture of it". At one point, C found an "oak apple" on the ground, and told the ones in earshot about it – another off-script moment. One girl links her hands above her head and said "I'm a flower!" As a few of them identified plants and flowers in the survey area, which the survey categorises as "wild", "garden" and "woody" plants, C concluded that there are "not many plants pollinators like at the moment".

The pupils were split into three small groups. Mrs D took two groups inside while the first group were doing their two-minute observation of what pollinators entered the randomly-placed quadrat. Definitely an emphasis on keeping them all occupied and well-behaved. That group did identify (online) the green spider we'd seen earlier: A Green Orb spider. Fairly common, apparently.

As the pupils began to fill in the details on the survey sheet, directed by C, there were a few context-specific interpretations of the weather: "This is full sun for (this town)!" (Mr McG), and for the wind: "for us, this is gentle!"

"Please don't be too disappointed if we don't see anything", said C before the two-minute count, "it means it can only get better!" She also told them they could treat the two minutes as "relaxation time".

As we waited for the next group to come out and completed quadrat 2, we (C, Mr McG and I) chatted about whether this two-minute "snapshot" (as C called it) could really be considered "science" or not. "You saying it's not science?", Mr McG asked me. We agreed it's probably a balance between "proper" science, and a good learning experience for the pupils.

There was very little in the way of pollinators during the two-minute counts. It's long, wild grass, but with very few flowers. The occasional buttercup. C did accept, though, that "this is actually a good habitat, they (bees) need homes as well". A hoverfly did appear at one point, though, and C shouted "hooray!"

Extract 2

This second extract is written using a series of theoretically-sensitive questions. It is taken on a day of participant-observation in a Polli:Nation-participating secondary school, where a group of seven pupils were engaged in the commonplace activity of building a "bug hotel". The pupils were part of the school's department of Additional Support Needs (ASN), and participated in the project for the same two periods every week.

School 7a – Visit 2

Date: 21st February 2017

Time: 8.45 - 11.15

What?: My first visit for one of the school's weekly *Polli:Nation* sessions, to be held every Tuesday morning between now and May. Today was mostly centred around building bug hotel from pallets (and collecting materials beforehand), with a bit of weeding in the "sensory garden" area near the end.

Notes/Questions

What human/more-than-human encounters were there?
- While gathering dry leaves from the ground, Liam finds a large woodlouse, and lets it crawl over his hand. He comes and shows it to me. He calls it a "slater" - I'd forgotten that's what people call them in this part of the country. Unlike some of the boys in the group, who display high levels of energy, Liam is quiet, thoughtful, and does his own thing within the group. He tells me how slaters are actually crustaceans, because they have a shell. I complement him on his knowledge and ask him where he's learned it. "I just like animals and stuff", he shrugs. At this point, one of the other boys, Brian, quickly takes the slater off him and throws it towards one of the girls, who is scared of insects. She screams and runs away. Liam waits until the commotion dies down, then goes and finds the slater, and places it carefully at the side of the path, among the leaves.

How do human and more-than-human elements respond to these encounters? How might they have experienced them?
- What to say about the slater? It was clearly in its usual environment – damp, dark places. Being in amongst those dead leaves was exactly that sort of place. And having looked up a bit about slaters… They are indeed "isopod crustaceans" that feed on dead plant material (so probably searching for food when Liam found it?), and are usually active at night (so are they sort of drowsy this time of day?). They use their antenna to feel their way around. They still breathe through gills as their ancestors lived underwater. As for how it might have experienced today, though: Crawling over new surfaces (people's hands), being chucked through the air, then picked up again. Did any of that register beyond a brief sensation? Or does it feel pain? Or fear? The point is, I don't know…

- Brambles: Are they growing at this time of year? We noticed how they'd been "re-rooting", ie, growing from one spot, then sticking into the ground again in another. The parent helper pointed that out – don't think I knew they did that. It's amazing how long they are too. You pull one up at one end, and are left with a long spiky string of it, tangled with other bits and sometimes re-rooting. Now they're being uprooted and chucked into a waste pile over by the polytunnel. Same with the weeds in the sensory garden.

