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An investigation of how physical literacy is enacted in primary physical education

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Abstract

Purpose. This research investigated how students are becoming teachers of primary school (ages 5-11) physical education, using a physical literacy approach (Whitehead, 2010). Primarily methodological, the purpose was to disrupt *how* to investigate this topic since research highlights that the philosophy underpinning PL makes the concept difficult to operationalize (Shearer *et al.*, 2018).

Approach. Physical education settings are inherently lively, and I retain this in the analytic insights from what I call my 'methodological meshwork' (Law, 2004; Ingold, 2006). Informed by phenomenology, posthumanism and sociomaterialism, data gathering included observations, interviews with artefacts, with humans, tweets, as part of the methodological meshwork. Diagrammatic presentations accompany written text, whilst also doing work *in themselves* (Decuypere and Simons, 2016). I followed the actors (Adams and Thompson, 2016), thus entered the middle of data, such as lesson plan or physical education equipment.

Findings. Onto-epistemological entanglements (Barad, 2007) are presented in an interweaving format. Thus, theory is discussed alongside the empirical and shows that a physical literacy informed approach to physical education is evident in multiple places-spaces.

Originality. Broader issues are raised about methodological assumptions that inform investigations of physical literacy and practice generally. It is hoped these may be relevant to a wider professional audience as well as those in physical and teacher education.

Keywords: physical literacy, methodological meshwork, posthuman, becoming teachers, teacher education, pre-service teachers, physical education.

Research paper with a practical focus.

Introduction

The substantive focus in this paper is methodological in so far as I rehearse some of the practical issues involved when trying to investigate the concept of physical literacy (PL) and how this may inform physical education (PE). For reasons that will become clear, I introduce PL to offer a different and distinctive approach to teaching PE. Whilst an understanding of 'physical literacy' is important, a further question becomes key; *how* might it be possible to investigate what happens within actual PE lessons? Throughout discussion, the methodological is foregrounded through some emerging empirical data. I have termed these *empirical lures,* which I then analysed alongside multiple theoretical perspectives outlined below.

The context for this research is one local authority/region in Scotland. However, the health and wellbeing of people throughout Scotland is an ongoing concern (COSLA, 2021) and physical activity features as an important element in local, national, and indeed, international policies outlining responses to health and wellbeing concerns (Jansen *et al.*, 2020; Whitehead *et al*, 2020; Scott *et al.*, 2021). More specifically, within Scotland's national Curriculum for Excellence (CfE, Scottish Executive, 2006) PE is identified as having a key role in contributing to the response (Education Scotland, 2021; Hardley *et al.*, 2021). It is not the place here to discuss discourses of PE, but to explore how PL might underpin practices of students learning to teach PE.

Physical literacy is receiving much attention in physical education and public health research literature internationally (Edwards *et al.*, 2018; Martins *et al.*, 2021). The International Physical Literacy Association (IPLA, 2017) defines physical literacy as "the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for physical activity for life". The definition is based on the work of Whitehead (1987; 2001; 2010), who conceptualised contemporary PL based on her philosophy of PE. Here, the centrality of embodiment for human flourishing is focal as it underpins challenges to bifurcations of mind-body and theory-practice. Dualisms inherent in some discussion and practice of PE have been largely unhelpful since separating mind-body results in at least objectification of the body, and body as inferior to the mind (Bailey, 2020; Durden-Myers *et al.*, 2018, 2021). PL provides another way of conceiving PE.

Largely based on Merleau-Ponty's (1945/2012) phenomenology that human beings are in dialogue with the world, a human-centric ontology remains foregrounded in Whitehead's PL. The three philosophical

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tenets underpinning PL are phenomenology, existentialism and monism (Whitehead, 1987, 2001; Durden-Myers *et al.*, 2020). I include Latour's (2005) idea to 'flatten' the social world to challenge anthropocentrism, by seeking connectivity, 'associations' (Latour, 2005), 'collectives' (Bryant, 2011), among things human and nonhuman. Such a perspective is not yet apparent in PL literature (Hyndman and Pill, 2018). Indeed, Latour (1999) asserts that phenomenology is founded on human intentionality only, whilst science deals with the rest of things in the world, thus seeming to reinforce the dualism of human-nature. Following actor-network theory (ANT), flattening the ontological hierarchy and seeking connections among things human-nonhuman may provide another way of making visible networks of how things are enacting (or not) in PL informed PE (PL-PE).

