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The gut as teacher: Learning from our bodies

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Abstract

This paper reports on a short course for working class people, in Cape Town, South Africa. It outlines how a 'gut pedagogy', that is, a practice of teaching through the body that takes the digestive system as 'teacher', is the starting point for 'reading the world'. The journey of food as life and energy-giving substances from the world, through the body, back into the world, illustrates how systems are entangled with each other. The gut pedagogy is deliberately centred within a part of the body that mediates between inside and outside, yet is rarely spoken about. The practice is rooted firmly within feminist popular education that re-connects what has been separated – body and mind, humans and more-than-humans, the gut and the brain. Feminist practice respects and surfaces different ways of knowing, both rational and gut instinct. The paper shows that we can learn from our bodies, if we listen: about health, about the interconnectedness of all life, about the need to respect life and work together to maintain our planet.

Keywords: gut, ecofeminism, popular education, systems, interconnectedness

Introduction

'You can't trust anyone. We no longer have community!'(Margo September, 15 April, 2024). This was the comment of a course participant in response to a socio-drama depicting dishonesty and theft in a poor community, performed by others in her class. The play was in response to the question 'what big concerns do you have about starting your small enterprise?' as part of a skills training course that focused on 'reading the world'. Within their homes, people are evermore asked to juggle the demands of everyday survival, confronted with too little of everything, from nutritious food to energy, water and cash (Joubert, 2018). When they step outside, safety and security are threatened by gang violence, drugged youth desperate for the next 'hit', and jealousy and gossip that

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thrives on others' misery. Women and youth, in particular, are targets, as neighbourhoods are described as war-zones. This is the context in which we run adult education classes for working class people in poor areas of Cape Town, South Africa, where the unemployment rate reaches 40 % and more, in some areas.

Communities that are torn apart do not respect life. In *Down to Earth,* Latour (2018) had warned about the perversity of modernity that:

> by ridiculing the notion of tradition as archaic, it precluded any form of transmission, inheritance, or revival, and thus of transformation – in short of engendering. And this is true for the education of human offspring as well as for landscapes, animals, governments, or divinities. (Latour, 2018, p. 88)

Women's relations to nature as a source of nutrition and nurture hold important lessons towards survival of the planet (Kothari et al., 2019; Lange, 2023). Other ways of knowing, including the deleted and excluded knowledges of colonized indigenous peoples, as a source of wisdom for living sustainably in and with nature, are forgotten or dismissed (Brody, 2000). Part of such knowledges is the recognition that, like animals, we live in a body – and bodies have needs that can only be met if they are fed nutritiously and are maintained healthily. Challenger (2021) insists people need to become fully embodied animals:

> Problems flow from the notion that we are split between a superior human half, and the inferior, mortal body of an animal. In short, we have come to believe that our bodies and their feelings are a lesser kind of existence. (Challenger, 2021, p. 21)

If bodies are denied, abdomens are totally excluded. In Western culture, social taboos have prohibited conversations about 'the downstairs' of bodies. The most neglected part of our bodies is the abdomen – in particular, women's pelvic area, and the digestive system. A cartoon illustrates this well: A doctor sits behind a desk, asking his woman patient: 'have you been examined downstairs?'. She responds promptly, 'no, I came straight up'. Women have not been encouraged to get to know their 'downstairs' and, in our context, are generally uncomfortable to speak about 'their private parts'. As Barnacle (2009, p. 23) says, 'The body has tended to have a pejorative status within western thought. This is due, not in small part, to an ongoing association with the female gender.' The multitude of words invented to refer to both sexual organs and excrement rather than naming them, are testimony to this discomfort.

This paper is a critical reflection on attempts to develop a practice of teaching through the body with the gut / intestinal system as teacher. Learning from the gut offers an introduction to the workings of a system, exemplary for the intricate interconnectedness of all systems. The 'gut pedagogy' was a gateway to 'reading the world' (Freire, 1972) to both find and make a place in it, and ways in which individuals can collectively make changes towards a mutually beneficial and sustainable alternative. The underlying strong message, practiced in this learning process, is that reciprocal respect and cooperation are essential to survival – both in terms of our health and that of the planet.

