

Technology and sustainability for/in early childhood education and care

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Abstract

Inspired by a posthuman philosophy, this paper explores sustainable natureculture kindergarten praxis as a pragmatic transcorporeal collective engagement with the present and sustainable future events to come. The point of departure is the economic argument for implementing science, technology, engineering and mathematics education within early childhood education and care as a preparation for the challenges a science- and technology-driven society brings at the forefront. By exploring and experimenting with dataphilosophy as our theory-method and the concept of non-position, we embrace and critique technology and technological solutions in connection with kindergarten praxis and steer them towards new forms of solidarity and socially just pedagogies. Through the article, we ask (in)directly what kind of subject position digitalization as part of a sustainable future requires, and the inevitable questions this subject position regarding professionalism within early childhood education and care brings.

Keywords

Digital technology, early childhood education and care, posthuman philosophy, dataphilosophy, sustainable natureculture kindergarten praxis, socially just pedagogies

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Introduction

The Anthropocene as the *geology of mankind* (Crutzen, 2002: 23) and *the epoch of knowledge* (Hovland Svensen et al., 2016: 82) is based on an assumption that human agency, technology and master plans will be able to gain control over the globe's unsustainable situation, both currently and for our future generations (Alaimo, 2016: 173). Education is highlighted as an important area towards a sustainable future (UNESCO, 2017; United Nations, 2015) and science, technology, engineering and mathematics (STEM) education has, as a result of the emphasis on scientific and technological solution to sustainability issues, been promoted as education's main way of addressing sustainability (Davis, 2012: 177). STEM education is here seen as a multidisciplinary approach that combines science, mathematics, engineering and technology in different combination, depending on the task to be solved (Martín-Páez et al., 2019: 800–801).

In this paper, we explore sustainable natureculture kindergarten praxis as a collective engagement with the present. Experimenting. Dataphilosophying. Speculating. Thinking philosophy, science and art together as common concerns with the possibility to open up to multiple fruitful questions (Reinertsen, 2018: 4). We position the human being as part of nature, living and existing on a planet together with, and as part of, a host of others, not capable by itself of preventing, repairing and reversing current and future planetary challenges – without simultaneously opening up to non-human affective productions.

Through the paper, the indescribable accident that caused the death of a one-year-old child while attending a kindergarten in Norway (Hagen and Madshus, 2019) follows us, but Crisostomo, in particular: *calling up on me, making me feel, think, shake, in anger and in pain*. Is it possible to sustain an event like this? Technology can't save a child by itself in a situation like this, but within our information age, can we afford not to investigate possibilities delivered from and by technological solutions? What kind of subject position does this require and how does this position affect the professionalism of a/the kindergarten teachers? As a way of staying with the trouble (Haraway, 2016) and asking multiple (fruitful) questions (Reinertsen, 2018: 4), Reinertsen explores the paradoxical non-position subject position and the underlying im/possibility of change.

Before we expand sustainable natureculture kindergarten praxis, a/the sustainable (post-human) subject and the professionalism of a/the kindergarten teacher this subject position questions, Crisostomo will present a/the child – my dataphilosophying – my affective becoming in connections with the death of a child under the care of the kindergarten staff. Reinertsen responds to Crisostomo's writings by exploring possibilities offered by smart technology and smart algorithms. Later in the article, we will explain more broadly our theory-method used in this article. For now, we can see it as a pragmatic transcorporeal collective engagement with the present towards solidarity and socially just pedagogies – for the child/the children and for our planetary common world.

A/the child, dataphilosophying and affective becoming – becoming transcorporeal

The death of a child under the care of the kindergarten staff, suffocated while sleeping. He was without supervision, left alone in a room (Hagen and Madshus, 2019) . . . I am looking for words, but I am struggling. How can I write this event? How can I approach this event? My mind and my

body, wishing for something else, wishing to escape, run away, close my eyes. Pain and sadness... and anger maybe. A lump in my throat is growing, hurting me. Tears are knocking, becoming. Making lines. A child is dead... a child that was supposed to be safe and taken care of... solidarity and socially just pedagogies... Is it (even) possible in a situation like this?

Oh, this makes me want more technology, smart technology, and smart algorithms! I want Artificial Intelligence (AI) with built-in machine-learning programmes and facial recognition. The child could have been saved because the alarm would go off, as the surveillance equipment would recognize fear and struggle in the child's face and one of the professionals would run to see what was wrong and save it!... I think of Irma again after some years (Reinertsen, 2016). She is still with me. When she came into a room in the kindergarten she worked in, the children would start playing... What did she know? What did she do? What was she? What did her professionalism consist of? What is her body? Mine? What is an algorithm? Mine? Professionalism? Mine? Non-position, subject position, change... Non-position, subject position... justice?

