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Connections, concepts and cartographies: re-imagining sustainable education systems through perceptive engagement with children in contemporary education

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Abstract

Concepts of sustainability should underpin education systems across the globe. Yet, strong positivist views have dominated Western knowledge structures for centuries, privileging isolated, quantifiable paradigms over holistic knowledge-making practices as lived and known by alternative groups of peoples and ages. If education systems aid in the shaping of future thinking through the minds that they cultivate in schools (Eisner, 2002), then it is imperative that they address a deeper understanding of how various influences co-construct entangled and distributed ways of knowing and becoming-with-the-world (Haraway, 2016). The role of perceptive engagement with the environment at various levels by children has been highlighted by Ecological Systems Theory (Bronfenbrenner, 1979) and provides a means by which environments cultivate thinking and behaviours. Connection and co-production between different levels of influence (including digital influences) have been recognised by some education reforms such as the CfE in Scotland (2010) and the CfW in Wales (2015; 2022). These reforms have started to engage with the productive nature of such systems, considering how they may intercept and interact at different levels in co-creating the holistic development of children, and therefore the wider ecology of education and learning. Engaging with children as co-creators of learning experience can begin to make visible different relations between environments that co-construct thinking and agency in the world. Through materialising children's engagement with the world through 'relationscapes' (Manning, 2012), we can begin a dialogue that could lead to new ways of understanding the progressive equilibrium by which mind, and life can not only be sustained, but also thrive in a shared future.

Keywords: making, embodied-mind, ecological-thinking, sustainability, children's perceptions

Introduction

A shift in the environment impacting learning

The perceptions and cognition of children develop in relation to their shifting relations, negotiations, and experiences with the environment (Koller, Paludo and de Morais, 2019; Morss, 2018; Bronfenbrenner, 1979). This idea is not new and was first developed at the turn of the century by a range of educational theorists and psychologists such as Jean Piaget (1954), John Dewey (1899) and Lev Vygotsky (1978). This led to many pedagogic advances that considered *how cognition was developed* which drew from different fields of knowledge in the late nineteenth and early twentieth century. This development was predominantly rooted in educational psychology, which was in its nascence as a field of its own during the early twentieth century engaging with a range of ideas on the development of cognition and learning for a child including behaviourism, constructivism, social-constructivism and experiential learning, and many of these pedagogies are still used today. Later work by psychologist Bronfenbrenner (1979) made such influences more tangible through his *ecological-systems theory*, where he made visible the influences that *could* impact the development of the child through looking at the various levels of influence in an individual's environment. Bronfenbrenner (cited in Morss, 2018, p.213) highlighted that;

“Human Development is the process through which the growing person acquires a more extended, differentiated, and valid conception of the ecological environment, and becomes motivated and able to engage in activities that reveal the properties of, sustain, or restructure that environment at levels similar or greater complexity in form and content.”

Bronfenbrenner's model has since been refined many times (Morss, 2018) and allows us to begin to unpick the extended, nuanced influences from the environment which co-create the developing cognition of a child. However, the environment has, over time, become more elusive and complex, particularly in contemporary times (Floridi, 2015) as environmental influences extend and disperse rapidly, through a multitude of digital and global interactions as a result of global hyperconnectivity and technological advancements such as the internet. Addressing this technological development, Bronfenbrenner's model received another update in 2008, by Johnson and Pupilampu, and later in 2010 by Johnson, who developed an *ecological techno-subsystem*, which considered the child's interactions with both living (e.g peers) *and* non-living elements (for example hardware) in the environment. Johnson (2010, p.177) highlights that;

“From a developmental perspective, Internet use stimulates cognitive processes involved in interpreting text and images...[and]...Metacognitive processes such as planning, search strategies, and evaluation of information are exercised when navigating websites...”

This idea is important to consider when thinking about the development of cognition in children in contemporary education systems and how digital technology is impacting their learning, development, and behaviours across different elements of the environment. Johnson (2010, p.183) also states that “From an ecological perspective, Internet use in one environment influences Internet use in other environments”, which is important when considering how learning is developed – it is not an isolated, linear event, but rather a messy, tangled, lateral route of becoming. This way of thinking about learning is very important for understanding sustainability, as the way in which thinking and knowledge are

understood, impact and influence how we think and act with the other elements in the environment also. Burnard and Colucci-Gray (2021, p.11) expand on this notion stating that

“...knowledge-making is not static and separable from the living and non-living world, but instead occurs in the form of assemblages made up of groups, ideas, elements, or systems that are continually intertwining to do something, to produce something.”