The paper begins with an outline of the various points of entry to working with/through the gut. It situates the 'gut pedagogy' firmly within feminist popular education as an embodied practice of teaching that respects and surfaces different ways of knowing, including paying attention to gut instincts. It then moves to a brief description of an adult education skills training course that was the context of teaching working class women and men to 'read the world' as a crucial part of learning a skill. This is followed by a case study of teaching through the gut, which I refer to as 'gut pedagogy'. The

relation of brain and gut is reflected in the interplay of rational discourse and emotional knowing within the material body. The journey of food as energy-giving substances through the body illustrates the interconnectedness of different parts of a system. The discussion leads to what Andreotti (Decolonial Futures Collective, 2023) calls 'probiotic education' – an education that enriches understandings of the world, akin to probiotics strengthening and supporting the microbiome in the gut.

From experience to idea: the making of a pedagogy

There were various routes into teaching through the gut and the making of the pedagogy. In the past, I have been involved in various education programmes on nutrition and health with mainly rural and working-class women. This work had inducted me into the importance of food production, preparation and consumption, and the impact of so-called development programmes that promote endless growth in line with economic imperatives, to the peril of local practices. Working in education with often multiply traumatised people, the idea of introducing a health component focused on both mental health and the physical body was inviting. If treated with respect, the gut sustains life in the same way as nature sustains the habitats of living beings. As an extremely sensitive organ, the gut system recoils from violence and stress and from eating habits that offer no nourishment - much in the same way as ecological systems respond to violence and trauma that damage its interconnected pathways and mycelial relations of support and care. 'Health is a continuum from the biodiversity in the soil, of our plants and in our gut microbiome' (Shiva, 2021, p. 13).

The digestive system is at the centre of energy production and overall health. It suggested itself as an interesting interdisciplinary entry point into dialogue on binaries, the politics of interrelated systems, including ecosystems, on gender and inequality, on the challenge to overcome all kinds of separations. Reading Enders' (2015), *Gut. The inside story of our bodies most underrated organ* introduced me to the fascinating story of life within the body and the fact that people only take note of their guts when they have a strong 'gut feeling', mostly dismissed as unreliable, or if they have digestive trouble. The division into rational knowledge associated with the brain (and men), and intuitive knowledge communicated by the gut (ascribed to women) became symptomatic of binary thinking. As a feminist educator I build on the belief that the subject of knowledge is never just an individual in some abstract context, but always an individual in a particular social situation within broader dynamics.

The strong relations between gut and brain, physical and mental health hold many epistemological and ontological lessons. The life and death of trillions of microbes within the digestive system keep us in good health or sickness and provide us with the energy to act. Thus, I thought that the gut might offer an illustration of the way we currently produce and consume to sustain or threaten life and living – both ours, and that of the planet in times of heightened risk. This raised the question: How could we use the 'gut' as an analytical tool to learn to 'read the world'?

Previously, Shirley Walters and I had suggested 'that the elements that need to be interrogated through praxis in an ecofeminist curriculum are those which relate to participants' lives in immediate ways, like food security and water.' (Walters & von Kotze, 2021) Current processes of food production and consumption, especially in vulnerable regions, are unsustainable and impact the health of people as much as the land. We proposed that focusing on what we eat and drink, food systems and food insecurity, nutritional health and hunger would be a good starting point for radical popular education, as the biggest impact of the climate crisis is and will be on agricultural and food systems,

(von Kotze & Walters, 2023; Intergovernmental Panel on Climate Change, 2022). Our suggestion was reinforced by Cock (2007) and Ghosh (2024) who pointed out that beginning with what people know from their daily lives can light a spark about climate justice easier than talking about 'carbon emissions'. The idea of building a learning session on the gut system was born.

Theoretical framework

The theoretical roots of this pedagogy are twofold: firstly, radical feminist popular education, secondly, ecofeminism. Both have the common denominator of an explicit material rooting, working from the premise that learning and knowledge production is embodied, as in 'My gut feeling is that…', 'I feel gutted that…or 'I feel gutsy enough to try this out!'.

