

Methodological shifts and departures in music education research: Embracing complexity with diffraction, intra-action, and agentic assemblages.

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Funding

The field-work stages of this research was funded by the National Foundation for Youth Music.

Disclosure statement

In accordance with Taylor & Francis policy and our ethical obligations as researchers, we are reporting that this research was funded by Youth Music but there are no potential conflicts of interest in this research.

Word Count

8000

Methodological shifts and departures in music education research: Embracing complexity with diffraction, intra-action, and agentic assemblages.

In England, music education policy is deeply rooted in neoliberal ideologies, shaping classroom practice and assessments. This paper presents findings from a four-year funded longitudinal project exploring the impact of musical partnerships on young people at risk of educational exclusion.

Through a posthuman lens, the researchers made a methodological shift, acknowledging the agency of non-human elements and physical spaces in musical interactions. Posthumanism offered alternative insights, challenging traditional notions of music education practice and extended human-centric perspectives and school assessment metrics. It expanded our understanding of what it means to be a musician and pedagogue.

This paper proposes that posthumanism can challenge existing notions of music education practice while simultaneously moving the discussion of important matters in music education research into new areas of thinking, doing, and being.

Keywords: Posthumanism, musical learning, partnerships

Introduction

This paper is concerned with the entangled practices of music teaching and learning in the secondary classroom, where bodies, policies, pedagogies, instruments, and spatial impacts intersect. Rather than relying on humanistic attitudes, we turn to posthumanism to broaden our understanding of subjectivity and identity. Posthumanism invites us to challenge entrenched narratives of music education practice and pedagogies by deconstructing the human and exploring our relationship with the world.

Drawing on data gathered through qualitative modes of inquiry, the materiality of the fieldwork and the subsequent analysis through the lens of posthuman theory revealed novel perspectives and insights. Methodological challenges faced by the researchers lay in navigating the interplay between quantitative and qualitative data, and realising that through a posthuman lens, other aspects came to hold hitherto unrecognised significance. They provided a voice to young people's musicality that otherwise would have gone unrecognised. This does not diminish the value of our data insights; instead, it highlights how posthumanism both challenges and expands our interpretations, something often overlooked in funded music research.

This paper discusses how a posthuman perspective disrupts the notion of human centrality and our relationship within the world. According to Mikuska and Fairchild (2020, 80), posthumanism 'initiates a shift from distinct subjects/objects to unveil co-relational constellations of assemblage'. It recognises our connection and the importance of giving value to the more-than-human. Taylor (2016, 7) suggests 'we are already in the middle of the posthuman condition, its forces already interwoven with the humanist foundation of our lives and thoughts'. It is essential in any conversation involving posthumanism in education to acknowledge neoliberal policies and practices, and how they have profoundly shaped our perceptions of musical relationships. While posthumanism offers a perspective that we consider to be inclusive in its recognition of interconnectedness and relationality, we acknowledge that it is not the only response to the entanglements within music education. This is particularly the

case in the current research reported on, as posthumanism allows another lens in the optical set to view music education through. Any consideration of the inherent complexities of musical encounters are not rendered more straightforward by simplistic unitary standpoints, and posthumanism allows for an alternative range of differently nuanced views to be glimpsed, in bell hooks (2003, 2) words, of “the insurrection of subjugated knowledge”. Acknowledging that simply adding another lens to the kit will not in and of itself achieve this, nonetheless we believe it is one response worth considering alongside others.

Music Education Policy

Current music education policy in the UK, and many other countries around the world, can be said to be predicated on neoliberal ways of thinking. This means that free-market fundamentalism and the notion of small government is central to this (inter alia Ball 2021; Mayo 2015; Plehwe et al. 2006; Springer 2013). Paradoxically, this has required legislation and policy to ensure politicians can impose their will on what they often think of as recalcitrant and probably left-leaning educationists, characterised by right-wing groups as “low level intellectuals with Marxist inclinations” (Wilkin 1996, 166). Teachers therefore find themselves hamstrung by their training and working circumstances. These forms of neoliberalism in education have been described by Apple (2017, 149-150), who labelled several key factors as to how this operates. The first is a complete faith in marketisation of education:

...private is necessarily good and public is necessarily bad...The world becomes a vast supermarket, one in which those with economic and cultural capital are advantaged in nearly every sector of society. (ibid.)