I do not know. I speculate. There are minor gestures in every movement. Irma's movements, mine... A minor gesture being, and building on Deleuze and Guattari's (2013) work on minor literature, 'the gestural force that opens experience to its potential variation, moving from within experience itself, activating a shift in tone, a difference in quality' (Manning, 2019). 'All becoming is minoritarian', Deleuze and Guattari write (2013: 123). Continual variations on experience. Open to flux. In variation is change, indeterminate. It is like when the colour of the trees changes during September and October. I do not know when but from green to yellow, red, brown, black... Movements of qualitative change. Every moment carrying its future... and a body defined by its capacities to affect and be affected (Massumi, 2019). My body. Irma's body... Body as profession.

In affect, we are never alone and it is not a personal feeling. We can explore affect through embodied relations to data, art, poetry, philosophy... dataphilosophying... turning my work on the non-position subject position into a transindividual, transcorporeal something. Something surprising and bewildering, not small, but not major, therefore neither culturally nor technologically appropriated.

I wonder about algorithms again and smart technology. I wonder about minor gestures and technology. Minor gestures, professionalism and technology... How far away is that? Is it at all possible? Could it be the additive threshold of human- or man-machine encounters, encounters or moments of non-position subject position man-machine collapse in which we can see both what a man or machine can and cannot do? Qualitative change and primary... A 'staying with the trouble' (Haraway, 2016), the knots of the virtual, affects and minor gestures related.

Sustainable praxis and a/the sustainable (posthuman) subject

The language of globalization has entered early childhood education and care (ECEC), where governments and business groups talk about the necessity of education meeting the needs of the global economy. An educational discourse focusing on educating students as part of the knowledge economy, with skills for the global workplace. This includes preparing the students for the challenges a science- and technology-driven society brings to the

forefront (Spring, 2008: 331, 337). In the Norwegian educational system, for example, STEM education has been highlighted as a central space towards a sustainable future, from early childhood and upwards. A focus directed towards a/the shift from polluting to climate-friendly solutions (Ministry of Education and Research, 2012: 2; 2015: 16).

While STEM approaches to education for sustainability emphasize knowledge constructions and problem solving, we argue that they do not sufficiently change attitudes, values and actions towards more sustainable ways of living (Davis, 2012: 1). We acknowledge that technology plays an important role in education for sustainability, while at the same time we point towards the necessity of including a wider ecological understanding where life cannot be achieved through technological solutions alone (Smith and Watson, 2019: 2). Sustainability approached through technical fixes to environmental problems employs also, from a posthuman point of view, a sense of distance. A distance between the human being as the expert, the problem solver, the engineer, the rational, calculating entity who stands outside the material processes – constructing the world – and the planetary world the human being is a part of (Alaimo, 2016: 32).

Hartley (2017) argues for combining and melding human and machine strengths to ensure that technology is harnessed to serve us rather than rule us:

The greatest threat is not technology; it is our prioritizations of technology at the expense of other subjects, the liberal arts, and how we ask the big questions so that our tools are put to good use. We must nourish technology, not through exaltation, but by bringing to its development and application the diversity of thought. (Hartley, 2017: 108)

We take the concept of other subjects further, liberal arts diffracted, the art of not knowing and natureculture indivisibility. Asking big questions about technology and sustainability simultaneously and molecularly inter/intraconnected. We try to think with more than, more than human, more than thought, more than diversity of thought. We try to think with non-positioned subjects, non-positioned subjectivity, the necessary subjectivity when merging the fuzzy with the techie (Hartley, 2017: 30). It involves hard questions about the nature of change.

Sustainability for/in ECEC is, within this paper, therefore explored as sustainable natureculture kindergarten praxis. Sustainable natureculture kindergarten praxis where ‘sustainability’ stands for a (re)grounding of the subject in a materially embedded sense of responsibility and ethical accountability for the environment she/he inhabits (Braidotti, 2006: 137). A pragmatic transcorporeal engagement with the actual/virtual present, in order to collectively construct conditions that empower our capacity to act ethically and produce sustainable futures (Braidotti, 2019: 173). To engage, critique and confirm insecurity, disagreements, dilemmas and paradoxes for/as a pedagogy of social justice in the present, in relations with and as a part of a sustainable future (Reinertsen, 2015: 623). A non-position as a way of including and thinking with, rather than as acting from, the outside of the material processes.