Methodologically and theoretically, posthumanism and sociomaterialism inform this investigation. More than one theoretical perspective is included to promote a pluralist approach that avoids colonisation by one framing (Jackson and Mazzei, 2012). The influence of post-qualitative writings provides linguistic resources with which to articulate the messiness associated with 'living in the middle' of research (St. Pierre, 1997; 2019; 2021). For example, I have invented the phrase 'methodological meshwork' (Law, 2004; Ingold, 2006), which I introduce in Part II. In Part III, strategies for analysis are discussed, such as following actors or lines, as these are woven among empirical data and theory (Adams and Thompson, 2016). Rather than *re*-presented, they are 'diffracted' in multiple spaces-places (Barad, 2014). This is exemplified in Part IV, presented in three pillars, to illuminate empirical-philosophical findings to date. Finally, discussion reflects on how and if the methodological meshwork is informing the findings. First, I set the scene in one Scottish higher education institution, where an approach to PL is embodied/embedded in primary education students' practisings of PE.

Part 1. Scene setting: Physical Education in Primary Teacher Education, and Physical Literacy

The context for this research is the teaching of undergraduate and postgraduate primary trainee (pre-service) teachers in a higher education institution in Scotland, although there may be implications for wider UK and international teacher education settings. Initial teacher education (ITE) seems not to develop enough practical knowledge or confidence to teach primary PE (Jess *et al.*, 2016; Robinson *et al.*, 2018; Huddleston, 2021). Students experience differences in degrees of feedback on lessons, and opportunities to observe PE lessons (Randall *et al.*, 2016). A lack of confidence (Randall, 2016) seems to prevail in qualified primary teachers, due to factors including length of time since university placement

(Haydn-Davies *et al.*, 2010), lack of input during university programme (Thorburn and Jess, 2008; Harris *et al.*, 2012) or limited opportunities for practice during placements (Randall *et al.*, 2016). However, the inclusion of PE within primary ITE programmes is recognised as important since it contributes to student understanding of movement in the formative (early) years (Carse *et al.*, 2017). In Scotland, following the extensive roll out of the *Basic Moves* Programme (Jess and Collins, 2003; Kirk *et al.*, 2018) around four hundred primary school teachers have gained expertise in PE. Additionally, in line with the suggestion that all pupils should experience at least two hours of PE per week (Scottish Executive, 2004), there is arguably forward momentum, whereby multiple stakeholders are addressing concerns about PE teaching in primary schools (Carse *et al.*, 2018).

Empirical research conducted on PL has not implemented methodologies which align with its philosophical foundations (Edwards *et al.*, 2017; Shearer *et al.*, 2018; Kwan, 2019). Specifically, little research has been conducted which attempts to look at the practical application of PL in schools by primary teachers (Roberts *et al.*, 2019). My research seeks to extend phenomenological understandings of PL so far, whilst experimenting with a 'methodological meshwork' that might align more with multiple ways of performing PL. The question guiding this paper is: *how do primary students enact physical literacy informed physical education (PL-PE)*? The following section explains my methodological meshwork for gathering data in response to the question.

Part II Methodological Meshwork

As stated above, this paper is primarily methodological. The ontological and epistemological are travelling companions and so a series of philosophical and empirical stances which inform conventional qualitative studies have been challenged. St. Pierre (2019) for instance, suggests that logical empiricism and phenomenology attempt to identify epistemic objects. This is at considerable variance with the approach taken here, which is concerned with identifying movement, relations, and assemblages which may or may not, endure. In my largely ontological project the inclusivity of post-qualitative and posthumanist inquiry (Ulmer, 2017) has been, and is, guiding how I follow what is a "complex choreograph[y] of knowledge practices" (Adams and Thompson, 2016, p. 110). Sociomaterialism includes recognising how multiple actors work to co-create events - or not (Nail, 2017). Elements of ANT, such as the concept of 'assemblage', for example, refers to 'networks' which might be held together by relations (Latour, 2005). Fundamentally, assemblages cannot be predicted, are dynamic, fluid and are