Secondly, he describes a group who are harking back to a better time which is thought to have existed before the messy situation in which the world now finds itself:

... neoconservatives who want a “return” to higher standards and a “common culture.”
...they are committed to a conservative culturally restorative project, pressing for a

return to an imposed sense of nation and tradition that is largely based on a fear of “pollution” from the culture and the body of those whom they consider the “Others.” (ibid.)

The final component of Apple’s analysis describes those who are fundamentally committed to measurement as being at the root of all solutions:

... people who are committed to the ideology and techniques of accountability, measurement, and the “new managerialism,” to what has been called “audit culture” ... They...believe that in installing such procedures and rules they are “helping.” For them, more evidence on schools’, teachers’, and students’ performance—usually simply based on the limited data generated by test scores— will solve our problems... (ibid.)

All of these impact the day-to-day lives of music teachers in whatever contexts they work. The increasing and omnipresent panopticon of observations, gradings and marks, the emphasis on spreadsheets rather than musical sounds, and the lack of official interest in creativity and music making beyond a superficial window-dressing can become wearing after a while, creating a context wherein human subjects – in this case music teachers – become objects in a system, one where little control or autonomy is afforded, or indeed permitted. Neoliberalism is not simply a policy backdrop against which music education and its associated research operates, but is in integral part of what takes place in and beyond the classroom. As (Wright 2012, 22) observes, “Policy is a means by which ideology...is made manifest in and through society’s institutions”, and music education, in England at least, where this reported research is based, has regular policy utterances, including recently a non-statutory but government-promoted ‘model music curriculum’ (DfE, 2021). Neoliberalism, then, in music education involves,

...relationships between ideology, knowledge and power representing the interests of particular social groups and the linked interests of commercially orientated music education individuals, organisations and institutions (Young 2023, 148).

What this means is that neoliberal ideology is not just entangled with music education in capitalist societies, it is the warp and the weft which runs throughout, and this is the policy context against which this research took place.

Research Paradigms and music education

It is important to note that historically there have been different perspectives on music education research, depending on geographical location. Principal differences could be detected between North American approaches, and those from Europe. Writing from a US perspective, Phelps (2005, 6) observed that:

Most research studies in music education fall under one or a combination of the following categories: aesthetic-philosophical, descriptive, historical, experimental/quasi-experimental (sometimes called behavioral). Or the research might be a combination of one or more of them...Occasionally music researchers engage in research across different fields...

Another contemporaneous US author, Roulston (2006, 153) noted that “increasing numbers of music education researchers have begun to use qualitative methods to examine research topics”. Both of these views would have come as something of a surprise to the UK authors of the BERA music education review group, who noted what they called “the major UK impact on...research literatures” (Welch et al. 2004, 239), and outlined what they referred to as the past existence of three ‘camps’: psychology of music, concerned hitherto primarily with ‘ability tests’; creativity research; and thirdly those who worked in schools and colleges.

What the UK and US research descriptions outline is the ways extant paradigms of educational research, with the eclectic links that the education discipline has to other domains and fields, are used in music education research. One implication of this is that the ongoing educational research paradigm wars, in which occasional bouts of activity resurface, can also be seen to

have consequences. In the paradigm wars there are contested, and sometimes entrenched positions:

Such disagreement extends to the relative value of different theories, methods, and research topics. Contested perspectives in education grew most pronounced and visible in the 1980s, at the height of what were known as the “paradigm wars.” This conflict was a “within-field scientist-to-scientist discussion in which the principal concern was whether research in the field met commonly accepted scientific standards” ... At its most polemical, the paradigm wars were framed as an all-out conflict between interpretivist and outcomes-oriented approaches to research ... By the outcomes-oriented approach, we mean the orientation to research based on the language of randomized controlled trials and causal inference. In this orientation, the main values are generalization, validity, and causation, as well as policy relevance... (Munoz-Najar Galvez et al. 2020, 613)

As a contrast to what might be broadly termed positivist research characteristics, the authors outline interpretive research, which they view as being:

...focused on providing rich understandings of specific learning contexts and contextualized instances of sense making. Furthermore, the interpretive approach values the density and richness of description, the interpretation of emic categories, and the development of theory rooted in the lived experience of subjects ... (Munoz-Najar Galvez et al. 2020, 613)

What this means for music education research is that the normal modalities of the broader field, with its focus on qualitative, quantitative, and mixed-methods research involving a combination of the two, are likely to be the most common forms of published work. However, in this paper we endeavour to “trouble the status quo in music education practice and research” (Pitt 2023).

