



Steps to an Ecology of Knowing, and to Teaching Embodied Transdisciplinary Hermeneutics

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Received 26 October 2016; Revised 25 November, 2016; Accepted 25 November, 2016

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Available online 26 November, 2016 at www.atlas-journal.org, doi: 10.22545/2016/00081

This article explores Bateson's concept of the Mind as Ecology, in the context of philosophical ideas on phenomenology and embodied knowing, and neuroscientific ideas on embodied cognition. It equally links it with ancient oriental ideas regarding the relationship between body, mind and soul, and practices as meditation and yoga to nourish the body as an organ of perception. It then explores its consequences for our ways of knowing, and concludes that the Mind as Ecology needs to be nourished by an Ecology of Knowing including direct and phenomenological knowing, autobiographic and experience-based knowing, and formal and science-based knowing. The article argues that such Ecologies of Knowing can be realized through the practice of Embodied Transdisciplinary Hermeneutics. It finally presents seven steps to teach Embodied Transdisciplinary Hermeneutics. Two of these steps focus on the learning process as a whole, and five explore particular ways of knowing, and how to teach them.

Keywords: Embodied cognition, transdisciplinary

hermeneutics, phenomenology, reflective practice, creativity, dialogue, mindfulness, bodywork.

1 The Mind as Ecology

The title of this article is inspired by Gregory Bateson's famous book "Steps to an Ecology of Mind, collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology" [1]. According to Bateson, the mind is a network or system with a high level of causal and energy relations that process information in multiple and integrated ways. It compares, associates, senses, estimates and calculates, and the outcome can never be reduced to simple inputs, but is always the result of highly complex mindful processes. For Bateson, the essence of all reality is its interconnectedness and inherent dynamism, and he devoted lots of time and effort to show us that we live with a basic misconception of the essence of nature and reality. We are very poor in understanding the world as ecology, and this is not only true for the world as a whole, but is equally true for our understanding of the parts, including our mind and body

or, as I will put forward in this text, our knowledge of the world.

For Bateson, it was equally clear that our minds cannot be understood as disconnected from our bodies, as well as from our social and our natural environment. He illustrated this with the concept of “*man plus environment*”, and gave the example of how someone fells a tree with an axe. “Each stroke of the axe”, he explains, “is modified or corrected, according to the shape of the cut face of the tree left by the previous stroke. This self-corrective (i.e., mental) process is brought about by a total system, tree-eyes-brain-muscles-axe-stroke-tree; and it is this total system that has the characteristics of immanent mind” [2]. An essential consequence of thinking in terms of ecology is that, in the words of Bateson: “no part of such an internally interactive system can have unilateral control over the remainder or over any other part. The mental characteristics are inherent or immanent *in the ensemble as a whole*” [3] (Italics HD).

In this article I look at knowing as ecology, as a systemic activity that emerges out of the mind as ecology, and more in particular I look at transdisciplinary knowing as a form of knowing that is inherently and immanently in the ensemble of ways of knowing. My argument is that transdisciplinary hermeneutical knowing is the only way of knowing that respects Bateson’s idea of man plus nature and the mind as ecology. Before entering in transdisciplinary knowing, I will first explore the idea of the mind as ecology within the context of philosophical ideas on phenomenology, contemporary ideas coming from the field of neurosciences, and ancient Buddhist and Hindu knowledge. Then I will present my ideas on transdisciplinary hermeneutics, as a practice of a unifying transdisciplinary form of knowing. Then I will present 7 steps that together create the conditions for a comprehensive way of teaching transdisciplinary hermeneutics, rooted in embodied and embedded ways of knowing and the mind as ecology.

2 The Embodied/Embedded Mind

Bateson’s concept of “*man plus environment*” is echoed in contemporary concepts of embodied, embedded, extended, situated or distributed cognition [4]. There is an ever-growing recognition that the idea of the mind as an abstract information processor is up to revision. Most neuroscientists today

acknowledge that the mind must be understood in the context of its relationship to a physical body that interacts with the outside world [5]. As Damasio convincingly argues, bodily and emotional experiences are of key importance in our capacity of reasoning [6]. There is no intellect-emotion divide, even though the loci of both are different. Emotions are mainly situated and stored in the body while the intellectual processes take place in the brain. They are however totally entangled and interrelated, with emotions feeding the intellectual processes [7]. Moreover, our brain does not serve us mainly to engage in abstract and theoretical thinking, but is first and foremost the control system of our body, a body that moves and acts in real-world surroundings [8]. This implies that the environment is an integral part of the cognitive system, as Bateson expressed with his concept of “*man plus environment*”. The information flow between mind and world is so dense and so continuous, that the mind alone cannot be seen anymore as a meaningful unit of analysis.