always, therefore, immanent (Nail, 2017; Alirezabeigi *et al*., 2020). The flow of actors in an assemblage may be from many spaces and not always visible, such as Scottish curriculum policy or university PE lecture content. Therefore, assemblages perform *across* several spaces, times and places (Mannion, 2020), are held together by relations, which are flowing, leaking or not (Nail, 2017). In line with recent developments on ANT, 'network' is replaced here, with Ingold's (2012) conceptualising of 'meshwork' to allow for non-linear relational lines to be explored, and to remove the association with 'technical' systems like electricity, trains, or worldwide web (Latour, 1996; 2005).

For Ingold (2015), experiences for human and nonhuman actors are e/affected by interactions in the world. Thus, in trying to follow the flow of relations in assemblages as student-participants are becoming teachers, the effects of PL-PE might be rendered visible as part of these interactions. Contributors to my meshwork have included: lesson plans, field-work observations with walk-through "cuts" to disrupt the gaze (Masschelein, 2010), student-participants, artefacts chosen by participants, tweets, PE equipment, a hedge, documents, university materials, laptop, notebook, diagrams, rucksacks, a definition (IPLA, 2017), researcher, posthumanism, sociomaterialism. In addition, following Ingold (2006; 2016), this multiplicity of theory and methodology led me to call this a connected 'methodological meshwork' (Ingold, 2012). By creating a methodological meshwork, the practice of researching with the messiness of relations – an improvisation, seeking to understand whether PL is being enacted - leans almost to post-qualitative inquiry (St. Pierre, 2021). To challenge the grip of positivist and post-positivist research structures by eschewing *a priori* methodological ideas (St. Pierre, 2019) was, however, deemed impossible. Rather, seeking maximum flexibility in research design and openness to the possibility of "making methodology anew" (Taylor, 2017, p. 322), seemed more feasible.

Within the methodological meshwork, to understand how PL is enacting as part of multiple assemblages, the task is to follow the lines, the relational, to find out what things 'do' to effect/affect or not, aspects of PL in the 'practice-ing' of student-participants (Gherardi, 2016). 'Practicings' incorporate the sense of moving that I seek to maintain in this research, and compliment PL-PE as a space and place where movement is literally fundamental to students becoming teachers. I apply 'diffractive' methodology which attends to "material entanglements" for learning about phenomena in the world (Barad, 2007, p. 88). Trying to include tangible and intangible things - relations and how they flow or associate among actors – is difficult to show, so I take up Decuypere and Simons' (2016, p. 378) advice

to use figures or visualisations "as descriptive objects in their own right". The diagrammatic is also conceived by Decuypere and Simons (2016) as bringing word and image to play in an 'active' way of *presenting* the relational. Heralding the meshwork diagrammatically is another experimental part of this research.

Part III Post-qualitative analyses

In her critique, Barad (2003) foregrounds the anthropocentric epistemological dominance of research processes of both researcher and human participants. To challenge the anthropocentric gaze, I try to provide space for the nonhuman actors to 'speak'. For instance, by attuning to 'things' in the research assemblage the researcher 'sees' the world saturated in meaning, seeing things and humans concurrently (Adams and Thompson, 2016). One way I do this below, is to 'follow the actors' (Latour, 2005; Adams and Thompson, 2016), such as PE equipment and lesson evaluation - evident in Plates 1 and 3. The effects of actors on things which are excluded or hidden, as well as included, visible, are diffracted through theory and other things in the entanglements (Barad, 2007). Diffracting helps avoid the linearity associated with representing effects of things on one another. As such, philosophy underpinning PL, posthumanism and sociomaterialism are included not to 'find' a pre-existing framing of a concept (in this case PL) (Latour, 2005). Rather, "a philosophical concept is a creative force … a multiplicity, a becoming with history" (St. Pierre, 2019, p. 7). In this sense I refer to the empirical and theoretical as interweaving companions in the methodology and analysis in my research.