In this sense it is following the lead of Schmidt (2005, 4) when he says:

Music education, because of its dynamic, has the potential to reach as a transforming power to different realities; however, in order to do so it must go beyond considerations of musical syntax, aesthetics, and performance. It needs to relate to the realities of individuals and communities in which it engages.

And it is this which we hope to do, by describing the ways in which a contemporary focus on the notion of posthuman research can challenge existing notions of research methodologies, whilst simultaneously moving discussion of important matters in music education research into new areas of thinking, doing, and being.

Engaging young people at risk of educational exclusion

This paper draws on data collected during a four-year research project, 'Exchanging Notes', a creative partnerships initiative funded by Youth Music (2019). It sought new ways to engage young people at risk of educational exclusion in school life through creative partnerships between schools, music teachers, music leaders and music organisations. This nationwide programme in England supported young people in 10 partnership projects, including 8 mainstream schools and 2 special educational settings. Over 163 young musicians took part in Exchanging Notes activities, as did 69 link music leaders and teachers, 7 head teachers, and 2 music hub leaders.

The young people involved rarely had prior long-term engagement with musical opportunities and were given the chance to explore music in modalities different from classroom music. Similarly, the project aimed to facilitate and foster long-term exchanges between classroom teachers and music leaders, aspiring to create a site for mutual pedagogical development, practice sharing, and professional learning. Young people were interviewed and surveyed regularly across the 4 years to understand the ways in which their musical identities may be developing, and the impact (if any) that they saw music as having on their lives and engagement

with school. Teachers and music leaders were also interviewed throughout the project to explore the nature of developing partnerships and mutual understandings of different positions.

The research process was grounded on a mixed methods approach, using surveys and interviews to gather perspectives directly from the participants, and analysing attainment and attendance data provided by schools. This school attainment and attendance data was provided at individual pupil level on a half-termly basis and was analysed at the end of each academic year for interim reporting. Attainment data was collected in relation to a young person being *above*, *at*, or *below* their target grades in literacy and numeracy, as determined by teachers at the start of the project. This meant that what was being collected in these data was the relational progress journey for everyone; researchers never knew what these target grades were and there were myriad systems used by schools for data-capture. These data were analysed at school level to understand the patterns of progress amongst specific sites, as well as across the whole cohort.

Whilst this quantitative data provided a sense of the development of a young musician, the views of the young musicians themselves were central to evaluation of efficacy and outcomes. The project sought to look beyond academic performance indicators as markers of impact, instead working from the perspective that young musicians were closest to the teaching and learning that took place in the sessions. They were therefore uniquely placed to offer insights and personal reflections on their developing identity as young musicians. Through participation in perception surveys of all young people and interviews with a sub-sample, space was created to find out how the young people were thinking about their own musical and social progression, and consider the extent to which perceptions had shifted over the 4 years.

Researchers also evaluated delivery methods, pedagogies in use, and notions of partnership through session observations, perception surveys, and interviews with music teachers and music leaders involved in delivery. Music teachers and music leaders were asked to complete perceptions surveys regarding engagement of young musicians in the programme, and were

interviewed to discuss developing understanding and exchanges between the schools and music organisations involved. Researcher observations were guided by Youth Music's Quality Framework to capture some of the pedagogical approaches, learner engagements, and innovative exchanges. It is important to emphasise that these observations were not about deciding what was 'good' or 'bad' practice, rather to describe and contextualise the experiences of all involved in activities, and all participants understood the purposes of such observations.

The findings generated through these approaches are documented elsewhere (Kinsella et al. 2019), but this methodology sought to balance some of the ways in which schools understood 'data' about pupil's learning journeys, as well as providing mechanisms to represent the perspectives of key stakeholders in the activity and research processes. Such an approach is relatively common for research evaluation processes in the arts and cultural sector and was widely understood within the funder's own frameworks.

However, what emerged during this partnership project were levels of complexity in terms of the fluctuating and dynamic power relationships in practices, both self-conscious and tacit, assumptions concerning definitions of quality and intended outcomes for the young people, and the ways in which the young people themselves interacted and intra-acted with these in entangled fashions. During the research process, limitations of traditional mixed-methods protocols in fully capturing the nuanced and dynamic nature of the interactions and experiences we observed became apparent to us as researchers. Consequently, a fresh aim was to enhance our analysis by applying a posthuman lens to reevaluate the entangled relations present in the study. Through the application of a posthuman lens, our intention was to unearth alternative insights that extended beyond human-centric perspectives or neoliberal data sets. Instead, we sought to acknowledge the agency of non-human elements and the physical spaces where musical interactions occurred.