Firstly, radical or popular education, as I use the term, is underpinned by the principles that it is rooted in the real interests and struggles of people, overtly political and critical of the status quo, and committed to radical systemic change (Martin, 1999). This is education for social mobilization, rather than social mobility (von Kotze et al., 2016) and it addresses the collective, rather than the individual. In this process, dialogue is the foundation for both learning and knowing. It is also the means to unearth or resurface other knowledges, including indigenous knowledge. Building consciousness is a process of re-knowing, that is, going back to something prior, an existing awareness, and re-experiencing it a-new. For this to happen, the social relations of power in the room are altered towards respectful subject to subject relations and a deliberate and purposeful commitment to interdependence and reciprocity as values and outcomes. The action component of praxis is 'inbuilt' into the process of learning. The 'really useful knowledge' grows out of participants' everyday struggles to meet life needs and protect the integrity of ethical reproductive work. It is created when individuals and groups begin to reflect upon their experience with each other in ways that lead to greater insight and understanding, and gets linked to action strategies for bringing about changes (Thompson, 2000).

Drawing on Freire's *Pedagogy of the Oppressed* (Freire, 1972) especially the production and use of 'codes' as starting points for learning 'to read the world', radical feminist popular education (FPE) begins with the here and now of people and conditions, rather than abstracting from the contradictions and tensions that confront them. FPE embraces the physical body as part of the knowing, meaning-making subject. Matter itself actively shapes and interacts with the world.

FPE includes a long history of the discourse on the body. Michelson (1998) sought to reconnect the dis-membered body to 'knowledge as a product of corporeally and emotionally grounded human life' (p. 217). The split between body and mind, in which the inferior body is dis-membered, severed from the superior mind, reduces people to just thinking beings is a notion that elevates 'rational' humans above 'instinctual' animals. Like Rich (1976), Michelson names the victory of male institutionalised medicine over female traditions of community-based healing as an example of an explicit power move on the (female) body as a site of knowledge. Physically, the body is always clearly located within specific tensions, contradictions and dynamics of space and time. And so, 'the act of remembering mind and body is always also an act of self-location in a world in which knowing subjects are real human beings and in which each of us has important things at stake in the creation of one kind of world rather than another' (Michelson, 1998, p. 229). In her study *Gender, Experience and Knowledge* (2015), Michelson argued clearly how:

> In its insistence that all knowledge is rooted in concrete, historical subject positions, feminist theory, in effect, has feminised the human knower, re-grounding authority in experience and positioning partiality and locatedness rather than abstract universality as the basis for credible knowledge claims. (Michelson, 2015, p. 59)

Mind, body and senses – what we called the head, hand and heart – work together to receive and make sense of messages; knowledge is contextual and embodied. Education often takes place under precarious conditions, as a 'pedagogy of contingency' (von Kotze, 2013), that is, a pedagogy that disrupts the notion of continuity and stability as it is constantly produced and re-produced in relation to changing dynamics. Like the economy in which it operates, it is open to the unforeseen emergence of what might happen and so it seeks to respond assertively to the conditions that people seek to improve or change. Curricula that become in the here and now of particular circumstances, could be described as contingent in that they respond to high-risk dynamics. Working with groups of working class women whose livelihood insecurities and threats of gender-based violence dictate flexible education sessions, take place in available spaces and places not specifically defined as educational, rely on cheap, available resources, and are often innovative and creative.