What was affectively palpable today? (Affect)
- Again, the human/non-human encounters – or, for the young people, the chance to see, touch, handle insects (or crustaceans in this case) up close. Usually they are spontaneous/unexpected encounters.

- Mrs C as an "activist" teacher/unique character: This is only the second time I've met Mrs C, and her attitude and demeanour really come across as she tells me about how she's been running the Polli:Nation project so far. She puts a great emphasis on doing things her way, being herself, and not caring what impression she gives. I have noted already how a school's level of activity within Polli:Nation seems to depend on a passionate and outgoing teacher. She is a strong character to carry a project like this forward. It seems to depend on that a lot.

- That woodland really is unique. It offers the chance for free exploration, out of sight from the teachers. From the teachers' point of view, it is small enough that the pupils can be let out of sight – it's a fenced-off area, and no real harm can come to them. Stretching several hundred metres from one end to the other, the woodland is bounded at one end by a small stream (which the group call "the Burn") and several gardens belonging to neighbouring houses, and at the other, a fence and locked gate which separate it from the rest of the school grounds. Mrs C says she really appreciates the woodland as a valuable resource for outdoor learning, but it's only her that uses it for most of the year. It being behind a fence and locked gate means it can only be used as part of a timetabled class like this. On the way into the woodland today, I also notice some rhododendrons, a few silver birches, a carpet of leaf litter, and the pungent smell coming from the Burn, which had some of that froth in it that forms in eddies on burns and rivers.

What (new?) ideas/"concepts" are in circulation? (Concepts)
- Giving a "home" to slaters, other bugs, bees, etc. Anthropomorphism when thinking about the bug hotel. As I've said before, this seems to be an activity that young people really get into, perhaps because of the relatability of giving something a "house" or "home". "So this is the Presidential Suite?", Liam grinned, pointing at an area at the top of the bug hotel, after Mrs C had joked about the hotel getting its "first customer" when they hadn't finished it yet.

- Different ideas/reactions to other species: What was interesting today was the contrasting responses to the slater from Liam and Brian. Picking it up and throwing it, vs carefully placing it among the leaves. That caring attitude (a "commonworld" perspective?) is also quite different from the "stewardship"/"other species as 'useful'" point of view the project is founded on, too. So could I say that other species such as the slater (and more obviously for this project, the bees) carry the capacity to provoke different affective responses in young people? Something to be

scared of, something to take care of, something that's "useful" to humans? And Polli:Nation seems to create the spaces for these different kinds of "othering" to happen

- Idea of "weeds" vs "plants", or more widely, "nature vs non-nature". Or even "types of nature". As the groups were pulling out weeds from the planters in the sensory garden, Brian noticed Danny pull out something that wasn't a weed, and exclaimed "Haha, that's a plant!"

- Young people/citizens as conservationists. The idea that we can "help" other species ("environmental stewardship") through building this protective space for them. And that the other species need "protection".

Appendix 2 – Focus Group Schedule

As discussed in Chapter 5, the composition of my focus groups developed iteratively during the course of this study. The focus group schedule below is the latest version, updated before carrying out focus groups in Scottish schools, following focus groups in England, Wales and Northern Ireland.

Focus Groups - schedule

Equipment

Photos (numbered, and selected!)
Flashcards
Camera
Audio recorder (empty, + spare batteries, + USB cable!)
Wind jammer!

Introduction

So as you know, I'm a researcher at the University of Stirling. I'd better just remind you what the purpose of this is, though – what I'm doing here…

You may have heard of Universities doing research into areas like chemistry, or biology, or even history, or literature studies. But education research is its own thing. Education research is ultimately about working out how education can be done better. So that young people like you will benefit from it even more. Like, what sort of things should you be learning to help you engage with the world as it is today? *How* should you be learning those things?