In this paper, we exemplify these alternative perspectives using specific examples from the interviews and field notes. The aim is to demonstrate how new meanings of partnership work were generated, ones that traditional analyses might have overlooked. This research received full ethical approval from the Birmingham City University ethics board.

Methodological departures

Taylor (2016, 6) observes that ‘Posthumanism invites us (humans) to dismantle current modes of doing—and then envision, create, and engage in doing differently’. Through a posthuman lens we are prompted to re-evaluate the traditional understanding of human presence, instead emphasising intricate interconnections among all involved, including both human and non-human elements, such as the forces generated by musical instruments like vibrations and rhythms, the music produced and musical interactions and intra-actions (Kinsella et al. 2022). Childers (2013, 605) recognises the affective nature of fieldwork and analysis where ‘the materiality of the field rises up to meet us, rubs up against us, pushes back on our interpretations’. This was deeply felt by the researchers and had significant influence on how they conceptualised what constituted research data and how they engaged with it.

Diffractional-intra-active-assemblages.

We focus on three pivotal concepts within posthumanism: diffraction, intra-action, and agentic assemblage, and consider their significant methodological implications and potentials for shaping the landscape of future research in music education. Drawing on key findings from the ‘Exchanging Notes’ research project, we instantiate how teachers, learners, music practitioners and researchers can begin to redefine traditional hierarchies between human and non-human elements within the classroom, acknowledging their collective contribution to music making.

Diffraction is an established concept in physical sciences referring to the disruption of wave-based systems as they encounter obstacles. For Haraway, the notion of diffraction can be used as a metaphor where it represents the disruption of dominant forms of knowledge allowing for the emergence of new insights and alternative viewpoints. To do this, diffraction includes diverse perspectives and knowledge, creating a new understanding that challenges singular and hegemonic modes of thought. A diffractive approach to investigating musical teaching and learning therefore encompasses not only linguistic elements but also the material discursive (Haraway 2016). This approach assigns value to the connections that interlink both human and non-human entities. It de-centres the human and recognises the agency of other materials, objects, beings, and environments present in the learning encounter, opening a space re-thinking pedagogy and practice. This onto-epistemological perspective, as articulated by Barad (2007), shifts the focus away from the hierarchical structures often present in music education. Instead, it transcends ‘traditional dichotomies such as dominating subject/object, human/non-human, and discourse/matter, as well as nature/culture’ (Hultman & Lenz Tagucji 2010, 539). It is therefore inherently relational. Consequently, we propose that diffraction is more ethically and socially just, given its meticulous consideration of connections between all things and the value placed on more-than-human knowledge creation (Kinsella et al. 2022). This approach offers possibilities for reimagining our understanding of the world. Furthermore, in line with Bozalek and Zembylas (2017), we consider diffraction to have the potential to open ‘new opportunities for ethical and political connections and transformations that were previously unimaginable’, including novel social and interpersonal relations. It therefore disrupts traditional representations, which sees the educator and learner as ‘already part of the substances, systems, and becomings of the world’ (Alaimo 2014, 14), instead inviting a new outlook towards a re-examination of the relationality between selves, others, the text, context, and larger social and political possibilities (Kester 2019).

However, when thinking of music education spaces, we need to further consider the material aspects that impact musical encounters; the complexities and interconnections of all involved in

the creation of music making. We therefore turn to Bennett's 'agentic assemblages' (2010: 23-24) to consider the materials, artefacts and spatial elements that impact learning. Bennett urges us to contemplate the assembly of all things and the relationships they forge. To understand this, prompt questions can be helpful. Examples include:

- What does it look like?
- What 'things' are in the space? What do you see?
- Who is in the space?
- What do you hear?
- What materials, objects are in the space? How do they feel?
- How do you move around the space?
- Who and what contributes to the classroom's dynamics?

Visual, auditory, material, historical, and cultural elements are likely to all impact the imagined – or recollected – learning space. Objects such as musical instruments, bulletin boards, computers, desks, chairs, and even the acoustic resonances from neighbouring classrooms all exert their influence and agency on the musical teaching and learning experience. Histories, cultural backgrounds, and the synergy between teacher and learner also wield their influence. In addition to these tangible and physical elements, we must attribute agency to other factors, including archival, historical, and local influences (Kinsella et al. 2023). Therefore, by acknowledging the importance of the material world, we are prompted to make a conceptual shift and move beyond our human-centric foci.