Phenomenological thinkers like Theodor Husserl, Martin Heidegger, Maurice Merleau-Ponty and others laid the philosophical groundwork for the embodiment/embeddedness thesis. Merleau-Ponty argued that it is not our consciousness but rather our perception that plays a key role in our understanding of the world [9]. Before him, Husserl introduced the concept of the “living body” (*Leib*) in contrast to the Cartesian “body” (*Körper*), to demonstrate that perceptual meaning is derived from the motions that the body makes. He emphasized the importance of the ‘lifeworld’ as the concrete world that surrounds us, and “is given through perception” [10]. It is an empirical world that we can relate to in phenomenological, embodied and experiential ways, instead of an abstract world created in mere conceptual ways. Heidegger introduced the concept of being-in-the-world (*Dasein*), indicating that a human being cannot be taken into account except as being in the middle of a ‘here and now and everywhere around’ world. It is the world we interrogate, consider and are concerned with, a world in which we accomplish things, make use of things and produce things [11].

We cannot isolate our minds from our bodies, Edgar Morin argues, and there is no superior stage of reason that has the capacity to dominate, sublimate or eliminate emotions. According to Morin, we are no *Homo Sapiens Sapiens*, but we rather are

Homo Sapiens Demens being both sapiens – wise – as well as demens – irrational, creative, imaginary and prone to unrestricted emotions. We are characterized by a brain-mind-culture loop, as well as with a reason-emotion-impulse loop and an individual-society-species loop [12]. We cannot isolate our minds from our bodies and ourselves from our societies or communities, and it does not make sense to fight ‘demens’ so reason can triumph, we rather try to balance and integrate the two.

In stricter corporal terms, neuroscientist Antonio Damasio conceptualized the importance of the body through the introduction of his theory of the so-called “somatic markers” [13]. Emotions are somatic markers that constantly regulate the homeostatic balance of our body. In doing so, they continually observe and register threats and opportunities, and inform us on how to act in the face of those opportunities and threats. They are important helpers as they create, usually in non-conscious ways, a framework for decision-making, putting information in the context of what is needed in terms of both risks and opportunities. According to Damasio, this neuronal signaling, carried out by neuroreceptors, is the base of a chain or hierarchy of various stages of knowing, where each stage builds upon the previous in chain. Based on this idea, he distinguishes among three conceptions of the ‘self’. The first is the ‘proto-self’ that constantly, and unconsciously, detects and records physical changes, relevant to maintaining homeostatic balance. The second is the ‘core self’, where emotions are converted in feelings, meaning that we become aware - conscious - of the changes occurring in our bodily state, and the corrections our body carries out or is asking for. The core self is the self we all recognize as “our body” with pain, fatigue, hunger, desire, itchiness and more, and should be seen as an active “body-mind-consciousness complex” on the level of single feelings. The third stage is that of the autobiographical self’ that places feelings in the context of experiences, using memory. Here we create our extended consciousness through contextualizing feelings and emotions in the context of previous experiences and higher - abstract - thoughts and concepts. It is on this level that we “are-in-the-world”, integrating concepts, feelings and experiences; remembering, comparing, associating and reasoning, integrating certain forms of information in the context of experiences, feelings and other information, thus creating a coherent view of reality

and of ourselves.