As a methodological tool to try and embrace what might be assembling during visits to primary school PE, three headings 'interesting, important, remarkable' (Deleuze and Guattari, 1994; Haraway, 1997) were written on my notebook. Other headings were key elements of PL – cognitive, affective, physical, holistic, lifelong (Whitehead, 2010; IPLA, 2017). With reference to St. Pierre's (2019) refusal of methodology, to which I alluded above, the headings are not emerging from the data and are evidence of *a priori* framing of methodological approach. I tried to let data about PL-PE flow through my notes as part of the meshwork. I sketched PE playground settings whilst observing lessons (Plate 1).

By the third visit to a school playground, rather than simply making the movements, I also noted my own movements during the observed lesson. I wrote, "I took walks around, through; paused @each 'side' of areas". Diagram 1 depicts movements around and through the PE lesson associated with Plate

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1. The circular are the various moments of pausing, sized according to time paused, during which I wrote notes and observed from a different position.

Plate 1: Playground plan from Researcher Observation Notebook, SA.

[insert Plate 1 here]

Diagram 1. Researcher movement and pauses during fieldwork.

[insert Diagram 1 here]

Observation started beside participant SA (bottom middle) and I moved anticlockwise, considering class activities, spread around the playground in Plate 1. Pauses were largest when at the margins of the PE lesson space, where equipment and activity would not be interrupted by me. 'Things' were creating boundaries, guiding PE and my movements and gaze. The diagram contributes to the methodological meshwork as it provides visible *presentation* of the trajectory of researcher, where things were placed, and where pupils were active/playing in this lesson-research assemblage (Decuypere and Simon, 2016). The number '1.' in the diagram is a walk-through cut. Foam javelin-throwing in the bottom left corner of this scape precluded a walk around that space. Thus, safety during physical activity enters the assemblage. The walk-through was something I intended to do during field visits to disrupt my own gaze (Masschelein, 2010). In Plate 1 and Diagram 1, the practicings in the PE lesson-assemblage delineate movement of other humans. Concurrently, the work that the diagram is doing is presenting my movement and a "relational gaze" (Decuypere and Simons, 2016, p. 382) which helps with analysis of, for example, the notion of boundaries. More is said on this in Part IV.

Part IV offers the reader three pillars to be followed individually, vertically, or alongside and/or entangled. The presentation format shows entanglements of the theoretical-empirical-reflexivity/analysis (adapted from Fox and Alldred, 2021). I focus on a few examples from empirical data,

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to show how diffracting aspects from the meshwork with theory might be communicated in depth elsewhere. 'Elsewhere' is in spaces-places where students continue becoming teachers. The pillars are my attempt to make visible entanglements of assemblages in which I am one actant (Latour, 2005). One concern expressed by Fox and Alldred (2021) about the three headings is that researcher situatedness is continually diffracted where she might not necessarily be an interesting or novel part of a research assemblage. I am another thing entangled, thereby showing how the researcher is also "*becoming with* the things of their research" (Thompson and Adams, 2020, p. 340). I attempt to address this through the third pillar where reflexivity/analysis is written. Further, being interesting or novel could preclude/include the absent (Adams and Thompson, 2016), something warranting further investigation. After Part IV, a concluding section summarises the multiple aspects being discussed in this paper – how is the methodological meshwork working and what are some early indications of how PL-PE is (is not) being enacted by student-teachers in primary PE.