These elements do not exist in isolation, which is why Barad (2007) encourages us not to perceive these relations as mere interactions but as intra-actions. As Taylor (2017, 319) states 'the material world we inhabit is composed of matter which matters differently is not, for Barad, a mere play on words but is an invocation of an ethical reckoning and a call to greater

responsibility'. Rather than presuming that entities within the classroom possess independent and isolated agencies, intra-action asserts that they are interwoven, and our relationships with them are perpetually shaped by each other, forming a collaborative co-construction. Such an intra-active process places a strong emphasis on the connections among all 'things' (Bennett 2010) present in the music classroom. Failing to adopt such an approach, arguably, restricts our grasp of the inherently social and material essence of the music classroom, elements that are so central to any musical practice.

The need to reframe our understandings.

To transcend these influences and envision an alternative musical learning environment or understand the ones we have already, we must be cautious not to disregard or understate the importance of the material world. Instead, as Bennett (2010 4) asserts, we should draw attention to their vibrancy because "things too are vital participants in the world." This shift diminishes the hierarchy often present in the classroom, offering a perspective that values the more-than-human.

To advance beyond the constraints of both quantitative and qualitative methodologies, it becomes imperative to heed Zembylas's insight (2017, 1409) that 'theoretical and analytical concepts within their specific ontological frameworks prove inadequate for comprehending data, thus necessitating an authentic acknowledgment of difference that transcends their ontological boundaries'. To transcend the limitations of the conventional reflexive gaze, educators, music practitioners, and learners must engage in the practice of 'working the ruins' (St Pierre and Pillow 2000). This endeavour requires the convergence of time, space, place, and individual perspectives, allowing them to diffract and intra-act together to contemplate novel possibilities. This approach encourages a departure from rigid research methodologies, acknowledging the complexity of knowledge construction and the multifaceted nature of data. It entails embracing subjectivity and difference as integral components of the research process and fostering a dynamic, reflexive, and interpretive stance that appreciates the intricate and

uncertain aspects of inquiry. Moreover, it emphasises the need to move beyond established ontological frameworks to more fully understand and engage with diverse forms of data, human and non-human, to generate new knowledge. Making a methodological shift is not an easy undertaking. Indeed Taylor (2017: 322) states that ‘creating knowledge-making practices which are imminent, embodied, embedded, entangled and situated...and which make space for the human with the nonhuman is a very real challenge’.

Thinking, feeling, and knowing through music intra-actions.

In this paper, we offer entanglements that illuminate significant moments in our exploration of musical development, collaboration, and pedagogies in *Exchanging Notes*, underscoring the understandings that separateness is not the original state of being. This shift in perspective supports a subtle yet powerful approach to knowledge, communication, and collaboration, emphasising the integral role of difference within the world’s entangled becoming (Barad 2010). Through discussions between field notes and interviews we endeavour to shed light on new post-human pedagogical pathways. Throughout this process, we pay attention to Barad (2014, 168) who suggests a process of re-turning, intra-acting with and diffracting data to create new patterns, connections, and spacetime-matterings:

‘I want to begin by re-turning—not by returning as in reflecting on or going back to a past that was but re-turning as in turning it over and over again—iteratively intra-acting, re-diffracting, diffracting anew, in the making of new temporalities (spacetime-matterings), new diffraction patterns. (Barad 2014, 168)

The factors contributing to learners in *Exchanging Notes* being classified as at risk of educational exclusion encompassed a range of complexities, including aspects related to behaviour, socio-economic, emotional well-being, Special Educational Needs and Profound and Multiple Learning Disabilities (SEND and PMLD), as well as school approaches to teaching and learning grounded in taken-for-granted neoliberal policies and practices. Although these

complexities were diverse, one common thread that united the learners' experiences was the musical intra-actions that developed over the course of four years. These agentic intra-active assemblages included not only the teacher, learners, and music practitioners, but the instruments, the learning environment, the sounds, the feelings, and the modes of musical communication.