Cognition is not an isolated development, it cannot be successfully separated, measured and quantified, or removed from the child as previous dualisms once thought, but rather it requires to be developed in a relational sense in line with an individual's developing ontology. This requires that both must be considered in tandem rather than isolation as they perpetuate the development of the child ontologically. It can be understood that knowledge-creation is always contingent on the relational elements that situate developing experience, and the developing environment holds within it all potential stimulus for the perceptual and cognitive development of the child at any given moment. If we consider these ideas in relation to the maturing children of our time, then it can give us *part* of an insight into what *might* influence their developing cognition – an important element for anyone facilitating learning experiences and building sustainable education systems. Yet, this is only *one* element in better comprehending the cognitive development of the child as the child is also an active agent in the larger ecosystem; acting, thinking and becoming-with the developing timely entanglements that co-construct their experience and learning. There are many frictions in understanding the ontological differences between child and adult, as these are vast and exist on very different ontological planes (Piaget, 1948; Vygotsky, 1978). This paper argues that there must be a two-fold consideration for sustainable learning systems - how *we perceive* children's thinking and the way in which children perceive *their own thinking* and development. This two-fold understanding is a core concept in this paper and considers opportunities to (re)consider co-constructive elements of the environment through engaging children in arts practice to materialise their situated experiences that frame their learning. This is an important element to consider as all learning is situated and embodied through the lived-experience of each individual learner. Therefore, each relation in a learning experience is personal and supports (or hinders) *how* new learning is embedded, which can support the learner's knowledge and comprehension. To further unpack this idea, the paper will begin by considering the previous elements that have led to an ontological divide between children and adults and will then contextualise this in light of how this might be addressed and what this might mean for learning in a sustainable education system.

‘Not old enough’: ontological frictions with co-creation perpetuated from previous notions of childhood, education and learning

“The knowing subject, Man, is assumed to be of a particular (adult) age. Modern schooling positions children as knowledge consumers, not producers, because it is assumed that they are (still) developing, (still) innocent, (still) fragile, (still) immature, (still) irrational, and so forth” (Murriss, 2018, p.2)

It is important to understand and recognise that ideas of being (or becoming) and engaging with the world are nurtured from a young age as the thinking is already being shaped dramatically by the

influences and context around each child (Bronfenbrenner, 1979; Morss, 2018; Johnson and Puplampu, 2008). Therefore, in a sustainable education system, it is important to acknowledge how children are understood and positioned in society and the world at large. Previous understandings of children's agency have been perpetuated by Piaget's 'ages and stages' model of cognitive development (Piaget, 2001; Piaget and Inhelder, 1972) which posited that children's cognition developed in a linear and biological fashion. This development has since been contested (Babakr et al., 2019) as it did not fully account for the way in which children develop individually – we now accept and understand that different children will develop cognitively at different rates. Unfortunately, the 'ages and stages' model has long been engrained in the fabric of Western culture and education, and therefore is still dominant, which has created friction between adults and children where concepts of maturity and age are concerned (Murriss, 2018). This view of children and childhood over time has created an age-related separation and ontological friction between what it means to be an adult and a child, and therefore also what it means to a teacher and a learner, which has perpetuated our notions of what constitutes knowledge, and what it means to learn. This is a problem for contemporary education, particularly in relation to sustainability because the friction and tension around notions of co-construction and working-with children - as both teachers and learners, is a fundamental element in the understanding and actualising of sustainable education systems. It makes the shift from *interaction* to *intra-action* (Barad, 2007) difficult to conceptualise and therefore actualise through pedagogies in and outside the classroom. This problem has been noted as a friction in both education and social systems that have perpetuated age-related separation as a result of previous Western paradigms (Haynes and Murriss, 2016). However, it is only by working together through shared understanding of co-construction, can we begin to reconsider how learning is best facilitated for each individual and thus flourish in changing environments, particularly when they are unstable and change rapidly. The perceptive engagement of children is an important factor in realising this idea, as previous reforms have left children behind as passive absorbers of information rather than active participants and agents of change (Myers, 2019). However, the world is as much theirs as it is ours and it is important to include them and listen to how they understand it. It is important to consider that;

“Children are not removed from the material world, but are critical to it...From the very moment of birth we are surrounded by the material world. Engagement with the world comes through interaction with that materiality and through material expression.” (Derevenski, 2000)