Finally, there is growing conciliation between Western and Oriental (Buddhist and Hindu) thinking on the body-mind-brain relationship, and on the body itself. The scientific field of neuroplasticity has come to recognize that, in contrast to the assumption generally held just a few decades ago, our brain is not fixed and is open to change, while practices in meditation, yoga and mindfulness do have the capacity to stimulate and realize such changes [14]. There equally is scientific proof for the important assumption in both Buddhist and Hindu thinking, that we have next to our physical body an energetic body that plays important roles in our emotional and energetic stages of being. Such proofs are realized with recently developed technology that can measure energy fields or energetic bodies [15 ;16]. These insights amplify our understanding of the relationship between emotion, reason, body and environment, and give room for new practices of consciously strengthening that relationship, through bodywork activities like meditation, mindfulness, conscious breathing, acupressure and more. It opens new ways for ancient practices as Reiki, Tantra, Shiatsu and others to be integrated in new practices based on the idea of the wholeness and unity of the body and the mind.

3 The Mind and Our Ways of Knowing

What are the consequences of embodied cognition and seeing the mind as ecology, for our ways of knowing and our education? Philosophical studies dealing with new technology explore this question in the context of modern technology like computers, the Internet and cellular phones [17]. Are such technologies merely contextual and helpful but outside of our inherent cognitive processes, or are they an integral part of our extended – cognition? In this context, Michael Wheeler asked the key question: is the same way of knowing possible with and without the extension? If it is possible, we cannot talk about extended cognition. But when the same way of knowing is not possible without the extension, it is justified to talk about extended cognition [18].

The question is very relevant in all areas of knowing and knowledge. Many forms of knowing, like experimental knowing as in acting upon and connecting with the world, are not possible without

having “the world” present. We cannot feel, smell, hear, touch, taste, act upon or create, when there is nothing concrete to feel, smell, hear, touch, taste or create. In all of these ways of knowing, the environment is an inherent and immanent part of the mind. The study of so-called Qualia provides us with interesting insights in this context. Qualia are individual instances of subjective, conscious experiences like pain, the taste of wine, or the perceived redness of an evening sky. In his article “Epiphenomenal Qualia”, Frank Jackson explains why Qualia cannot be reduced to concepts, while he gives the very interesting example of Mary the color scientist:

“Mary the color scientist knows all the physical facts about color, including every physical fact about the experience of color in other people, from the behavior a particular color is likely to elicit to the specific sequence of neurological firings that register that a color has been seen. However, she has been confined from birth to a room that is black and white, and is only allowed to observe the outside world through a black and white monitor. When she is allowed to leave the room, it must be admitted that she learns something about the color red the first time she sees it – specifically, she learns what it is like to see that color” (¹⁹Jackson, 1982: 130).

Jackson’s example shows that our mind cannot function in a complete way - as ecology - when it is only partially nourished, with only concepts, abstractions and scientific data. Our minds need to be nourished with a rich ensemble of ways of knowing: concepts, data, practices, experiences, cultural codes and wisdom, sensorial information, emotions, feelings, color, smell, vibrations, revelations, reflections and more. Bateson’s concept of the mind as ecology tells us that our mind is inherently transdisciplinary as it, in principle, always compares, associates, senses, estimates and calculates, while none of these activities alone can have unilateral control over the remainder or over any other part. Yet the functioning of the mind as ecology depends on its nourishment or, in other terms, on the inputs it receives from our body and from our environment, next to abstract and conceptual information. The concept of the mind as ecology has enormous consequences for our ways of knowing. It tells us that

it is impossible to get a full understanding of the world without bodily being present in that world.

The example of ‘Mary-the-color-scientist’ is very strong, as she is totally, in a 100% form, deprived of one specific way of knowing. That is exceptional, but many of us experienced something similar in less extreme forms. Most of us learned to understand reality not in experiential ways, integrating body, mind and environment, but in rather formal and abstract - Cartesian - ways, with a mind that was basically disconnected from our body and our physical environment. Many children in the history of modern education learned to understand nature and society merely from books, without going out in nature or in the streets to see, feel and relate in sensorial or direct ways. In higher education the fragmentation and isolation is even worse, due to the disciplinary and theoretical focus of academic research and education. Fragmentation and isolation however is not restricted to higher education. In most schools, teaching still takes place in a sequence of lessons in mathematics, followed by geography, history, physical education, etc., without any class that teaches us how to integrate these subjects. Likewise, most of us never really learned to be in contact with our feelings and emotions or to train our senses. We never really learned to be in contact with our bodies and unfortunately, this is still the reality for many children today, despite of the change realized in the past decades.