Part IV

Philosophy/Theory	Indicative Empirical Lure	Reflexivity/Analysis
In using the term 'posthuman' I refer to all *bodies*, whether organic or inorganic, human or nonhuman. Thompson and Adams (2020) also note the term 'more-than-human' and use 'post' and more-than-human interchangeably. Kuby (2017, p. 877) posits that the more-than-human ontologies also fall under what she calls "an umbrella term" of posthuman. I have considered using a different term, such as 'body(ies)', to better serve my writing but have not found a convincing alternative yet. Importantly, for posthuman research, the researcher 'lingers' with things which beckon (Bennett, 2010). Things which beckon include humans; thus humans are *among* things-in-the-world – "one *type* of object among many" (Bryant, 2011, p. 249). The terms 'object' and 'thing' might be conceived as different in that objects are already fixed whereas things are constantly altering and being altered, thus in flux (Harman, 2009). Sociomaterialism including actor-network theory (ANT) (Latour, 1999, 2005; Callan, 1999) is included to draw or map aspects of the entanglements of human-nonhuman. ANT may help illuminate weaknesses with philosophy of PL (Kanger, 2017). However, ANT does not do all the work necessary for embracing also the organic, or 'ecology' (Ingold, 2012), whereas sociomaterialism encompasses	The empirical lures presented here are from two field visits during which I observed a student and a teacher/practitioner. Student-participant (SA) was on a university teaching placement with a primary 2 class (age 6). The lesson merged two classes, around 50 pupils and 4 staff. Reasons for merging both classes include COVID-19 to cope with staff absence and efficient use of outdoor space. Practitioner (PA) had one primary 2 class. The methodological meshwork for purposes of this paper, included observations, notes, photo, lesson evaluation from SA, her interview, my diagrammatic presentation of the lesson. I walked 'through' and around the lesson areas in part to disrupt the 'gaze' of other things, as well as my own. During different visits I was drawn to: • a pile of 'stuff' (Plate 2) • lines/court markings on a playground area • a plastic golf club. Plate 2 shows an assemblage that could happen in a school space which is suitable for physical activity using equipment such as tennis balls. If the playground had been on a slope, or COVID-19 not imposed outdoor lessons, this assemblage might not have looked like this one. Things assembled in Plate 2 are later moved away from the protection of the hedge (boundary) and set out on the tarmac surfaces of playground courts.	Avoiding the human centric is not easy as I try to enact being sociomaterialist. For the posthumanist aspect of this research, Thompson and Adams (2020) provide a frame of reference for how to hold posthuman research to account, asking what is its worth in everyday practices? In the practices of primary education students, teaching PL-PE is a complex assemblage. Diffracting data from multiple sources through sociomaterial and posthuman theories is challenging researcher dominance and human centrism. On reflection, it felt like the dynamic nature of things pulled me into the middle of them and during these moments Bennett's (2010) descriptions flowed around the assemblage too. When walking through or around PE lessons, I felt 'exposed', and also more attentive to things. For Masschelein (2010, pp. 46-47) researcher is more present, without judgement, whilst re-orienting. As researcher in the school placement setting(s), looking around the outside playground space, there are many things present with the pupils. It is a dynamic assemblage as things are working to try to create successes for the pupils. SA presents at one physical activity station but is *present* across multiple assemblages, such as lesson plan evaluation-lecture experiences-

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materiality/matter as moving, fluid, dynamic, flow of things. As referred to above, 'meshwork' is borrowed from Ingold (2006; 2012) who uses it as comparable with Merleau-Ponty's (1968) 'fleshiness' of the world – that is, all things in flow, ever present, all stitched into the fabric of the world.

Posthumanism and sociomaterialism seem to offer the opportunity to research differently by refusing many binaries - of mind-body (even 'body I am' and 'body I have' (Sheets-Johnston, 2015), nature-culture, theory-practice. By addressing 'gaps' among things, I am seeking to move beyond changes of terminology (Mulcahy, 2012), to actualising an empirical-philosophical account of PL, which is enacting as you read Part IV.

The writings of Merleau-Ponty (1945/2012) inform Whitehead's (2010) conceptualisation of physical literacy, especially in describing human-world experiences as 'dialogues with the world'. The extent to which current PL research literature explores the relational aspect of thing-human-nonhuman is limited, hence the relevance of showing relations being enabled – for example, ball-tarmac-eye direction-hurdle-success-pupil. Physical, affective and cognitive learning domains (Bloom, 1956; Krathwohl *et al.*, 1973) are working *intra*-actively (Barad, 2003) in many human-nonhuman PL-PE assemblages. One student-participant had created a space-place

Things 'beckon' the pupils to roll the ball, avoid the cones, roll the ball under the hurdle, to a partner. The pile of things is a common feature in PE lessons and things transform from pile to invitation to play. Oftentimes, the teacher/student moves the things, other times the pupils are given guidance about where to put things. Things create the boundaries of an activity, prompting movements in the education context. For example, one pupil practicing with a hoop was noted as 'Important' during one observation because she had more than one hoop around her wrists!