The centrality of children in the world is a key factor to engage with when considering sustainability and whether children are acknowledged to have agency or not, their presence still impacts our thinking and doing in the world. They make up a large part of society and the way in which we understand them, and their relative position, is fundamental to how we cultivate future generations and thinking. This idea has been engaged with more purposefully in some education systems where they have started to look purposefully and attentively at the views and opinions of children and young people which are given agency in deciding how the future is shaped. This is a key element in *The Well-being and Future Generations Act in Wales* (2015), which is the first of its kind. It takes responsibility for and focuses on “...the principle of sustainable development and encompasses economic, social, environmental, and cultural factors” (Davies, 2016, p.41). For example, the Act has meant that 16 and 17-year-olds can

vote in political decisions in Wales and some young people are members of Welsh Youth Parliament, where they campaign on issues such as equality for children in asylum-seeking families and improving connectivity and school transport (Howe, 2020). The progressive yet vital understanding that children and young people make up a large part of society and should be included in how that society evolves has been overlooked for a very long period of time yet is fundamental to ensuring sustainability in every sense of the word. This idea has also been further embedded in curricula as countries such as Scotland (through the Curriculum for Excellence - CfE, 2010) and Wales (CfW, 2015, 2022), have both recognised and addressed this in their education systems, and have begun to work with young people in an attempt to co-construct a better future.

Previous understandings of adults 'knowing best' and 'transmitting' information is outdated and insufficient for solving problems and finding solutions in today's environment at large. Ideas surrounding what defines a child beyond their age, have been contested for the last twenty years as media and hyperconnectivity have alerted concern to 'children losing their childhood' (Derevenski, 2000, p.5). Derevenski (2000) argues that being a child extends beyond age and power relations - it is far more concerned with the nature of experience as symbiotic, contextual and material. It is therefore important to recognise children as beings who are on a continuum of developing experience. This continuum is fluid and fluctuating as it is continuously co-constructed and re-constructed through biological, cultural, social, digital, and environmental *negotiations* or points of intra-action (Barad, 2007) – i.e., mutual impact. It is necessary, therefore, to recognise children as being actively part of these tangle of influences; productively shaping them while also being shaped by them at any given moment. Rather than understanding children as inexperienced youth who need to be indoctrinated into being or thinking in a particular way at a particular age, teachers need to understand any learning development as contingent on negotiation with these points of influence for each individual. A posthumanist view of this can start to unpack these points of negotiation rather than transmission, however, to do so, will involve the child as much as the teacher in the active co-construction of knowledge and experience for both. For example, it is necessary that the teacher is able to facilitate and support a learning experience without a focus on transmitting knowledge. This can be facilitated through inquiry-based learning approaches that put the child at the centre of learning (Dewey, 2010), where the child is able to engage with lessons through elements they can relate to, or areas of interest from which ideas can be framed and further developed by working-with rather than working-for the teacher. These include making real-world connections through exploration and high-level questioning that promote deep learning. Ingold (2000, p.5) highlights that,

“Skills are not transmitted from generation to generation but are regrown in each...the study of skill demands a perspective which situates the practitioner, right from the start, in the context of an active engagement with the constituents of his or her surroundings.”

With this in mind, it is important to consider how learners re-situate themselves in the environment and re-consider their engagement in the context of learning which can inspire more purposeful pedagogy for both the teacher and student alike. This means understanding that learning does not occur in one

direction, but rather the learning emerges between conversations, ideas and actions between teacher, student, peers and objects.

Co-construction with the situated learner: shifting from power-over to power-with

“To be human, indeed to be living, is always to be in a situation, a context, a world. We have no experience of anything that is permanent and independent of these situations” (Varela, Thompson and Rosch, 2016, p.59)

To better understand elements of co-construction in learning experiences and education, this paper considers the work from Varela, Thompson and Rosch (2016) in relation to situating cognition and experience. Any interaction, any contact that occurs in a learning process can be understood to have both cause *and* effect on all elements that entangle in that process (becoming an intra-action) whether that be thinking, doing or learning. It is from this idea that we can begin to unpick the elements that are required for learning practices to become sustainable as we focus attention on the tensions that each have cause/effect actions at different levels. Varela, Thompson and Rosch (2016, p.xxxviii) highlight that it is important to recognise ‘the lived body, lived mind and lived environment...[as all]...part of the same process’. This is a significant shift to note when considering learning in a sustainable education system as it not only re-connects mind and body as one, but it also couples this with the environment in a feedback loop of active correspondence. These ideas take a clear departure from the views of Western science and alternatively draw not only from phenomenology, but also Eastern and Buddhist philosophies that better consider learning as part of being and living as a situated learner. Considering the situated learner in a learning process, is to consider the co-constructive processes that perpetuate ‘human-becoming’, rather than focus on elements of cognition isolation. By ‘human becoming’, I refer to the ontological process by which world and individual correspond and shape each other. This symbiotic shaping needs to be considered when cultivating thinking on sustainability. Haraway (2016, p.58) terms this as a form of ‘thinking-with’ and ‘making-with’ - a *sympoiesis*. She adds “nothing makes itself; nothing is really autopoietic or self-organizing” (ibid). It is important for sustainability that ecological models of thinking are engaged with as they allow for a more connected and holistic means of understanding the negotiation that takes place between all intra-actions that co-construct experience. Malafouris (cited in Siebeck, 2016, p.298) extends this further and highlights a shift from cognitivism towards a more relational and embodied model of understanding cognition;