In many cases, music practitioners facilitated this process through a deliberately unhurried and slow pedagogy where they lingered in the moment (Clark 2022). They granted the learners time to move slowly within the music space, to linger with the instruments and immerse themselves in new classroom rhythms. This allowed the learners the opportunity to forge new connections with the instruments and musical elements, which led to new musical intra-actions between learners, music practitioner and teacher. In mainstream schools the time afforded to these spacetime-matterings (Kuby & Taylor 2021) differed to more traditional notions of time in classroom music lessons. By emphasising the materiality and relationality of these interactions, posthumanism offers a lens through which we can explore the dynamics of musical learning and pedagogy. The longitudinal nature of the project permitted the participants to linger and dwell, to be with and have space to explore new becomings. In this excerpt from field notes, the researcher acknowledges these intra-actions involving time, instruments, and spaces. However, they are prompted to ponder how such interactions might appear to other staff observing the session. This contemplation challenges deeply ingrained perceptions of what constitutes effective pedagogical practice and the parameters of how we assess such activities:

The learners move around the music room. No one has really spoken yet in the session, the learners are interacting with the different instruments – guitars, drums, and keyboards. Sometimes just strumming gently or pressing the keys exploring sounds. Some of them drum loudly. The music leader has also left the computer on so that they can play music they want to listen to. When I came to a session previously, they were allowed to choose their songs of the week. The practitioner doesn't intervene straight

away.... Some time has passed and it's only now that the practitioner begins to get involved. They go and sit near the learners and play their guitar, improvising and interacting with the sounds they are creating. There's no talking, just playing... there is no defined outcome or expectation. This continues for the entirety of the session...I wonder what SLT would think if they came to this session? Would they wonder where is the learning? Where is the teaching? It seems so fluid and with no direction. It can get quite loud and could appear without purpose. But when you look deeper, they are responding to one another, they are communicating through the music.

The impact of this approach had significance for these learners, who hitherto found it hard to engage in classroom lessons. The open and fluid space, with no pre-defined learning objectives, provided a space of deep intra-action. They were permitted to explore the space, the instruments, the sounds, they were able to communicate in other ways that moved beyond the verbal. Through these intra-actions the music leader could explore differences, connections, and impulses. In an interview with the schoolteacher, they commented on the affordances of this approach:

Students have indicated that the music sessions are the thing that keeps them coming into school and going through tough days...they use it to channel their stresses and frustrations and they speak extremely highly of their tutors' patience, kindness, and encouragement. They enjoy making music and feel they can express themselves in these sessions.

In special schools, these forms of intra-action were referred to by music practitioners as intensive interactions, which is an approach commonly employed in special education when working with learners who have severe or profound learning disabilities (www.intensiveinteraction.org, n.d.). This approach recognises the importance of being responsive, encouraging adults to spend time observing and responding to the learners'

meaningful cues. Additionally, it acknowledges that communication extends beyond spoken words, placing significance on gestures, body language, and facial expressions. However, a supplementary aspect of this approach within Exchanging Notes was the incorporation of musical instruments as communicators, where sounds and the physicality of instruments played a vital role in fostering reciprocity. This process is described in these quotes from music practitioners:

...what I was doing at the beginning was to introduce him to a musical instrument by just placing it close to him and letting him hear the sound. I then work on his responses before he even touches the instrument. I took this approach this time as he normally acquaints himself with the instrument through touch so I wanted to explore whether he would respond differently if we tried a different sense.

...it wasn't so much about playing different instruments and how he was playing them. But the instruments became the mediators, mediating between me and him. I like the idea of the sessions being more in that way. As opposed to sessions being about seeing him doing lots of different things with instruments, which is often what schools' base success on, instead I like to try to find different ways in which we can work and communicate together.

She loves objects, she explores them quite eagerly. She also explores their pulses. We start to communicate through music. It often starts like call and response and then gets more intentional over time. This is the way we communicate.

Reverberations, acoustics, and movement forces.

Building on these spacetime-mattering entanglements were the effects of reverberations, acoustic challenges, and the exploration of movement. These dynamics were present in many of the projects who worked in spaces like sports halls, small practice rooms or classrooms filled with

diverse furniture, including specialist music spaces but also non specialist classrooms. These spaces, and their impact on music making, made us consider the entire intra-active network force. Each element played a significant role in shaping the overall music experience and therefore needed to be accounted.

In this first entanglement, the music practitioner has an awareness of the impact of these forces and how they intra-acted. It is important to note that these forces can have negative impact on the teaching and learning experience signifying the importance of their recognition:

... we were in a different room with different dynamics. It was a smaller space, and we were working with drums which intensified the sensory engagement. This had impact on the lesson, not in a bad way but we had to account for that. We sometimes had to stop for some silence for the [learner] or play softly and quietly. These dynamics have real impact on [learner's name] sometimes this can be positive, sometimes I have to be really mindful of when it is getting too much.