Now, this Polli:Nation project is unique. A project that's happening in 250 schools right across the country, and involves you guys doing practical, hands-on work to help address what is a really big issue – the decline in numbers of pollinators, which you'll have learned lots about I'm sure. You might remember that it's funded by the Lottery. The money for it comes from when people buy lottery tickets. They've been generous enough to also provide funding for me to do research into the project, to find out how and what young people learn from a project like this, what is it you value about the experience (if anything), and perhaps, what could be done better if there was another project like it?

So I'm basically looking to find out about your experience of the *Polli:Nation* project. How was it different to what we might call "normal" school lessons? What really "stays with you", ie, what do you still think about now, what is still affecting you?(?) So what was good about it, but also maybe, what was *not* good about it? What would you change about it, if it was done again? What advice would you give to others participating in this project, or running it?

It's really important to point out that:

- You are NOT being tested. If I asked you what you've learned about pollinators, or the environment, even if you said "nothing", I wouldn't say "oh that's terrible, I'm going to tell the headteacher", I'd just say "ok, fair enough", then maybe ask what could be done to help you engage better with it? Is that clear? I'm just looking for *your* thoughts

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on the project. You really can say whatever you like. There are no right or wrong answers. Nothing you say will get you into trouble, or anything like that!

- Although this project is funded by the lottery, I am NOT the funders. I am independent of them. So I'm not looking for you to say anything in particular. Again, you can say what you like.

- I am going to audio record our conversations with this *(show audio recorder)*. I'll be writing a report for the funders, and a longer thing for my own PhD, based on things that you, and other young people, have told me (I am doing these interviews in about 15 other schools). So this is mostly so I can remember what you say. It'll be presented in written form, though, ie, I'll listen through it and type up what you say, which takes ages! But importantly, I'll change your names, I won't use the name of the school, and your voice won't be recognisable. So it's anonymous – no-one will know it's *you* saying these things.

So... any questions on any of that before we start?

Before we head outside…

We're going to go for a quick walk around the school grounds in a minute, but before that, just remind me…

Has it been just you guys working on the Polli:Nation project? (ie, how much of a "whole-school" thing has it been?)

How regular have Polli:Nation activities been?

Walking interview/quick guided tour/re-cap

Let's go outside quickly, and you can show me the school grounds, and what you've been doing in them as part of this Polli:Nation project. Think right back to last August, or June even…

I know I've been here before, and I kind of know what you've been doing. But there may be some things I've missed, and it'll help jog your memories too. So I would like you to…

Show me the *most important* changes you have made to the school grounds.

Or (if not enough time, or bad weather): Re-cap what they've done, using whiteboard or flipchart paper.

Recap (back inside)

Has it all been outdoors? What other elements of the Polli project have there been? *Add those to the list on the whiteboard.*

Photo elicitation

I've heard about what you know about at this stage of Polli:Nation. I'm now interested in *how* you learned it. You *could* have just learned about it in a classroom, or on the internet, right? **What was special about this particular way of doing it?**

I have this set of photos here to help jog your memories. When I lay them all out on the table, I'd like you to pick one that reminds you of something you've done, or somewhere you've been, as part of the *Polli:Nation* project, that is important, special, or memorable, to you. I'll go round each of you individually and ask you a few questions about your photos. You'll all get the chance to speak.

It's not necessarily the nicest looking photograph that I want you to pick – it's more which photo reminds you of bits of the *Polli:Nation* project that were important to you in some way.

Choose a picture that reminds you of something you've done, or somewhere you've been, as part of the *Polli:Nation* project, that is important, special, or memorable to you.

Give them few minutes to choose a picture.

(If the group are likely to find it difficult to focus... Take in the photos and make a pile of the photos they have chosen. Go through them one by one...)

Ok, this picture, number (???). Who chose this one? *(Hand it back to them)*

What does this picture remind you of?

Tell me about that *Polli:Nation* activity, or moment(?). What did you do? Where? Who was there? What was the weather like? Etc.
Just to warn you - this may sound a little artificial as I was there and I know what the activity involved, but I'm just trying to get an impression of how you experienced it.