“Instead of simply reproducing ourselves, we rather extend ourselves and we construct new cognitive and material ecologies for growing and instituting our minds. We create things which in turn create us.” (Malafouris, 2016, p.298)

The idea of co-creation when framed in this way better accounts for the interconnected and complex interactions that feed into learning and can be developed to support teachers and students in navigating pedagogic decisions. For example, we can begin to consider how education can stimulate thinking from this model through the behaviours it cultivates in schools and societies at different levels of influence in the environment. In Scotland, Education Scotland (2022), highlight a focus on developing Learning for Sustainability through a collaboration with *One Planet Schools Working Group (2012)*, this involves a whole school and community approach. This approach supports the view that economic, social,

personal, local, global and political elements are all entwined which has led to such incentives being prioritised. This has been similar in Wales, where the CfW (2015, 2022) has also re-developed its curricula to be inclusive at multiple levels as above including the involvement of young people in political decisions and the partnership between communities and educational institutions (schools, further and higher education and businesses) in the co-development of future generations. Shwartz (2019) has argued that when students feel that their thinking is important and considered, it reduces hierarchy in the relationship between teacher and student, thus making co-construction more beneficial and productive in developing learning. It is important for sustainability that hierarchal models are re-considered, and that power is understood as an emergent property from a range of dispersed but connected relations at multiple levels of influence, rather than a top-down model of influence. To recognise and give value to the ideas of children as active participants in learning is significant, as they are also part of the developing world. Schwartz (2019) builds on these ideas with reference to relational cultural theory (RCT) and connected teaching concepts where he draws attention to points of correspondence which begin to shift hierarchal models of 'power-over' to models of 'power-with'. This power shift focuses on power as a dynamic energy that emerges *between* interactions and places emphasis on cause/effect as mentioned previously, rather than the separation of cause and effect as previous dualisms have dictated. This does highlight a potential area of concern for power systems that do not wish to re-focus on this co-productive model, for example, the education policies in England (DfE ITT Market Review, 2021; CCF, 2019) as to do so releases an element of control and (apparent) certainty in favour of less control by governing bodies and more uncertainty. This could be a reason why some models of education in Britain still favour mechanistic and cognitivist models of learning that focus on standardisation of education and transmission of information and facts as a means of building knowledge in students (DfE England, 2021; Willingham, 2021; CCF, 2019; ITT reform England, 2021). This model differs dramatically to the embodied and situated learning experiences as supported by CfE (2010) and CfW (2015, 2022).

It is interesting to consider how Britain has become divided in its education systems as Scotland, Wales and England have begun to develop their learning systems in very different ways as a means to support 21st century learning in schools – a stark contrast to the mass standardisation of previous learning systems that supported mechanistic education in the 20th century. A reason for this departure from tradition could be due to the many routes of knowledge-making considered in 21st century learning as information has become dispersed and readily available through a range of technologies which impact and evolve behaviour and thinking very differently for each individual. It can be difficult to consider how each individual student might engage and react to particular influences and information in a learning experience. This paper offers one way (although there are many more) of considering how this might develop through engagement with arts practice as a means to materialise influences that co-construct lived-experience for each individual. This considers the arts on a phenomenological level – as a means of making visible *what and how* influences might impact an individual (Arnheim, 1997), rather than as a mimetic one as previously taught during the industrial era (Eisner, 2002). Therefore, a renewed and re-considered engagement with arts practice might equip teachers and students with a means of better understanding processes of co-construction and negotiation, as it can make visible these mutual points

of transaction which feed into developing learning experiences. This is an important element in understanding sustainability in education systems and developing awareness for effective engagement with lifelong learning.