Secondly, Readings on ecofeminism and the separation of nature from humans, as theorised by Lange (2023) and Salleh (2017) were important markers in developing the gut pedagogy. Salleh's materialist ecofeminism is compelling, as she combines a 'feminist, decolonial and socialist response to the 21st century ecological breakdown' (Salleh, 2017). Salleh (as cited in in Moreno, 2023) does not believe crises can be addressed without also rejecting capitalism and if you look underneath capitalism, you find patriarchy:

> In the patriarchal-colonial-capitalist system the originary and most ancient form of power is men's domination over women. Then comes colonization invading the land and taking the resources of other peoples. Finally, the capitalist economic form emerges from colonization and is relatively modern, only a few hundred years old. It is important to see these three systems as concurrent, entangled and mutually reinforcing systems. Capitalism itself would not work without patriarchal energies driving it. These energies are learned and embodied in men and acted out in social and economic practices. Looking at the three systems, each has several levels – from the unconscious to everyday actions, to political structures, to ideology. (Moreno, 2023, para. 10)

While the discourse on the body continues to proliferate in feminist inquiry, the body itself is rarely afforded more than a very limited agency. Writing about 'gut instinct', Barnacle (2009) points out that:

> The gut, like the psychological sphere, interacts directly with the outside world: the former in the formation of relations with others, and through that the self, and the latter as a canal that passes all the way through the body, from mouth to anus, in the ingestion, digestion and excretion of food. The gut is actually an exterior passage through the body, allowing the outside world to literally pass right through us. The role of the gut in mediating between inside and outside parallels that of the psyche. But whereas we think of the psyche as dynamically involved in the development and maintenance of one's relations with others and the world, the gut rarely gets attributed such a role. (Barnacle, 2009, p. 25)

This relationship between body and world, reflected in the interaction between human/animal and the dynamics and pressures of material social, economic, political reality, suggests that the gut is actively engaged with the world, physically and psychologically. The exact nature of this interaction in the process of knowledge construction would make a fascinating study, that goes beyond this article. However,

Barnacle (2009) draws attention to how teaching and learning through the gut can speak to an embodied way of knowing that is intersectional, drawing on health sciences, ecological studies, educational theory, in particular popular education, and ecofeminism.

Pedagogy, as the practice of teaching, and curriculum reflect each other, as they often do in radical FPE. The 'gut pedagogy' is an emergent curriculum, focused on the functions and workings of the gut as a primary source of learning, while drawing parallels to other systems. There is a coherence between the what and the how of the pedagogy, strongly informed by purpose.

Case study: learning to read the world

The following is a short case study of the emergence of the 'gut pedagogy' in action. I present this case study as an embedded activist facilitator, testing the idea of the 'gut pedagogy' in the context of a short course for unemployed working class people in a poor area of Cape Town. I offer a thick description of experimentation with the process and include the voices of participants as they reflected on their experience. This course ended with reflective reviews involving participants, and the production of mind-maps that situate the gut pedagogy within the context of other socio-economic, political themes. This was followed by group interviews with participants and my co-facilitator, Vanessa Reynolds, the coordinator of the hosting organisation.

Context

Many doors lead off the central space on the first floor of an old building in the economic heartland of a working-class area. It is rented by The Women's Circle (TWC), a women's NGO that operates in different townships of Cape Town. The doors lead to various rooms used for small enterprises, namely hairdressing / nailcare, sewing, handiman/handiwomen and T-shirt design. A cook and baker in the kitchen prepares nutritious food at low cost. There are numerous small tables and chairs arranged in the multi-purpose space. TWC has taken great care to make the space homely – the women who come here must feel safe and supported, as this is a shelter, a place for multiple learnings, conviviality, togetherness. It is a collection point for / of courageous women who refuse to submit to poverty and misery, and a 'rehearsal' space for practicing building relationships towards collective action.

'Reading the world' is a 10 week course of two hours each, repeated for three groups, to accompany a 3 month skills training project attended by selected women and men who hope to embark on self-employment enterprises. Taking our cue from Paulo Freire, we have named the course 'Reading the World', to clearly indicate the purpose: to critically examine the power dynamics and interests that direct socio-economic interests, pressures and contradictions. For example, tracing fashions back to their origins further afield and charting competitive initiatives within neighbourhoods may avert embarking on business directions that are doomed to fail. Importantly, course participants are invited to make sense of the interconnectedness of institutions and systems. In the process of analysing existing and potential risks, participants relate these to broader interests and consider how 'power with' through cooperative initiatives may strengthen their proposed enterprises.
Each day, there are 16 people, a mix of old and young, women and men, isiXhosa and Afrikaans speaking. The majority are women some of whom live in a woman's shelter and feel shy to interact with others. Many are on medication for depression or mental disorder. All share a history of traumatic experiences due to the legacies of Apartheid, unemployment and poverty, local socio-political strife, gender-based violence and gang

related territorial wars. What brings them together is the desire to learn one or more of the skills on offer, and to start a self-employment project.