(Invite other pupils to contribute. Anyone have anything to add on that?)

Flashcards activity

Start by asking them openly: **If you were in charge of a project similar to Polli:Nation, what would be the most important things to include in it?**

Then move on to my own flashcards: Lay out flashcards on the table. These are all things that, through observing *Polli:Nation* activities in other schools, strike me as being special about the project.

Which of these elements do you think is the most important in the *Polli:Nation* project? You can pick more than one, or the same one as someone else…

Give them few minutes to choose a picture. Then discuss as a group…

Which one have you picked? Why is that important? Etc.

Further Group discussion

- **Context-specific questions,** eg, "You say you worked with (other community members) – what was special about that?" Or… working with scientists, working with parent volunteers, working in a small group, etc. etc. (This will probably have been covered earlier, though).

- **What kind of things do you know more about, or are better at, after those activities?**

- **Behavioural change: Are there any things you now do in your own life, outside of school, as a result of having been part of the *Polli:Nation* project?** I mean, do you think about other species/insects in a different way? Do you think about your local environment differently…? (Give me an example)

- **Is there anything you would have changed about the project? Something you would have liked to see more, or less, of?**

Appendix 3 – Sample Memo Extract

The extract below is from the memo written to accompany the relational map displayed in Figure 5b. Whilst producing the map, I simultaneously made notes on the nature of the relations between elements.

Human/more-than-human encounters – Relational Map memo

1. Pupils are afforded this opportunity because of the **Polli: Nation project**, which in turn stems from **environmental/charity sector imperatives about "outreach"**, and the **discourse of "connection to nature"** stemming from experiences like this, and leading to the development of pro-environmental behaviours. It then depends on **how pupils are selected** to take part in the Polli project in their school – the particular way in which their school has chosen to fit it in. As observed, this often relies on **alternative curricula (eg, ASN)**, which enables more time to be spent on the project because of the greater flexibility of the timetable. Pupils'articipation is also facilitated by **dedicated teachers**, who as mentioned elsewhere, the project seems to really rely upon. Their school's participation in Polli in the first place, meanwhile, depends on the **school's attitude to outdoor learning**.

2. **(Citizen) science-based activities**, and **practical conservation tasks**, give rise to encounters like this. The conservation tasks take place in these creatures' habitats, so are bound to happen. They are facilitating pupils being in places where they may encounter these species. The baseline surveys, meanwhile, involve spending a set time actively looking for pollinators, so again, are bound to lead to close-up encounters (and heighten pupils' excitement/engagement when they do happen). Also, as with the point above, the wider context of the project, and the fact they are carrying out these tasks/activities, lend greater significance to encounters like these. Would it be the same if pupils (who are not participating in Polli) simply saw a bee on a flower when playing at break time? Would they even notice them? This in turn links to the idea of bees as "useful"/ecosystem services, and expressions of empathy towards other species. If they *did* see a bee without the context of this project, would they care? Would they try to squash it? Several pupils in the focus groups actually said something along the lines of "now when I see a bee, I don't want to kill it…".

3. **Expressions of empathy** stemming from encounters like these (I probably have data/evidence of this?). And surely increases potential for a relationship to be delivered other than the "ecosystem services" one? Perhaps, though, this depends on areas of the **curriculum** are being covered – eg, can they now go away and write about this encounter with a pollinator?

4. Lots of pupils say in focus groups and conversation that learning about pollinators is more effective when "you actually *see* them" (words to that effect). So these encounters both stem from a project that is designed with the goal of helping them **learn about pollinators**, and (potential) further enhance this learning.

5. Perhaps these close-up encounters are given greater meaning because they are taking place within a project that is aimed at **contributing to pollinator**

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conservation, and learning about the science of pollination. (See also point 2)

6. Close-up encounters like this are often spontaneous, and therefore often give rise to **spontaneous imparting of info** from teachers or visiting experts (eg, about the creature they have seen – I have data on this), or **spontaneous expression of memories of knowledge from the pupils** themselves (eg, in School 7a, when Liam tells me about slaters being crustaceans). **Visiting experts** often increase the potential for such imparting of info, and even the potential for the encounters to take place (eg, with the guy from Buglife visiting School 1b, I think he actually went and looked for some insects to show the kids).