'Where, when and who are you?' - rendering visible student situated positions with-the world through arts practice to inform pedagogic development

The arts have long been associated with culture and heritage, yet the value that the arts offer has often been mis-understood by politicians and policy makers in many previous reforms (Efland, 1990; Eisner, 2002). However, some countries, such as Wales, are beginning to engage much more with the use of arts in education as they can support relational understandings through their phenomenological rooting of knowledge comprehension and creation. In the Welsh education system this concept has been engaged with as a response to an independent report on the value of arts in positively impacting learning and cultural understanding in addition to skills required for economic growth required for contemporary living (Smith, 2013; Donaldson, 2015; Southern, 2019).

“The expressive arts provide opportunities to explore, refine, and communicate ideas, engaging thinking, imagination and senses creatively... Engagement with the expressive arts requires application, perseverance and close attention to detail, capacities that have benefits across learning more widely. In the review of *Arts in Education in the Schools of Wales* commissioned by the Welsh Government, Professor Dai Smith said powerfully, “It is clear ... that countries across the world recognise the significance and potential of the arts in enabling improved educational, social and economic outcomes.”(Professor Graham Donaldson, as cited by Welsh Government, 2015)

In Wales, during the development of the CfW (2015-2022), the Welsh government advocated several schemes that supported the involvement of the arts in 'creative learning' across schools to support well-being, the closing between attainment gaps, and the opening up of new possibilities for learning. All schemes involved collaboration between artists, teachers and students at varying degrees who worked together to develop learning through the arts. In *The Lead Creative Schools Scheme* (Welsh government, 2015-2020), practicing artists who participated were referred to as 'Creative agents' and were employed to work with teachers, children, and schools to improve teaching and learning experiences so that learners had more involvement and engagement in learning experiences, and to explore how creative making can lead to new ways of teaching and learning. For example, an artist would sign up to a creative network and would be selected by a school for a collaboration on a particular project. The teacher and practitioner would spend time with each group to help them develop and challenge their ideas (Arts Council for Wales, 2020).

In a project undertaken by a primary school in Swansea, the students worked with the local *Mission Gallery*, where there they learned about how to create an exhibition space for their artwork (Hwb, 2017). In this project, the students engaged with the work of an artist in the exhibition through the medium of clay. Comments from the children showed a deeper engagement with the learning experience; 'I have used clay before but never been as creative as that. That is because we were given clay to explore and make what we wanted...I found that there is always more than one way of looking at an object' (Hwb, 2017). By starting to engage in making-processes with artists and arts practitioners in the wider

community, a different type of engagement in learning is beginning to develop – a learning that is collaborative, process-driven rather than outcome based, and one that encourages a deeper, more visceral reflection. The report reviewing the scheme has been largely positive in relation to student engagement (Griffiths and Powel, 2020). However, despite many successes of schemes such as these, there have been tensions, particularly around the discourse of ‘creativity’ and what that might mean to governing bodies, artists, learners, and teachers (Southern, 2019; Griffiths and Powell, 2020). Southern (2019) highlights a tension found in one of the creative learning schemes “the message that ‘being creative is enough’ was not always accepted,... at times, there was a disconnect between the artists’ aims and the expectations of the school/staff”. This tension was also recognised in the report that reviewed the *Lead Creative Schools Scheme*, as one of the recommendations of the report suggests “further research into and exploration of the developing language surrounding creativity, creative learning, and teaching of the expressive arts amongst educational professionals” (Griffiths and Powel, 2020, p.117) is required for a wider and deeper engagement with schools and stakeholders. A deeper understanding of creative learning theory and a shared discourse for developing creative pedagogy are required to fully understand the extent to which creative learning can be embedded and utilised successfully by all teachers. One of the key understandings by artists across the schemes was that,

“Creativity was represented as an element of being human, rather than as a skill to be taught. It was explained that techniques could be learned, but that we are all creative, and this creativity can have other effects – on us as individuals and on our place within a group” (Southern, 2019).