Plate 2. Hedge-container-tennis balls-cones-cone holder-bag-hurdles-coat-rucksack-notepad-tarmac assemblage.

[insert Plate 2 here]

electronic resource-interview reflections-golf club.

There are more examples like the golf club, wherein humans and things are interwoven in such an entangled way that there seems to be no 'gap'. Multiple perspectives are interwoven in this episode and others like it. For instance, the assemblage of SA-pupil–writing ability–PE practicing–professional learning–researcher questioning–. Further, things in the assemblage include Ingold's (2016, p. 10) 'unseen' "interstices", MacLure's (2013) 'mobius strip', translations according to ANT (Callon, 1984). These relate to the fleshy in-between of Merleau-Ponty's (1945/2012) phenomenology, and Bennett's (2010) 'liveliness' of things. In other words, things 'afford' relations-activities. Things already matter (Barad, 2003) and already have a history (Ingold, 2012). Moreover, that history is lively.

Liveliness may also disrupt, interrupt, bodies at work and play, such as balls being thrown 'off' target. Things can 'surprise' the gaze of the human (Bennett, 2010, p. 5), and like the pile of stuff in Plate 2, things are always immanent – part of what Bennett (2010, p. 4) calls a "speculative onto-story". The properties of things have their own histories and potentials as to what they can do (Ingold, 2012) and in PE that includes pupils coming to know how one might interact with tennis

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for pupils to experiment with hoops (physical, cognitive), for instance, and the motivation (affective) to practice was observed.

Barad (2003) introduces the term *intra*-action which connotes ongoing ontological relations where object and subject are brought together in what she calls *phenomena*. This contradicts Cartesian dualism as well as challenging *re*-presentationism. Inter-action presumes an external/outer pre-existing entity whilst Barad's intra-action removes the need for a signifier and signified. For example, the knower-known-knowledge triad becomes one phenomenon – knowing. Knowing is thus performative rather than a linguistic, representative concept. Concepts like physical literacy, are based on human--nonhuman phenomena, being performed or practiced by constant intra-actions. All bodies are materialised – all bodies matter – in Barad's understanding of practices, hence my thinking about 'bodies' rather than 'things'.

There are implications for agency as "ongoing reconfigurings of the world" (Barad, 2003, p. 818) - human and nonhuman agency, which Barad (2014) follows up in other texts not explored here. Practices of PL are not external, and pre-determined, waiting to be placed into a correct space and time; intra-actions are "within-phenomena" (Barad, 2003, p. 815). Thus 'following an actor' is not following a "singular entity", but rather tracing the

In the interview with Student A (SA), she discussed the opportunity afforded by the golf club(s), because she had positioned herself at that activity area. She related to pupil class-based learning: "they struggled with fine motor skills, like they couldn't' write very easily, so anything that was em… really tight grip things, they weren't very good at and that's why some of them struggled with wrapping their hands around golf clubs and things like that" (SA Interview).

Plate 3. Student A lesson evaluation.

[insert Plate 3 here]

Plate 3 shows the boundaries within which student teachers are summarising their lesson evaluations. Here, SA had written "physical literacy G. B. website" in the 'Next Steps' section

balls or hoops. How SA or PA set out things-pupils-plan-PE-PL- is an ongoing performing of knowledges-through-practicings (Gherardi, 2016). Each visit to the PE lesson, therefore, builds on the previous knowledges experienced, pupils-participant are constantly *becoming* (Bennett, 2010; Ingold, 2012).

Barad's 'diffractive methodology' (2007) serves as a way of reading information from multiple research sources whilst passing through one another, and theory, and "paying attention to patterns of difference (including the material effects of constitutive exclusions)" (Barad, 2011, p. 445). As is being attempted here, data-theories-participant reflections, are being read through one another without 'cleaning up' data.