From the start, we emphasise cooperation, and fun. Transitive solidarity, as defined by Gaztambide-Fernandez (2012) denotes people entering a relationship of active engagement with others to achieve a set aim. It is as important for people to build bonds of trust and to support each other, as it is to generate a feeling of being part-of, of belonging. 'Reading the world' has the explicit aim to connect participants in order to forge transitive solidarity in what is perceived to be a hostile world. Laughter is a great way to break the tensions that participants bring with them, and physical exercises, games and various small performances create a playful atmosphere. Risk-taking as learners is encouraged as much as safe keeping, and TWC facilitators attempt to take care of both.

The first session is introductory: to begin to establish a basis of trust and cooperation and to signal the very participatory nature of the course. Trust building is not a linear process but takes time and each session will include explicit exercises and reflections. The second asks participants to situate themselves in their communities: they draw 'mobility maps' of their neighbourhoods and identify 'hubs' of particular activities, threats and risks and social services. The third session is focused on the gut, where we 'map' the route of food from the outside through the body, and back outside and study the microbiome, as described below. This session is followed by tracing and comparing the commercial food system with food sovereignty through community gardens. Fifth: Communication skills, involves various forms of respectfully interacting with others, by including considerations of culture, language, gender. Basic research skills, problem-posing and analytical skills make up the rest of the course. All the way through, insights are related to and made relevant for the hairdressing, sewing and handiwork courses. Explorations of power, gender, class are woven through, as are repeated references to the gut as a micro-ecological system exemplary of other systems. In the final session participants collectively produce mind-maps that illustrate how they have made sense of the course and relate the different components to each other and the skills training.

What follows is a detailed description of the process of the 'gut system' session. I have included discussion points and interpretations as they are an inseparable part of the gut pedagogy itself: this is not a lecturing process, but a weaving of action and reflection. There is a constant learning spiral of questioning what happened (What?), interpreting and making sense of it (So what?), possibly adding information to deepen the examination, and drawing tentative conclusions towards action (Now what?).

Gut pedagogy in action

What:

I announce the day's topic: 'the gut' and ask for translations into other languages represented in the room. I acknowledge the uneasiness and unfamiliarity of exploring something situated in the 'downstairs' part of our bodies and draw attention to this being a collective and not just individual discomfort: irrespective of our differences, we have all been socialised into regarding the lower abdomen as 'taboo'. There is a lot of uneasy laughter especially as we reach agreement about terminology: 'How shall we refer to our waste, our faeces?'.

When the laughter has died down, I distribute pieces of fruit and invite participants to eat them very slowly, mindfully, consciously, and follow the journey of the fruit through the body, pointing out and naming each organ and its function, while making a

crude drawing on flipchart, as illustration. The process is useful as it demonstrates existing knowledge but also myths and gaps in understanding biological digestion.

I introduce the workings of the trillions of bacteria, viruses and fungi, collectively known as the microbiome. There are more bacterial cells than human cells in a body. The food people eat affects the diversity of the gut bacteria, and since bacteria control how the immune system works, this diversity is important (Enders, 2015). I list some of the main functions of the gut microbiome. Although there is no definite proof, there are up to 1,000 species of bacteria in the human gut microbiome, and each of them plays a different role in the body. The workings of the gut biomes, the trillions of bacteria, viruses and fungi keep the immune system, heart, weight and many other aspects of health, both physical and mental, in order. The microbiota also support the regulation of brain function. As Challenger (2021) reports, researchers have shown 'a high occurrence of gastrointestinal symptoms among those with autism spectrum disorders' (p. 137).

So what?