We are naturally transdisciplinary beings that in principal - always know through our ecology of mind, but education often is providing us with a poor and homogeneous input of knowledge. As a consequence, we never really *learn* to master a transdisciplinary/ecological knowing process. This, in turn, hinders our capacity to balance heterogeneous knowledge components, and to find equilibrium among our emotions, feelings, intuition, experiences, cultural wisdom and the outcomes of logical thinking. We have poor literacy in many of these ways of knowing and thus, in an integrated way of knowing.

4 The Importance of Transdisciplinary Hermeneutics

Basarab Nicolescu [20, 21] formulated his transdisciplinary project in part as a response to the problem of education just mentioned. He asks attention for the high level of fragmentation of our knowledge,

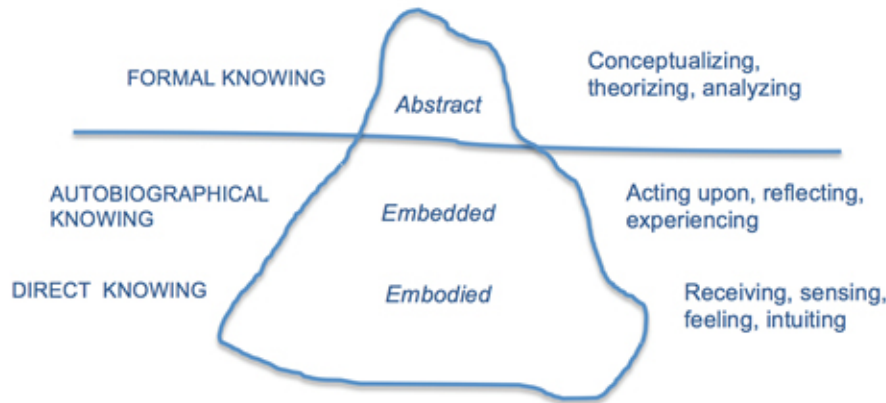


Figure 1: The iceberg of transdisciplinary knowing (self generated).

as science gets ever more divided into disciplines and specializations, leaving us behind with a fundamentally fragmented understanding of the world. He equally asks attention for the loss of intimate contact with the world that we now know merely in terms of abstract descriptions, theoretical constructs and mathematical formulas. We create knowledge *in vitro*, Nicolescu argues, like in sterile and isolated glass bottles, instead of knowledge *in vivo*, situated in living ecologies [22]. He makes a plea for forms of knowing that are – in his terms - in between, across and beyond the disciplines, rooted in a more direct and intimate relationship with the world. This allows us to see and experience the world as a living subject - a lifeworld - and relate with it in more caring and responsible ways. He follows a line of thinking that goes back to Husserl's phenomenology and the hermeneutics of Heidegger and Gadamer. He makes a plea for transdisciplinary hermeneutics that integrates the knowledge coming from traditional academic disciplines, but equally from poetry, art and quantum physics. The aim of transdisciplinary hermeneutics is to integrate and unite these different ways of knowing thus creating "meaning of meaning" beyond any single way of knowing and any single level of reality [23].

Over the past years I worked on a concept of transdisciplinary hermeneutics that I see as comprised of two basic dimensions or axes [24, 25]. The first is an identification of different ways of knowing, that I conceptualized in terms of three generic ways of knowing, that I now label as formal, autobiographical and direct knowing. The second axis is the actual practice of transdisciplinary hermeneutics, the act

of knowing in an integrative and unifying way. In terms of the first axis, I look at knowing as a hierarchical complex, starting with embodied and direct knowing – neurological receiving, feeling, intuiting, sensing – followed by autobiographical knowing realized in acting upon, reflecting and experiencing, up to formal and abstract knowing as in conceptualizing, theorizing and analyzing (see figure 1).