7. **Pupils' differing attitudes to other species**: This influences their reaction to the encounter. Eg, with the slater in School 7a, Liam talking about it then placing it by the side of the path, and B picking it up and throwing it at one of the girls (but he did later express appreciation for how important pollinators and other insects are). This, in turn, is influenced by the **age of pupils**. The encounters provoke different reactions in PS and HS pupils.

8. **Pupils' engagement levels** seem very high when close-up encounters are taking place. There's often a collective "wow, a ladybird!" (or something like that), especially in primary schools. In this way, **pupils' emotions** are influenced by these encounters. There is a real **sense of wonder/"affect"** about these moments.

9. I think the **relaxed atmosphere** and **small group size** (which are themselves closely linked) enable greater potential for such encounters. Because pupils and teachers can "slow down" and notice more. This less structured atmosphere/approach also enables **free play/exploration**, which in turn leads to more experiences like this.

10. Clearly the **pollinators (present)** and **other insects (present)** also play a part in this. And of course, pupils' reactions to the close-up encounters are influenced by the **environmental issues** around pollinators and biodiversity, which this project seeks to engage them with. In this way, **pollinators (not present)** have also played a part – eg, in the talks they have previously had out the importance of them. These encounters are given significance by the message that has been put across before they saw any pollinators (at least during this project). The **more-than-human responses** (eg, visible landscape changes and the presence of these creatures itself) brought about by **practical conservation tasks** in many cases enable more encounters like this to happen…

Appendix 4 – Sample Information/Consent Letters

Sample information/consent letter for teachers

UNIVERSITY OF STIRLING

Andy Ruck,
PhD Researcher,
Faculty of Social Sciences,
University of Stirling,
FK9 4LA
Email: a.t.ruck@stir.ac.uk

22nd August 2016

Dear (teacher name),

Participation in *Polli:Nation* Research Project

I understand that you are taking a leading role in your school's participation in the *Polli:Nation* project, which will be running throughout the upcoming academic year. As explained in the introductory letter your school received from Grounds for Learning, our small research team at the University of Stirling will be carrying out a project to evaluate and research the educational processes and outcomes of *Polli:Nation*. As the project's lead researcher, through visiting a number of schools in person, I hope to explore the ways in which pupils engage with the outdoor aspects of the project. Information gathered will be used in a report to be distributed within the charity and education sectors, and in my own PhD dissertation. In consultation with staff at Grounds for Learning, I have identified your school as one that I would like to visit.

I hope to make between three and ten visits to the school while *Polli:Nation* activities are taking place. These visits would initially be alongside (name), Project Officer at Grounds for Learning, who I understand has already has arranged with you to run several *Polli:Nation* sessions with pupils. I may then - depending on the themes that emerge during these initial visits - wish to attend any subsequent sessions independently in order to further explore these themes. (Project Officer)'s visits will take place during the Autumn term, and I would aim to make subsequent visits throughout the upcoming academic year (when/if *Polli:Nation* activities are taking place).
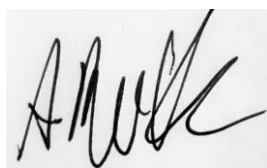
As well as participating in some of the activities alongside the pupils, I hope to interview pupils in small groups. I will ensure that these interviews are relaxed and enjoyable. Some of the discussions will take place while walking around the school grounds. Interviews will be recorded, and the pupils will be invited to take photographs of aspects of the project that they think are important. In theory, such visual data, or data which relies on a description of the physical attributes of the school grounds, may render schools and pupils "traceable". I will, however, ensure that any photographs used do not include pupils' faces, and that pseudonyms are used for schools and for all participants. Child and adult

You can return this form to me via email, post, or I can collect it during my first visit. I have also requested permission from the headteacher, who will provide separate consent about the school's role in the research more generally. If you agree to take part in this research, I can also send you information sheets and consent forms to be sent to parents/guardians, and pupils. With pupils, I will use both consent forms and face-to-face discussions for this. It would be great if you could then assist me with distributing and collecting these forms, and with discussing the work with pupils as appropriate.