A question about gut disorders opens the session to stories about diarrhoea and constipation, and yes, this must be related to bad water or food ingested, or to infections. The connection to the importance of wholesome food and clean water, to sanitary living and working conditions is clear. Participants begin to make links to socio-economic conditions and influences outside the body: environmental factors, including food habits, impact individual behaviour. Does this mean the gut microbiome tells a story about inequality? How does the diversity of microorganisms in the gut reflect food systems and access and affordability within the apartheid city?

A participant draws on personal experience to illustrate how she understands the connection of gut and brain: she knows when she is depressed because she gets diarrhoea; another agrees: 'When I'm stressed, I can't go to the toilet.' Participants share experiences that illustrate the gut-brain connection; they relate numerous stories of how the brain and gut communicate with each other. They affirm what they have heard: Keeping a healthy gut is key to overall well-being.

Depression and trauma are as much a part of daily life, as poverty. There is a clear link between the gut and the brain. Increasingly, research suggests that the gut microbiome affects the central nervous system, which controls brain function, and vice versa. A short input explains that the 'little brain' is two thin layers of more than 100 million nerve cells lining our gastrointestinal tract from oesophagus to rectum. Mayer (2018) and Enders (2015) list numerous ways in which brain and gut are connected: certain species of bacteria can help produce chemicals in the brain called neurotransmitters; serotonin is an antidepressant neurotransmitter that is mostly made in the gut; people with various psychological disorders have different species of bacteria in their guts, compared to healthy people. This suggests that the gut microbiome may affect brain health, borne out by psychologist Gabor Mate (as cited in Jay Shetty Podcast, 2023) who describes the 'cognitive dissonance' between the dominant narrative in everyday life (what is perceived as normal), and actual experiences, between what we are told, and what we feel, sense, think in our hearts and bodies. He posits that people ignore 'gut feelings' as irrelevant or misleading, and often this, he argues, leads to trauma, which is damaging to our wellbeing.

Playfully, we engage the imagination as I ask: Does the process of digestion have certain similarities to learning, to the processing of information? How so? Participants unpack the actions involved in reflection and relate these to the processing of food particles in the gut. What if food particles were concepts and ideas: how do we break

them apart into constituent elements, add more information, like food, and mix it up with previous data? There is reference to mindfulness, the importance of being fully present in a place and time, and participants probe the 'immune system' of the gut by asking how might this be similar to testing the reliability of data?

The session goes beyond words to dramatic and visual representations: Participants mime the faces we pull when we have a 'gut ache' or try to suppress a bout of diarrhoea. Each one draws an imaginary bacteria, virus or fungus, cuts it out and sticks it on the graph, creating a collective image of the biome in the gut, with lines that connect the organ to the brain. Arrows indicate links to the world beyond the biological and psychological body: social, with regards to race and gender, historical, with regards to cultural eating habits, economic, with regards to class and geography. Epistemologically, the image illustrates the diversity of the gut microbiome; pedagogically, participants have contributed to the construction of a visualization of a biological link, the understanding of which is crucial for improved wellbeing.

Now what?

How can this knowledge lead to actions? There are suggestions how to strengthen the microbiota by eating wholesome food. Factors such as unbalanced diet, stress, antibiotic use, or diseases pose threats while a healthy host–microorganism balance is the basis for a gut to perform metabolic and immune functions and prevent disease development. My colleague Vanessa tells the story of how she uses the 'gut pedagogy' to explain and illustrate the interrelatedness of parts in systems.

> So it begins when I put food in my mouth. The microbiome is doing its work in keeping you healthy, and whenever you do something that is not good for your body, the system breaks down. And in the same way we can see real world systems when they are built. When everything is not working together the system breaks down, and that is what we are seeing. And that is how our economy and our country challenge you. It's an unhealthy system.

She then questioned, how systems could be changed.

> So how do you affect the system? I brought it back to the gut: how can you improve the function of your body, your immune system, by what you put in?
> You can chip away at a system, things don't change immediately, and when you look at your health, there are things you can do to improve your health: by the things you eat, and the water you drink….