This example emphasises the importance of decentring the human and the centrality of material-discursive (Barad 2007) impacts present in music making. A deep understanding of their role within the classroom was needed by the music leaders as well as an attention to the learner to ensure an ethics of care (Hendricks 2023). In this second entanglement, the influence of drumming, its capacity to evoke emotions, the role of movement and the spatial factors all had profound impact on the collaborative music-making:

They all stand around in a semi-circle in the sports hall, the music leader is at the front but in the middle of the group. The classroom teacher is amongst the learners playing a surdo drum. The whistle blows. The whistle is the communication tool, it cues in drumming sections...they move from side to side to the infectious and energetic rhythms, you can see through the playing and movements that this physical expression

is liberating. It's different to the traditional classroom space.... their bodies move together side to side, beat by beat, the larger open space and movement all are creating a freedom...there are no behavioural issues present, in fact I wouldn't have even known that these learners had behavioural issues had it not been for information received on their complex needs. So, what is it about this session. Does the drumming have some sort of power? Can they exert emotion? Is it the larger open space? Is it the movement? Is it the feeling of making music?

The transformative influence of music, rhythm, and physical expression within the spacious sports hall seemed to foster heightened focus, engagement, and emotional regulation among the learners. In contrast to the more typical classroom environments where behavioural issues tend to be more prevalent, the collaborative and liberating nature of the music session appeared to channel their energy and emotions in a positive direction. This musical 'agentic assemblage' (Bennett 2010, 23-24) attributes the complex interrelated aspects involved in music making. For example, the power of spatial awareness, sonic sounds – such as, the physical impact of drumming, the instruments themselves – as well as the intra-actions between teacher, music leader and learners; in such an assemblage it was impossible to separate, isolate or promote a hierarchy. All 'things' came to matter and were given value in different ways from a traditional classroom.

Diffraction, dissecting, and re-framing assessment.

Exploring and thinking with posthumanism is challenging, especially when working with schools who are bound by metric-focused policies and practices. This gave rise a central question: What is a valid assessment of musical progress and progression in music education?

Throughout the project this question was continuously discussed and debated. We remained mindful that '...in efforts to increase reliability, it is all too easy to fall back upon things which are easily assessable, which, whilst probably reliable, are not necessarily valid in measuring

aspects of musical learning' (Fautley 2010, 26-27). This was further highlighted by this comment from a music leader, 'I think there is a political element that necessitates to formalise everything into an assessment level system'. The continual challenge was how to diffract, dissect and re-frame assessment so that it recognised multiple ways of knowing, the unique contributions of each learner and the forces generated with and through material intra-actions.

We do not want to present Exchanging Notes as a victory narrative, providing solutions to problems associated with assessment in schools. Often, assessment practices were definitive, and in a continual process of 'trace, reproduce, assess, trace, reproduce, assess...' (Taylor and Huckle 2023, 6). However, we want to offer some suggestions of pathways explored that begin to recognise the centrality of the posthuman.

For many projects, there was a move towards multidimensional lenses of musical learning which relied less on standardised metrics of fixed criteria, towards assessments that began to embrace complexities of the learning process, recognising that knowledge was co-constructed by all 'things that have vitality' (Bennett 2010). As Exchanging Notes spanned four years, teachers and music leaders had time to engage in this process of diffraction. They continually questioned approaches, engaged in debates, and often found themselves disagreeing on pathways that measured success, as articulated by this teacher and music leader:

It has been difficult to explain the demands placed on us in school and the measures and data we need to collect to evidence learning. This is not always understood. (Teacher)

In doing so, the teachers started to assess and conceptualise work differently. They were aware of and attentive to the effects of assessment practices and disrupted the 'AcademicAssessmentMachine' (Taylor and Huckle 2023, 8):

We look at success differently, we are not bound by school measures, so we have time to consider other aspects of musical development. I think in a more holistic way. (Music leader)

To posthumanise assessment therefore required the teachers to be aware of and recognise the issues associated with Taylor and Huckle's notion of the 'AcademicAssessmentMachine', and in the case of Exchanging Notes we could detect teachers' assessment-machining:

It's easy to see assessments as separate from us. We print them out and file them away. We drag them into desktop folders. We package them up in envelopes or filing cabinets. (Taylor and Huckle 2023, 8)