Non-position, subject position and change. The non-position builds on the Deleuze and Guattarian model of noology as a matrix of intensity (2013: 580) to avoid objectifying encounters with the other and pre-conceptualizations and opinion, paradoxically through residing in the subjective. Subjectivity and the subject position is therefore the key to objectivity through affect, professionalism about embodied mindsets and dataphilosophical orientations, ultimately, and again, the necessity of subjectivity. Change is therefore not the

change of the individual subject from one state to another. Rather, it is about ‘giving to the world the power to change us, to “force” our thinking’ (Stengers, 2008: 57). The way I see this, the concept of minor gestures possibilizes a going beyond habitual thought and opens up different potentialities of orientations and forceful thinking. The minor is interwoven with the major. Read here as technology and/or STEM. Neither the minor nor the major are however fixed in advance, but the major is a structural tendency that organizes itself according to predetermined definitions of value. The minor works the major from within as a force that courses through it, unmooring its structural integrity, problematizing its normative standards (Manning, 2019). It is in a minoritarian tendency that the subtle shift of change is conditioned, immanent to the in-act, rhythmically inventing its own pulse (Manning, 2019). The minor might create newness, new forms of existence, always-new becomings already there. I wait.

To explore boundaries, our thresholds of sustainability – sustainable natureculture kindergarten praxis – we must experiment. Experiment as actively creating encounters that are likely to increase active becoming for sustainable transformation and changes. Create, experiment, add something, relate (*difference*) elements together (Deleuze, 1995: 139) – and virtual intensities will emerge and actualize themselves for us, affecting us. Dataphilosophy as a theory-method, which we will explore in the next part of the article, opens up to affirmative ethics and knowledge constructions. A minor research and educational language where the (main) object is to engage, for changes and for social justice (Reinertsen, 2015: 623). Engage in challenges a science- and technology-driven society brings to the forefront (Tippett and Milford, 2017: 83), where boundaries between human and technological substitutes are being challenged as much of the information, knowledge and thinking power are being produced and situated outside of the human mind, embodied in an anthropomorphic frame (Braidotti, 2019: 14). If a/the technological solution is able to recognize fear and struggle based on a child’s facial expression, how will it affect the professionals in their everyday moments? If the professionals have to monitor a screen to keep track of a/the potential warning signal from the smart technology and smart algorithms, will it still benefit the children and their everyday moments?

Speculating. Connecting my body, my attention . . . to the screen. To a/the sound of a (potential) ping. Being ready for acting, being ready for a necessary quick response . . . if the ping is a reality. Constantly connecting my attention to the screen. Dear child, I am here, watching you, caring for you, listening to what you are telling me. Listening and but maybe not . . . Dear child, there is nowhere else I would rather be, but when the ping . . . I am here (and/but maybe . . . not . . .)

Dataphilosophy as a/the theory-method for sustainable future events to come

A child in the dark, gripped with fear, comforts himself by singing under his breath. He walks and halts to his song. Lost, he takes shelter, or orients himself with his little song as best as he can [. . .] But the song itself is already a skip: it jumps from chaos to the beginnings of order in chaos and is in danger of breaking apart at any moment. (Deleuze and Guattari, 2013: 362)

Methods are performative. They help produce realities, have political implications and are never purely technical or innocent (Law, 2004: 143). Within this article, thinking with theory is our postqualitative theory-method, helping us create knowledge constructions for socially just pedagogies in and for sustainable natureculture kindergarten praxis and sustainable future events to come. A thinking tool (Deleuze in Foucault and Deleuze, 1977: 208) in relations with the death of a child, our data, as vibrant presence and the affect produced with and through our researcher bodies (Denzin, 2017: 91). Exploring boundaries and thresholds of sustainability, where the potential for sustainable changes is located in the duration of the daily life events within ECEC, and in the language we use for thinking and communicating (Deleuze, 1992: 213). Is it possible to sustain the death of a child under the care of the kindergarten staff? Is it possible to reassure parents that this accident should not have happened? Do we rely too heavily on the potential of [new] technological solutions, in changes towards a sustainable future?