The gut as teacher

Eating and food illustrate how humans are entangled with other creatures and plants. In her book 'Eating in Theory', Mol (2021) suggests that eating allows people to 'breath, read, write, clean, cook, stay warm, and otherwise burn energy.' As energy is not material, a thing to hold in one's hand, but the result of a process, she concludes that integration happens when the food has been broken down and turned into constituent parts that are delivered to other parts of the body system. Walking '*through* the world' requires energy, and this energy is generated through eating '*from* the world'. The completed digestive process ends with elimination of waste – and as the waste products leave the body, they return '*to* the world'. This prompts Mol to wonder what might happen if we were to stop

celebrating the humans' cognitive reflections *about* the world, and 'take our cues instead from human metabolic engagements *with* the world?' (Mol, 2021, p. 3).

The very visceral way in which the outside world literally passes through us (Barnacle, 2009), what Michelson (2015) called the relationship between body and belief, lives, ecological context and power, contradicts the perception that Nature is inert, passive. Sheldrake (2020) has documented how fungi communicate and enter into complex relationships, and, indeed, as he argues, make decisions – despite not having a brain. Although his studies were not conducted on the gut microbiome, there may be similarities in the way fungal hyphae branch and fuse with a clear sense of direction, creating complex networks. In ecosystems outside human bodies, fungi make mycelium, living labyrinths that have been used to learn strategic design, such as the transport networks of major cities like Tokyo. Fungi interact intensely with other species, often creating nested arrangements with symbiotic relations of reciprocity, such as the symbiosis between fungi and algae. If we accept that nature is not external to human beings, 'as hunter gatherers and other indigenous people already knew' (Morizot, 2022, p. 2), we can imagine similar entanglements inside.

The gut as teacher struck a chord: A participant commented on how 'the stomach' talks: 'My child has such a noisy stomach. It talks all the time. Loud rumbling and grumbling!' Others agreed: if one listens to the gut 'talking', one would know when a child was hungry. When the 'teacher' deep in participants' bodies speaks loudly in order to transmit feelings of wellbeing or trouble, the body-owner often attempts to silence it, not bothering to try and interpret the source of protest or celebration. Becoming aware, people can listen to and learn from a knowledge system at work, one that is as ancient and varied as living beings. Despite the organ living in each human and most more-than-human beings, modern humans are generally unable to make sense of its language. Highlighting how an organ within the body can be the teacher, if we are ready to listen and observe, was an exciting discovery.

The gut pedagogy illustrated how situating learning within the body, with the gut as 'teacher' shows up the intricate entanglement and mutual interdependence of human and non-human entities. The interrelatedness and connectivity between all the parts in the body shows how systems function. While each person's microbiome is unique, and all microbiomes can only survive within the particular digestive system it finds itself, all systems work the same way. Endangering the health of bacteria in the gut by consuming fast food rather than nutritious food, taking laxatives or antibiotics and the cultural ritual of enemas threaten the health of the microbiome. Vanessa took this lesson to heart:

> After that session it clicked. As a result I now look after my own health. There is a consciousness like never before. I feel I must preserve the little people (rubs her abdomen, laughing). Suddenly, when I eat I think of the microbiome, and how I must look after it! I am in connection with my body as I have never been before.

The notion that the microbiome are living creatures that work invisibly triggered the connection to other invisible labours. 'Reading the world', an older woman raised the issue of the gendered divisions of labour in the home, and how this work is rarely acknowledged. She laughed as she pointed out how the act of cleaning is only noticed when it is not done! Using the gut as an illustration of patriarchal systems proved to be a useful starting point for exploring inequality and power both in the home, and beyond, and how only larger systemic transformations can bring about the changes required for survival.

In the final session of the course 'Reading the World' participants were asked to create a 'mind map' to consider and show how 'the gut' fitted into the curriculum.

Without fail, 8 groups showed the interconnectedness, the entanglement of everything, from the 'Earth to table' (Barndt et al., 2023) journey to communication, problem analysis to research tools, issues of power to mental health in a context of violence. One group produced a drawing that also illustrated the links between environment, climate change, food production and the gut system. It included waste processing through composting, thus illustrating the circle of food production, consumption, re-growing.