Enactments of PL-PE include nonhuman-human phenomena materially configuring, creating knowledges – for Barad (2007, p. 342) knowing is "a distributed practice that includes the larger material arrangement. To the extent that humans participate in scientific or other practices of knowing, they do so as part of the larger material configuration of the world and its ongoing open-ended articulation". The student-participant in becoming a teacher is through ongoing material assemblages.

The lesson plan (Plate 3) is a diffraction from and diffracted back to PE lectures at

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connections, relations (Adams and Thompson, 2016, p. 38). Outer boundaries are created by the intra-actions performed or practiced. Boundaries are, however, not stable or fixed. For Barad (2003, p. 817) "The world *is* intra-activity". The relevance of her idea of intra-action for my research is that it helps show how PL is enacting by iterative encounters among things animate-inanimate-human-nonhuman, hence the importance of the posthuman perspective.

One aspect of PL and PE is the affective learning domain, perhaps not as easily traceable in assemblages as, for example, effects of things performing the physical domain (Mulcahy, 2012). Affect, located in the in-between, or fleshiness of the world, moves among things and Mulcahy (2012, p. 11) suggests this is more than mere 'intersubjective' linkage between things. Student-participant language (Plate 3) seems to indicate that the enjoyment of pupils is important and joy during a PE lesson is associated with the affective domain. In PL-PE, enjoying and participating in movement activities is an effect of motivation, confidence and physical competence. All of these elements support enacting of PL (Whitehead, 2010).

of a lesson plan. In her interview she recalled a university resource recommended by me. Researcher is evidently entangled with the student-participant's developing PL-PE. Other invisible things in the lesson evaluation assemblage include the IPLA (2017) definition of PL, Scottish curriculum policy, laptop. The messiness of the sociomaterial is becoming-with SA and (fleeting) appearances of PL are being made visible.

The notion of boundaries might provide future analysis, as boundaries seemed to matter at several junctures through data gathering. Playgrounds, lesson plans, pupils all have boundaries – trees, lines of courts, sections on the page, 'space bubbles' (extend arms out to the sides, rotate at waist, reach above the head, to show personal space).

university, online resources used in those lectures, and the 'next steps' of SA. The traces show a past-present-future, evidence of "spacetimematterings" (Barad, 2014). Experiences during the PE lectures are informing a PL-PE understanding, in theory-based sessions during online learning, but also in practical PE workshop sessions. Aspects of PL are visible - such as physical competence (SA is looking for golf/hockey skill resources, Plate 3), motivation and confidence, "giving children a variety of equipment … something they enjoy and practice" (SA, Plate 3). The traces from SA plan-practice-reflection-PL resources, bring to light the many different effects diffracting and affecting assemblages (Mulcahy, 2012). By including things as 'mattering' (Barad, 2014), e/affects which matter here are rendered visible - those in which PL is performing. Further, through embracing posthumanism, the intra-actions of lesson plan text with SA reflections/evaluations makes visible aspects of PL that were not observed by me during the lesson visit.

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Concluding Reflections

My intention in this paper has been to put into practice the idea of methodology which has at its core, dynamism and fluidity, a move towards post-qualitative inquiry, to embrace the messiness of research. The vehicle for contextualising my methodological meshwork is physical literacy informed physical education (PL-PE) as teacher education students are becoming teachers. Through my methodological meshwork the dynamism of PL is demonstrable in many 'spacetimematterings' (Barad, 2014) and this is in part due to decentring human, including 'things' in the meshwork. The philosophical roots of PL may limit its meaningfulness if human embodiment remains its core central tenet. This aspect of phenomenology which focuses on unique human experiences and for some research traditions, 'brackets out' context to provide a clearer human perspective, eschews the potential richness offered by including things nonhuman. Hence, I introduce posthumanism to account for all 'bodies' cocreating PL. Indeed, in line with a flattened ontology (Latour, 2005), the human body is also "a thing" (Ingold, 2012, p. 437).