Within this article, we think with the philosophy of Deleuze and Guattari (2013: 362) as a way of providing protection, while at the same time critical engaging to make ourselves unsafe towards changes and socially just pedagogies. Thinking with and from a non-position subject position to include and embrace difference. Vulnerable and creative processes as a way of staying with the trouble, where learning to be truly present is a necessity. *Dear child, I am here (... until the ping goes off). Connecting ... to what, where, when? Am I here?* Thinking with microbes, plants, animals, humans and technology. Our researchers bodies, entwined and as part of a myriad of unfinished configurations of places, time, matters, meanings (Haraway, 2016: 1). Folding and twisting, affect and being affected as a transversal transcorporeal subject-in-process, exploring and experimenting – dataphilosophy – towards boundaries and thresholds of sustainability. Outlining a centre *in the dark*, creating a circle around the centre *at home* and opening up the circle *towards the world*. Intertwined and constantly moving, producing, becoming (Ingala, 2018: 191–193). A minor research and educational language, where everything is political and takes on collective values from within, able to treat and develop its contents (Deleuze and Guattari, 1986: 16–19). Where are the borders of how much a/my body can take – without folding apart? What kind of knowledge constructions is it possible to produce as a transversal transcorporeal subject intertwined in the world, collectively engaging with the present and sustainable future events to come? Becoming technology, becoming technological me?

Becoming technological me ... and/or technology mediating you ... Making you ... through technology. Dear child, I am here, caring, watching, listening ... through technology. Becoming technological you. Dear child, I am here ...?

Technology as (the global world's) sustainability solutions for the future

We stand on the brink of a technological revolution, a transformation unlike anything we have experienced before (Schwab, 2015). Digitalization and computers will replace routine jobs and the most valuable resources for the future will be people with the ability to create new ideas and innovation (Xu et al., 2018: 93). STEM and STEM education are promoted as key contributors to an environmentally sustainable future, while also being contested as a

support for a continued technology-mediated economic growth (Smith and Watson, 2019: 1–2). Thinking with and from a non-position subject position, embracing and criticizing technology and technological solutions in connection with kindergarten praxis, is where I think we need to go. An intergenerational solidarity and socially just pedagogies in and for a sustainable future; for the children and for our common planetary world.

Non-position, subject position and change. For me this is ultimately about an art of not knowing and showing waiting. We are preoccupied with knowledge and facts to build on for sustainability and change. We also talk of knowledge-based and knowledge-informed learning and sustainability. Further, that our actions and technologies must be knowledge-infused. All good, but I actually claim that reaching our goals might be dependent on the opposite; dependent on opening up to the art of not knowing, the non-position as including knowledge, change and learning activism shown through waiting. It is a nomadic waiting opening up to the potentiality of every moment, minor gestures with/in affects, hard to see and measure.

Ultimately, this is about politics. Affect as a political question about the im/possible imperceptible richness of the present. Moving to another level of bodily capacitation. Minor politics in major politics for sustainability. Subjective professionalisms as opening up to the intuition of the world. I think of Irma again: when she enters the room. I think she would never give away her subjectivity to a surveillance camera... Children know affect. They play.

I sit there in my chair thinking/reading/writing. It is rather late in the evening. The house is quiet. Just a couple of cars driving past disturb the silence. Suddenly my son stands in the door with his red and green hammer in his hand. He sleeps with it. He just stands there. I just sit there. He says, what is the meaning of a table, a book, a hammer, a car, a night, a bed, a moon, a toothbrush?

'All becoming is minoritarian', Deleuze and Guattari wrote (2013: 123). Becoming woman, becoming animal, becoming technology, becoming professional, becoming child...

The art of not knowing and the im/possible imperceptible richness of the present

Digital technology is already a part of young children's lives (Mantilla and Edwards, 2019: 11) and children, with their whole lives in front of them, are already more dependent on a sustainable future than adults. STEM and STEM education, with the purpose of preparing students for a hypermodern, techno-optimist, competitive global future, have an obvious economic argument even within ECEC. Not just for children who will seek future careers in STEM-related fields, but also as a preparation for the population in general towards facing the challenges of a science- and technology-driven society (Smith and Watson, 2019: 6; Tippett and Milford, 2017: 83). When we know that digitalization and computers most likely will replace routine jobs and the ability to create new ideas and innovation most likely is what is required of the children in the future, what kind of education do we need to provide for our children? What kind of subject position does this require for professionals in ECEC in how they cooperate with – and care for – the children?