However, whilst as researchers we were acutely aware that whatever we thought, the teachers *had* to give grades, as it was – and continues to be – a required part of the system, but looked at from our one-step-back perspective:

...when we approach identities from an agential realist perspective, we see that nothing we do can be apart from us. (Taylor and Huckle 2023, 8)

This required us to think both responsibly and ethically about our own actions and reactions within the system being researched. Our ethical positionality meant we had to remain fully cognisant to other forces that have impact in the music classroom, examples of which are highlighted in these comments by teachers:

I think that it's about providing people a way to connect to music first. The making process almost unlocks the connecting process. I think making, doing, becoming musical drives the ability to connect. This is what I look for now. (Music leader)

I have learnt how to question what I am doing. I really look at how they [the learners] are working. I am taking time to observe. I listen and watch the young musicians, try to get to know them and get feedback. This is not always done verbally but through the music. For me I look beyond session by session and think about this over a longer period of time. (Teacher)

Central to this was the trust created in the music making space. When reciprocal acceptance and respect was developed, an affective and pedagogical bond was established. This is particularly important when considering the posthuman, and when asked to go beyond existing concepts of knowledge creation. This created a favourable atmosphere for teaching and learning, where everyone was engaged in 'the ongoing dynamism of becoming' (Barad 2007, 142):

I think it's about that fluidity between doing and learning, through making, learning through thinking, and thinking through learning. Thinking with and through everything in the classroom (Music leader)

Conclusion

A posthuman approach to education research and practice challenges us to dismantle, de-construct and disassemble policies and structures that underpin many current education systems, whether these are unrecognised, unvoiced and tacit or overt and visible. Bayley (2018, 20) argues, how we 'do' education lies at the heart of rising to the challenges of the complexities of 21st-century living. This entails challenging the status quo and reimagining our methodologies to better reflect the complexities in music education. Through critical reflection and action can we hope to create more inclusive and responsive educational environments that respect the diverse ways in which music is experienced and understood.

We posit that a lack of understanding of more-than-human ways of being excludes many learners. A posthuman perspective challenges dualisms between the human and non-human, subject and object. In our analysis, concepts like diffraction, intra-action, and agentic assemblages allowed us to explore the interconnectedness of all entities present within a music classroom space. Through these lenses, we could focus on the musical environments and the intra-actions between humans and other non-human aspects of musical learning.

Furthermore, Exchanging Notes concentrated on engaging young people facing diverse challenges, including social, emotional, physical, and/or disability-related factors that could potentially impact their musical participation. It became evident that their musical journeys were far from linear, they were shaped by complex interactions and entanglements among various elements within the music education classroom context. Therefore, drawing on posthuman theory, we embraced a new lens to explore their musical experiences with greater sensitivity and inclusivity. More traditional research methodologies often struggle to capture the complexities and interconnectedness that characterise music learning environments, particularly when working with young people facing diverse challenges. A posthuman lens on analysis provides a deeper understanding of the multifaceted interactions at play, underscoring the significance of co-creation and collaboration in the process of musical learning and development. A key factor in this was teacher and music leader development in understanding the importance of recognising these more-than-human entities, and then valorising them through recognition. For teachers, this meant looking beyond metric focused assessments and considering other key components in processes of knowledge generation and learner progress.

However, we acknowledge that the initial methodology and reporting of Exchanging Notes aligned with the very methodological frameworks we aim to challenge in this paper. As researchers, we were constrained by funding systems and processes, taking a cue from Taylor and Huckle (2023) we could be said to have been part of the ResearchEvaluationReportingMachine. We are uncertain whether, had we proposed a posthuman study from the outset, this research would have been funded, and we will, of course, never know! Nevertheless, applying a posthuman lens to data analysis enabled us to capture a deeper understanding of the experiences of teachers, music leaders, and learners that otherwise would have been missed. We propose that for music education and research to become more inclusive a paradigm shift is needed. Research funding and education-based practice needs to begin to challenge established ways of thinking and conducting research, which in turn will

hopefully lead to new insights and understandings of music education practices, processes, and relationships.

By foregrounding the entanglement of musical entities, posthumanism not only illuminates alternative ways of knowing that depart from neoliberal policies, but also empowers educators to consider new pedagogies that celebrate students' diverse musical expressions, engages them as active participants in their learning journey, and recognises the importance of other entities that play a role in shaping teaching and learning. As highlighted in the paper, a posthuman lens has the potential to create more meaningful and relevant music education practices that align with the diverse needs and aspirations of learners in the 21st century.

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