It is important for schools to address this through a deeper comprehension of the philosophical underpinning of professional arts practice. The value of the arts works on a phenomenological model which is experiential and diverse. It opens up dialogue with the value and meaning-making for not only a culture or a society, but also for individual expression. The aesthetic element of the arts deals with the semiotics of value, attention, and an individuals’ specific way of engaging with the influences of the world. The tensions between professional arts practice and school education were a tension that I had already considered as an artist, educator, and PhD researcher, and as a means to directly address this issue, I conducted a case study workshop with trainee art teachers at a university in west England earlier this year (2022). It was important that the participants had both a suitable and developed knowledge of art practice but also an initial (but not overly-developed) understanding of educational theory, to support and inform developing ideas of learning. In the case study, we worked together to develop new pedagogic methods that emerged from creative making. The over-arching concept was to start a physical, tactile conversation that engaged with material but was purposefully imbued with their experiences. The workshop was informed by philosophy that underpins artistic-making for artists themselves (Klee, 1967; Malevich, 1968; Carter, 2004), in addition to a collaboration with suitable educational philosophy (Dewey, 2010; Piaget, 2013; Sterling, 2001; Jickling and Sterling, 2017) and a deeper anthropological comprehension between person and environment (Ingold, 2000; 2013). These influences developed my understanding of how lived-experience could be made visible via material engagement and making-processes which influenced my initial concepts for the workshop. With this in mind, I invited the trainee art teachers to engage in making-processes and conversations inspired by the work of Culpepper and Gauntlett (2021) and we used this process to engage in discussion and

reflections to purposefully develop ideas of how experiences might highlight different engagements and be used to foreground learning in and beyond classrooms. To begin, we started with discussions about lived-experience and how this creates layers of influence to us over time which impacts our engagement. This was made visible via personal cartographies where each trainee teacher manipulated a range of materials to manifest a 3-D map of their experience that day. McCarthy in Obrist (2014, p.6) states that;

“Maps are not copies; they are projections...Projections are not neutral, natural or ‘given’: they are constructed, configured, underpinned by various – and quite arbitrary conventions.”

During the mapping task in the case study workshop, it quickly became evident that linear time was difficult to quantify as the 3D maps became layered with a range of conceptual anchors that developed from memory, feeling and attention in that moment of negotiating the visibility of their experience with the material they were using. What started as a ‘simple map’, became a visceral tangle of influences that had perpetuated their becoming in that moment – fluid, messy, highly subjective, and emotionally charged. The mapping activity was undertaken to make visible the ecology of influences that perpetuated the cognitive development (and ‘becoming’) of the trainee art teachers. By drawing on arts practice, they were able to anchor their personal sign relations that emerged between thinking, doing and becoming. These maps were transversal rather than linear - they laid out the developing cognition of their minds, thus making visible any transactions with their wider engagement that had influenced (and still influences) their developing cognition. This mapping activity had created what can also be termed ‘relationscapes’ – a map of relations that perpetuate their becoming and by extension, the wider development of their relations such as society, peers, and the wider global context. The ecology of influences fed into concepts of sustainability, as thoughts became actions and actions became reflected upon as we discussed how these influences shape us, and how, by extension they shape others through our interactions and *intra-actions*. This is an important element in considering sustainability in education and the wider environment, particularly in relation to cognition. The maps created by the trainee art teachers do not tell us a clear journey that can be followed easily by another, instead, they offer a means of dialogue from which an individual’s experience can be discussed and better understood, therefore allowing better consideration of how we, as teachers, might engage and support a learner. They lay bare the semiotics of value and attention of the individual learner – an important element to consider if we are to cultivate effective and sustainable learning experiences for our students. This



Figure 1: Images from case study workshop with trainee art teachers (June 2022)

method offers a means of better understanding the situated position of the learner so that new pedagogies can materialise through co-constructed dialogue as the result of these cartographies.

Through working with the trainee art teachers and rendering visible their varied and individual creative negotiations with the world through arts practice, their thinking is made visible so that new concepts can develop from engagement with discussions as a result of this emergent process. This could lead to consideration for more sustainable pedagogies that consider these relational understandings or ecological '*relationscapes*' (Manning, 2012) which map the intra-actions that co-construct experience for the individual student, but also the wider society. If we consider the idea that 'Concepts are events in the making' (Manning, 2009, p.5), then by materialising these concepts through their situated relations, teachers can nurture new generations that are able to more consciously develop their thinking. This in turn promotes better awareness of *attending* to events (actions) with an ecological consideration, which could lead to more considered, co-constructed ways of thinking and becoming-together in a creative and diverse symphony of lived-experiences. De la Cadena and Blaser (2018, pp.3 - 6) expand on this idea by highlighting the variation in aesthetics that shape experience for each individual;



Figure 2: Images from case study workshop with trainee art teachers (June 2022)

“Many worlds are walked in the world. Many worlds are made. Many worlds make us...Inasmuch as knowledges are world-making practices, they tend to make the worlds they know.”