The 'world' of participants in this course is, as outlined above, precarious and dangerous. After years of working in the wilderness, Mbatha, 'The Black Lion', observed that 'It is hard to reflect on your connection with the living world when your stomach is empty and your mind consumed with anxiety about providing for yourself and your family' (Mbatha, 2021, p. 265). Connecting people with the stomachs and overall health as linked to socio-economic context was a useful starting point for exploring systems, more widely. Months after the course, participants still refer to the 'gut session' and the connection between commercial food systems and health.

Conclusions

'Can we learn from our bodies?', asks Ian McCallum, (2005):

> To me, human anatomy is one of the finest examples I know of biological differentiation and diversity. It is a living definition of ecology, an embodiment of the interactions and interdependence between molecules, cells, tissues, organs, and systems, sensitive to both the inner and outer environments. (McCallum, 2005, p. 46)

The 'gut pedagogy' responds to his question with a resounding 'yes'. Every time I run the 'gut pedagogy', the need for many different parts in a system comprising entangled components to work together harmoniously is well understood. Starting from 'where people are' – with the gut – holds promise to build sustained and sustainable connections with all living things. The challenge now is to broaden reflection and action to inhabiting the space where we live with greater care and critical consciousness.

In the 'gut pedagogy', knowledge is drawn from multiple sources, not least physical embodied ones, showing how the separation of different sources and kinds of knowledge is an artificial construct that belies forces of life. As the interwoven fungi that line a forest floor create conditions for life, a meaningful sense of the world is made by connecting parts and particles and knitting them together. While science is often experienced as dull and distant experimentation in a laboratory, the science in the gut-pedagogy is made creative, joyful, a human activity where our bodies are the laboratories and the gut is the teacher. Any struggle for transformation requires energy and focus. Energy is produced in the process of digestion – both mentally and physically. Our bodies are with us, wherever we go – and we need to care for them to sustain life – our own, and the more-than-human world that we care for.

Andreotti (Decolonial Futures Collective, 2023) suggests we need to 'expand space and hold space for difficult things without feeling overwhelmed or immobilised – develop stamina and resilience for the long haul'. She proposes a 'probiotic education', one that helps learners process information through inquiry, insight, hindsight, foresight. She speaks about 'educating the gut for the heart to be filled, so that the head can follow'. Sadly, how to learn from and with the gut by making wise food choices that will also feed the brain is often only a choice for affluent people. Living under conditions of precarity, as hinted at by Mbatha, may involve knowing what to eat, without having physical, economic, social, environmental access to such sustenance. The probiotic education Andreotti advocates necessitates a change in the material conditions that would

enable deliberations about relations between humans, more-than-humans and the earth. But would working towards different kinds of futures that would ensure greater equality not require a change in systems?

Given the increasing complexities of uncertain, high-risk, everyday living and working educators need to ask what kind of education might hold the space for this complexity. To open hearts and minds begins with acknowledging and overcoming the colonisation of our imagination and rejecting our attachment to a single story – particularly one that is steeped in violence. Learning from and about the gut can teach us all humility, as we are confronted with our often self-inflicted vulnerability in terms of food choices, connections with other living beings, environmental pressures and deficiencies, and structures and systems we have put in place or keep on maintaining. The microbiomes deep in people's bodies speak, yet we refuse to listen and bear the consequences. The 'gut pedagogy' is one attempt of feminist popular education to facilitate opening a window to making different choices.

Microbes have given us bread, cheese and wine; their social interaction is exemplary as they communicate, using signals and enzymes. Maybe we can learn from the microbiome in our gut, that working together we can identify the 'hostile' forces that threaten our immune systems – both inside and out. How would it be, if all human creatures cooperated in building a pluriworld where food security also meant sustain-worthy conditions for all? A pluriworld cannot include wars, patriarchy, divisions; it requires love and cooperation, humility and respect and living in balance with each other and the more-than-human world. The gut is our teacher – let us listen!

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