Sustainable natureculture kindergarten praxis as a transcorporeal grounded and embedded subject. Experimenting. Engaging the actual/virtual present. Giving the world the power to change me,

while at the same time having the power to act ethically for sustainable future events to come. Future events to come... The death of a child is not possible to undo, redo. I feel, shake, anger and pain... Criticism and blame sounds easier. Engaging demands, making me think, become and change. I do not know. I do not have the answers. I can ask questions. Speculate. Engage. Act. Outlining a centre in the dark, creating a home and opening the home towards the world. Intertwined. Moving, producing, becoming. A fly is whirring around my head, my ears. Making sounds. Landing on the top of my head, my arm. My hands are waving... (inter/intra)acting. Becoming with the world. Becoming child with. Avoiding instrumentalist education. Trying. Avoiding education from a distance. Trying. Sustainable natureculture kindergarten praxis as a transcorporeal grounded and embedded subject. Dear child, I am here. Embodied and embedded, trying – again and again. Exploring. Experimenting. Thinking with and as part of the world. Exploring complexity. Experimenting with complexity. Asking complexity questions. Speculating maybe. Reading. Thinking. Becoming sustainable. Becoming world.

The concept of the Anthropocene, based on an assumption that human agency, technology and master plans will be able to gain control over the earth's unsustainable situation, employs a distance between the human and the planetary world. An absurd distance as the humans' unintentional activity, and its interactions with other forces, has the possibility to outpace even the best-laid plans (Alaimo, 2016: 173). The more or less clear boundaries between humans and technological substitutes within our information age are also, from a posthuman point of view, being challenged as much of the information, knowledge and thinking power are being produced and situated outside of the human mind, embodied in an anthropomorphic frame (Braidotti, 2019: 14). Social humanoid robots are, for example, able to recognize faces and basic human emotions and interact with humans through conversations (see <https://www.softbankrobotics.com/emea/en/pepper>), sing duets with a human being (see <https://www.youtube.com/watch?v=G-zyTlZQYpE>), express emotions, understand humans and build trust with people (see <https://www.youtube.com/watch?v=gWxRLA2BWkw>). A digital intelligent personal assistant can respond to your questions, send your messages and show you content and information that you might need based on your location, time of day and routines (see <https://support.apple.com/en-us/HT205184>). Technological substitutes as improvements of the human body (see <https://www.youtube.com/watch?v=AxyIHjd3PBg>) are also examples that represents the difficulties in sketching up clear boundaries between humans and technology – and between who the constructor is and what the constructor constructs.

The technological achievements made by humans are amazing, while at the same time scary. How can we both use new innovative technologies in ways that will benefit Planet Earth while at the same time ask critical questions about the prizes that comes along with the transformations – and for whom?

Living with smart algorithms. Inter/intra acting. Algorithms that can learn from humans, becoming active parts of our lives, of our kindergarten praxis. I am typing, writing about an event that took place in the kindergarten. Writing about what we did. Posting pictures of the children's backs while walking among trees. Posting pictures of the anthill; the biggest anthill we had ever seen. Posting pictures: how can we measure the anthill using sticks as a measuring tool? How do the ants live? Who are they, the ants? What do they look like? What do they like to eat? Do they go to the toilet? Reading online, children and staff. Seeking information, children and staff. Asking questions. Seeking. Searching online. Producing technological traces, circulating. Posting something.

Learning me – learning us. Me/us becoming data. Me/us becoming technology. Hi ‘technological me/us’. Have we met before? Speculating on sustainable future events to come. Affectivity as a/the ethical force aiming at increasing transcorporeal complexity relations; affect and be affected.

Fuzzies like us and our role

Algorithms are already ubiquitous, and they’re changing nearly every aspects of our lives, from how we search the web, to how autocorrect alters our text, to how we navigate with GPS and use our phones to take and send pictures [. . .] The point is not that they are dangerous; it’s that they must be developed with a sensitivity and depth of understanding about how they can best serve our needs. And that’s where fuzzies are playing a major role. (Hartley, 2017: 103)

In his book *The Fuzzy and the Techie: Why the Liberal Arts Will Rule the Digital World*, Hartley (2017) relates techie with STEM, the fuzzy with the liberal arts. Being more fuzzy than techie, we (in)directly therefore try to contribute to realizing visions about how the power of algorithms could be applied to serve sustainability, our pedagogical practices, ultimately justice through dataphilosophizing and affect. Contributing hopefully to building products with insights from the study of human and more-than-human nature. We think fuzzies like us tell the most compelling stories. Telling stories about the necessity of technologies making us lean on each other. Dataphilosophy to expand the inquiring mind. The im/possibility of change and the necessity of subjectivity. The necessity of subjectivities of the likes of Irma. When she enters a room, the children start to play. Our primary role is showing waiting. Never giving up. The type of change we speak of is minor, imperceptible but vital. Come natureculture fuzzytechie.

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