A means of understanding the dialogue that enfolds a diverse range of worlds is best placed to open up opportunities for different understandings from different peoples and children in particular to be communicated. This is important for developing sustainable pedagogical practice. This intimate partnership between *person and world* creates a dialogue from which life unfolds in a continual correspondence. Korn (2013) highlights that this highly personal and intimate relationship that each individual has with the world is core to all lived-experience as individuals navigate their way through experiences, drawn to different elements that co-create and enable the unfolding of each life as it is lived. In the case study that I referred to previously, this was discussed through the layering of experience via a range of materials on a map. Through engaging in the making-process, it promotes a holistic development where thoughts and actions progress together to develop the learner.

This method of ‘making’ could be more purposefully used in our classrooms to enable dialogue that is rooted in an understanding of how lived-experience impacts and develops cognition and therefore learning. The process of making can be understood as a process of *growth* (Ingold, 2013) and ‘With regard to perception, it underpins the distinction between the optical and a haptic relation to the world’ (Ingold, 2013, p.20), where the optical does not mean solely visual and haptic does not limit itself to the hands. The process of *making* is embodied and relational, allowing for the maker to manifest the influences of the world as they understand them. Ingold (2013) discusses a few examples of how when a maker creates an object in the world (a wicker basket, a clay pot or even a drawing) they render visible not only their influence on a material, but rather a network of transactions that become visible through working *with* a material. In the case study that I conducted, this same process made it possible to render visible the negotiations between the trainee art teacher and the network of transactions and intra-actions that also became visible through working with the materials. These other elements – the fingers and feeling of the maker, the pressure and resistance of a tool, the temperature of a room, the availability of the material; all co-create a narrative that make visible a network of influences that co-create experience for that individual. This is a very powerful method of communicating an individuals’ correspondence with the world. Each point of transaction (each story) is made visible – the story as to how and why the maker chose to use a particular material; the story of how that material came to be; the story of how the environment holds the potential for things to be made. These reflections can begin to start discussions on *how and why* we construct experience in the way that we do, and how we can reconsider different narratives that might lead to a more sustainable future for all. If we want to make a more sustainable, more equitable future, then we need to include more narratives of both the human and non-human elements that co-construct the world. We need to enable discussions with children, who are at the forefront of change, and through facilitating experiences whereby they have opportunity to render visible their personal interactions with the world. Through arts practice such as these, conceptual maps and cartographies of children can be engaged with as they have possibility and potential embedded in their making which can help us re-imagine, re-invent and re-consider our relationships with each other and the world at large.

Children and making: a process of making visible personal intra-actions that co-construct experience

When children make things, it is important to recognise that this renders visible their developing negotiation with the world (the intra-actions) as it is *unfolding*, this process perpetuating their developing perceptual experience and engagement with the world (Ingold, 2000; 2013). This concept is understood by phenomenology and models of enactive and embodied mind (Varela, Thompson and Rosch 2016; Thompson, 2007) which situate this experience not as an abstract process of disembodied mind (as many previous dualisms dictated), but as a visceral process of human becoming with the world. Through using artistic means of rendering experience visible via materialisation, the artist makes visible their situated cognition through engaging with materials and their body (Woodward, 2017). It provides a means for such individual to communicate how they understand and experience the world.

“Unlike the either/or approach of reductionist scientific inquiry, whereby boundaries are set for exclusion, artistic inquiry is led by questions and interventions that aim to produce ever-richer versions of reality.” (Burnard and Colucci-Gray, 2021)

This can then be used to stimulate a reflective discussion (Culpepper and Gauntlett, 2021) around what this might mean for the individual, and how this might be used to re-inform the direction of their cognition (or learning). This process, essentially creates a map or a cartography of an individuals' lived-experience and by using a range of artistic methods of production such as making and drawing, it produces an object, an artefact, which can then be used as a stimulus for unpicking and reflecting on the complex entanglements of the environments that co-construct cognition for that individual. Other examples building on the idea of arts practice as a method for this process can be seen through the work of Blaikie (2020), who terms this process as 'worlding'. Blaikie (2020, p.331) continues to expand on this process stating that

“Worlding refers to the felt materiality and materializing of affects, ideas, events, relationships, spaces, and places... Worlding is not static; it evokes unfolding awareness and transformations over time, organically and unpredictably, situated in porous and integrated ecologies of being, thinking, feeling, and creating, encompassing the textures and temporalities of places, affects, and material cultures.”