I am a full member of the Protection for Vulnerable Groups (PVG) scheme, and have recently obtained an updated Scheme Record through the University of Stirling.

Finally, please feel free to contact myself or my Supervisor, Greg Mannion, if you would like further information. I am also happy to arrange a meeting with you ahead of my first research visit, in order to discuss the project further.

Thank you in advance for your co-operation and support,

Andy Ruck (PhD Researcher)

Contacts

Lead researcher: Andy Ruck, (email) , (phone number)

Supervisor: Dr Greg Mannion, (email), (phone number)

Grounds for Learning contact: (name), (email), (phone number)

Further Information: http://www.polli-nation.co.uk/useful-materials/project-evaluation/

UNIVERSITY OF STIRLING

Consent Form for Teachers

Polli:Nation Research Project

Please tick the appropriate boxes:

1	I offer general consent to my involvement in the research. I understand the processes involved and the role of participants in it.	
2	I understand that in reporting and outputs, pseudonyms will be used and obvious identifiers removed.	
3	I agree to invite the participating pupils to complete the consent forms and get these back to the University of Stirling.	
4	I will ensure consent forms for the parents /carers are completed. (Written consent forms for parents enclosed)	
5	I consent to written data (eg, researcher's notes) being used at the researcher's discretion.	
6	I consent to the use of all audio and visual data at the research team's discretion. [In images and reporting, participants' faces will not be shown, pseudonyms will be used, and obvious identifiers will be altered or removed].	
7	I consent to findings about the young people involved in the research being subsequently used for research and teaching (courses, reporting, academic writing, conferences, other publications).	

Signed: _____

Teacher (please print name): _____

School: _____

Date: _____

Sample information/consent letter for pupils

UNIVERSITY OF
STIRLING

Andy Ruck,
PhD Researcher,
Faculty of Social Sciences,
University of Stirling,
Email: a.t.ruck@stir.ac.uk

22nd August 2016,

Dear student,

Polli:Nation Research Project

Your school is part of the *Polli:Nation* project, where you will be turning your school grounds into habitats for bees and other pollinating insects. This project is run by the charity Grounds for Learning, and involves 260 schools across the country. The project is being evaluated by the University of Stirling, and I am one of the researchers. I will be visiting schools myself to look at the ways that pupils learn during the project. This is an important piece of research that other schools and charities will learn a lot from. Your school is one of the schools that I would like to visit.

I will take part in some of the project's activities with you, and maybe ask you a few questions about your experience of the project. There are no right or wrong answers to these! Your voice and experience as a young person is really important for the research and the project as a whole.

When reporting information I have gathered, I will not use your name, or the name of your school. If I use any photos with you in them, I will make sure you can not be identified. It is not essential for you to take part in this research. You can opt in or out at any time.

For now, in the form below we would like you to say whether you are happy to be part of the research. Please fill in the form and return it to your class teacher. Please feel free to ask your teacher for further details or if you have any questions; throughout the research, you can ask the researcher at any time.

Thank you for your co-operation and support,

Andy Ruck (PhD Researcher)

Contacts

Lead researcher: Andy Ruck, (Email), (Phone number)

Supervisor: Dr Greg Mannion, (Email), (Phone number)

Grounds for Learning contact: (Name), (Email), (Phone number)

Further Information*:* http://www.polli-nation.co.uk/useful-materials/project-evaluation/

Consent Form for pupils

Polli:Nation Research Project

I am happy to participate in this research

☐

I am happy for any audio recording of my voice, and photography that includes me, to be used afterwards as part of the research. I understand that the researcher will not use my name, or the name of my school.