The philosophies underpinning PL, posthumanism and sociomaterialism have been diffracted through empirical information in a diffractive methodology. Following the empirical lures of field visits, a lesson evaluation, diagrammatic presentation of one field visit, a golf club, things have provided arguably, a richer, three-dimensional account of practicings of PL-PE. Entering the middle of things assembling, it has become apparent that attending to detail allows more things in any assemblage to speak. Following the empirical lures whilst diffracting through theories meant further following of actors but also "tracing responses and passages" (Adams and Thompson, 2016, p. 81). Doing these analyses by diving into the meshwork means loosening it first through the detail, and then seeking the relational, the 'co-respondences' among things (Ingold, 2012). Or in another way, investigating the ruptures, leaks and (dis)continuities. In whatever way these descriptions are working, there remain 'matters' to follow.

More questions are arising from this paper than are 'answered' but the point is not to foreclose. As Law (2004) warns, there may come different ways of relating to the mess that raise more questions because there is much to unravel, to follow - whether to dead-ends or lines that fizzle out (Adams and Thompson, 2016). 'Vagueness' does not mean 'methodological failure' (Law, 2004, p. 14). Primary focus here has been methodological, to follow the actors, and I will continue to undo, rupture, work with St. Pierre's (2019) post-qualitative ideas, because an ontology of immanence (Deleuze and Guattari, 1994) seems to retain the dynamic nature of PL-PE. This means retaining the sense of movement on two

fronts. One is the way in which the empirical is entangling with theoretical/philosophical. The other way is in coming to know how PL might be enacting if student-teachers perform PL-PE as part of their becoming teachers.

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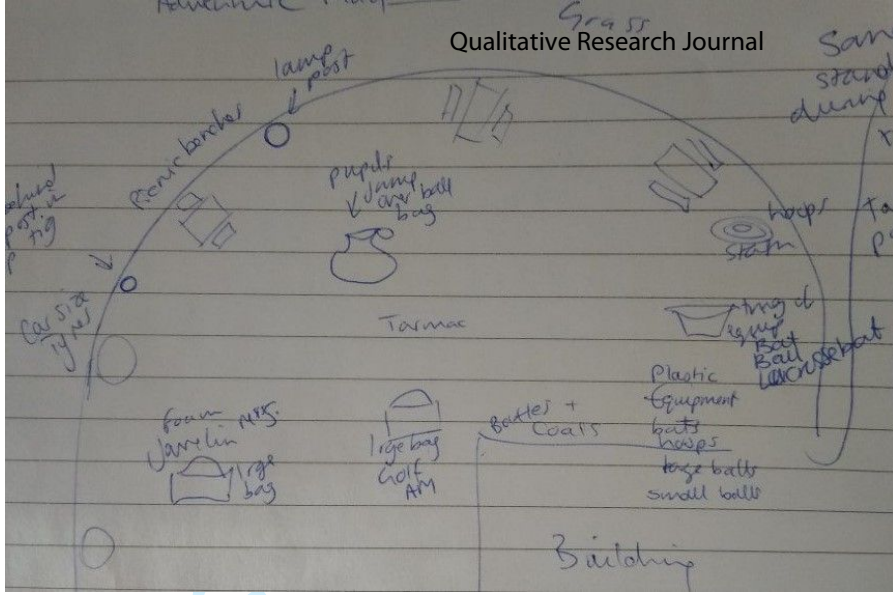
Plate 1: Playground plan from Researcher Observation Notebook, SA.

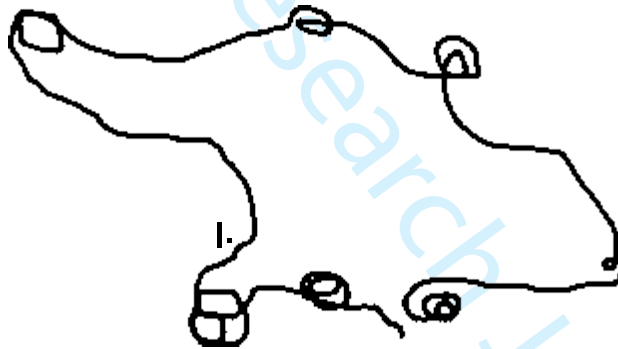Diagram 1. Researcher movement and pauses during fieldwork.

Plate 2. Hedge-container-tennis balls-cones-cone holder-bag-hurdles-coat-rucksack-notepad-tarmac assemblage.

Plate 3. Student A lesson evaluation.