For Blaikie, this process involved a case study with teenagers, more specifically Danny and Opal, in a school in Canada where they engaged with narrative, images and discussion to make visible the layered experiences of the students. This enabled discussion points around shifting identity and belonging as the students reflected through the processes of making. She concluded with

“Worlding Danny is layered, multidirectional, and entangled. In our connections to and with one another, in our intersubjective being and “being with,” I was drawn to Danny's worlding of herself through our conversations, her art, and her poetry.” (Blaikie, 2020, p.343)

The thoughts and actions by the both the individual, situated learner and teacher can be reflected on and re-considered through this process, therefore allowing ideas and actions to be purposefully informed and changed. This transformative process is very powerful, particularly in relation to sustainability as it allows us to map out what we are perceptively engaged with (in and out of the

classroom) and how this has a co-constructive effect on how we impact the world and how the world impacts us. These ideas lead to questions to re-consider what we do and why – an important question at the heart of sustainable education practice as it considers more closely, the ecosystem that perpetuates the cognition (and becoming) of the learner.

Conclusion

Re-considering ‘progress’: shifting towards sustainability as education

Sustainable education systems are more than a desire to ‘go green’ or ‘save the planet’. They involve a developing understanding of the way in which processes interact ecologically and how the systems that perpetuate this lead to certain ways of living and becoming-with the world (Braidotti, 2019; Haraway, 2016) and these processes involve everyone and everything. These complicated processes are not easy to separate as we once thought during positivist eras, and are always contaminated by the continuous transaction between things. During the twentieth century, mechanistic industry shaped the way in which processes and systems were run, used and talked about (Efland, 1990). From the machine-like methods of factories to the mass schooling of children from the late 1800’s (Ball, 2017; Efland, 1990; The Education Act [UK], 1870). These structures were run on a hierarchal power model that flourished with a capitalist infrastructure leading to an acceleration of wealth and prosperity for Britain. Progress was understood to be something quantifiable and accumulative. However, we have since entered into a more complex environment as a result of such accelerated progress and globalisation from technological advancements that were birthed out of the rise in industry. These advancements dramatically changed how we live, think and act in the world – extending influence far beyond local consumption very quickly. New ways of living, being and understanding from across the world became accessible at the touch of a button, weaving new influences into the realities of those who perceptively engaged with them. ‘Progress’ has become more complicated, and our once successful systems have become less effective for dealing with problems that arise from such instability in the environment, such as mass illness (COVID19) and climate change. Previous Western models of knowledge production and comprehension have become outdated as dualistic paradigms cannot solve complex problems from a contemporary hyperconnected environment. There is an urgency that has been recognised by many (Haraway, 2016; Braidotti, 2013, 2019; Barad, 2007) as we grapple with new ways of understanding how to pivot, develop and re-consider what *progress* means in such a world.

Previous ways of thinking about progress and cognition have separated us from considering the reciprocal a/effect of other animals, people and influences leading to a thinking that has nurtured disconnection, isolation, and privilege. To develop what notions of progress might mean in an unstable environment, requires a shift in thinking and doing.

“This equates to replacing the old way of thinking, not only of increasing specialisation, but also of the mechanisation that caused separation amongst people (e.g., the designer and the artisan, the architect, and the maker) and between people and places.” (Burnard and Colucci-Gray, 2021)

To think differently, we need to learn differently, and to do this, we must re-consider the co-constructive elements of both experience and learning. One means of starting this process of re-consideration is

through developing co-constructive pedagogies that work-with children through a series of disruptive experiences to help us question what is and what might be. Disruptive experiences refer to means that allow us to open up learning spaces that ‘...unsettle the current disposition toward standardised ways of thinking...’ (Ruby and Christ in Bozalek, Braidotti, Shefer and Zembylas, 2018, p.135) - a necessary movement for re-considering possibilities of how mind might unfold to tell different narratives that are more beneficial to a sustainable future. ‘Humans are creators of new things which constantly change the ecology of our minds and re-shape the boundaries of our thinking’ (Malafouris in Siebeck, 2016, p.297). Malafouris highlights how this productive process can have a developmental a/effect on developing minds. By cultivating learning *with* children through creating such experiences, new ideas can materialise that allow us to reconsider how we think about things and the relation we have with them. By working-with children ‘the search for different ways of structuring the experience of knowing’ (Burnard and Colucci-Gray, 2021, p.14) can be actualised as we open ourselves to different ways of thinking-with and becoming-with the world as it develops. Discussions through worlding, from which both a mixture of storytelling and fact telling emerge, we can begin to understand ‘the patterning of possible worlds and possible times, materialsemiotic worlds, gone, here, and yet to come’(Haraway, 2016, p.31 as cited in Blaikie 2020, p.336). Through this, different pedagogy can emerge from which we could begin to consider how the young co-construct parts of the world, and maybe this can lead us to new possibilities that can support sustainability that have not yet been fully anticipated or realised.

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