☐

Signed: _____   **Print Name: _____**

Date: _____   **Name of School: _____**

Appendix 5 – Ethics Approval Letter

UNIVERSITY OF STIRLING

sd/MM

22 June 2016

Andy Ruck

Dear Andy

Faculty of Social Sciences

Colin Bell Building,
University of Stirling,
Stirling FK9 4LA Scotland
Telephone: +44 (0)1786 466273
E-mail: socsciethics@stir.ac.uk

Young people's response-making to environmental issues through practical conservation and citizen science (PhD fieldwork)

Thank you for your application to the Faculty of Social Sciences Research Ethics Committee on 16 June 2016 for ethical scrutiny of the above project. The Committee agreed that this was a thoughtful application that had given careful consideration to the need to seek consent from participants, educators and parents and to safeguard anonymity and confidentiality.
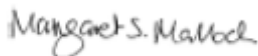
We agreed to approve your application but have set out suggestions below which we would ask you to address:

- In the non-technical summary include a sentence about the outputs planned e.g. summary report to funder based on brief visits to all sites, PhD and journal publications arising from the case studies.
- Can you give some indication in B about the time period for case studies and the frequency of visits and scheduling of data collection methods? For instance, will the 40 days be spread evenly over the school year, will there be a period of familiarisation with researcher before children asked for consent or participation? Can you make a distinction here between the activities that will be part of the evaluation for the funder and those for the PhD?
- Think you do need to explain here that you will be explicit that you are preparing a report for the funder and that some data collection is for your PhD and academic purposes. How will you explain the concept of collecting data for a PhD to the younger children? It is preferable for the explanation about the project and request for consent to the children to come from the researcher directly - to avoid any pressure on the participants to agree to take part because the teacher asked or indeed to avoid teachers making any presumptions about participation. This will be particularly important for the case studies where there will be repeated visits. However, if the practicalities of the project mean that this is not possible it is important to ensure that children are given opportunities to say that they do not want to participant once they meet the researcher. The application says that this will be checked- can you say how you will do this? Pleased to note that children will be able to participate in the project even if they do not wish to take part in the research activities. Would like to see outlined here the content of what will be said to the children about the activities in which they are being invited to participate.

- 1.6 Should 'Yes' be ticked as you are referring to other purposes? Some potential for confusion here over the purposes of each phase of the study and who will be told what – best to get this clarified in earlier sections.
- 2.1 Would like to see offer of confidentiality include telling children that will not pass on what they say to their teachers, what teachers say to heads, researcher perceptions of individual institutions to funders.
- 3.3 Should include taking care to explain to teachers that children may return to classroom at any time they wish and ensure that moving around the school to do so is permitted if offers of withdrawing anytime are to be credible.
- 4.1, 4.2 and 4.3 Researchers are expected to store any electronic files on the university maintained H-drive. Need to ensure that files will be transferred from portable devices to the Hdrive promptly. Need to explain how will ensure confidentiality of field notes or other data in hard copy while on field visits. For instance, could use different notebooks for each school and ensure never take evidence from one setting to another. Keeping data for 10 years seems excessive – would expect all hard copy data to be destroyed after project with all that is to be kept transferred to electronic files and securely stored.
- Should response to 5.1 be yes? You say that it will be impossible for anyone to guess at the identity of a participant or setting. Seems like a big claim. Suggest that you focus on what will be done to minimise this and make it clear what you will say to participants about the risks of a location or individual being identified.
- 5.3 Wrong box ticked?
- Will help to understand any ethical risks if you explain in the application what the content of the images is likely to be? What kind of photographs will be requested or invited? Again any photographs or audio files should be transferred to the H drive for secure storage.
- How will you ensure that data is not included for any young person who does not consent to take part in the research?

If you have any queries on the above please do not hesitate to contact myself or Dr Christine Stephen (christine.stephen@stir.ac.uk).

Yours sincerely

Margaret S. Malloch

Dr Margaret Malloch Chair of Ethics Committee

c.c Dr Greg Mannion Dr Kirsty Park