The challenge of transdisciplinary hermeneutics is to learn to master all of these ways of knowing – with their specific organs of perception – independently from each other, and to then combine them to create meaning of meaning. Our bodily movements and neuroreceptors are an organ of perception, and so are our feelings regarding our bodily state. Our emotions form an organ of perception, and so do our imagination, revelations, insights, past and present experiences. Scientific ways of knowing equally form an organ of perception, with rather distinct characteristics. I broaden the meaning of 'organs of perception' beyond the original meaning Goethe gave it – as feeling and feelings-intelligence - and use it to identify any method, activity or way of knowing of a particular level or part of reality. The complex of all of these organs of perception allows us to know in multiple and rich – transdisciplinary - ways, and none of them should be excluded or used in isolation. It is through a mix of knowledges and ways of knowing that we nourish the mind in rich ways and make it function as real ecology. It equally allows us to integrate them with cognitive knowing of concepts, ideas, theories and facts, as with the internally stored memories of previous life experiences, cultural wisdom and tradition. It also offers us the opportunity

to incorporate and integrate aesthetic experiences, with colors, forms, textures, sounds, temperatures and smells, as manifestations of emerging insights and recently revealed revelations.

I like to visualize this as an iceberg where abstract and formal knowing is visible, and embodied/embedded knowing is not. This is inspired by the metaphor of the iceberg used in organizational studies [26]. In organizational studies the top of the iceberg represents the formal goals and objectives of an organization, together with its structure and finance. This part is visible and often the main subject of discussion. The invisible part of the iceberg stands for the culture, the habits, the implicit norms and values that are too often taken for granted. In knowledge it is not different, we focus on the formal disciplines and ways of knowing, and forget about all that is in between, across and beyond those disciplines. This knowledge however is the basis of disciplinary and formal/abstract knowing, as it provides context and meaning. It allows us to turn knowledge *in vitro* into knowledge *in vivo*, creating connection and an intimate relationship with the world. It is a much bigger conglomerate of knowing than the mere formal and abstract knowledge we focus so much on.

The second axe of transdisciplinary hermeneutics is about the actual engaging in the knowing process of connecting us with our body and our environment. I see it as an art, rather than a science, and as a dance with the world, tuning in with its rhythms, vibrations and movements [27]. It is a double dialogue with the rhythms, vibrations and movements of our inner self, as well as those of the outside world. It is highly sensitive and mindful, and allows us to integrate the bodily awareness of our internal energies with those of the outside world. Whatever we want to know, a physical space like a city, a landscape or a public space, a community, organization or group, or if we want to know a person, a patient, a client or a co-worker, the dialogues have similar dynamics. We use our senses, we see, hear, listen and if possible we touch and smell. We equally feel in a literal sense, emotions, vibrations, tensions and harmony, and we try to build bridges between those outside movements and our own internal movements. In this way we build images an impressions or a bodily map of what or who we are knowing. We observe, sense, perceive and feel, yet equally, and possibly at the same moment, we interact in the sense of *creating*

movements, connections and possibly transformations. We enter in processes of learning and knowing by doing, through reflective practice and acting upon. In doing so, we create experiences with the person, organization or space we are engaged in. Finally, yet again this may be simultaneously, we collect data, analyze and conceptualize what we see, hear and, we include that what is obscured and invisible for the senses. We study history, relationships, important events, future plans and more. In this way, we allow ourselves to create meaning of meaning beyond any single way of knowing.

It is about disclosure in the Gadamerian sense of the word, as in tuning in and listening to *how we allow the world to disclose itself* [28]. These words – how we allow – the world – to disclose itself – are essential and I like to explain them making use of Nicolescu’s distinction between Real and Reality. For Nicolescu, Real is simply ‘all that is’, and is in principle infinite. However, it is ‘forever veiled’, since we never will be able to ‘grasp’ it completely [29]. We always have a limited view on all that is to be known and as a result, Reality is always much more limited than Real. We always only ‘see’ in terms of the methods and language we use, making a selection of ‘all that is’, based on our capacities of sensing and observing, our capacities of comprehension, apprehension and imagination, and our organs of perception. It is in this context that transdisciplinary hermeneutics is crucial, as a way to allow the world to disclose itself in multiple ways, on various levels of reality. It is realized in cyclical, iterative or spiral ways with our inner self as well as with a concrete lifeworld, with the aim of creating, what Nicolescu calls ‘meaning of meaning’, which is acquired through the interconnections of all of the reality we include in our process of disclosure.

It is important to mention that I see the term disclosure in a Gadamerian way, rather than in a Heideggerian way. The concept of “disclosure” is closely linked to the work of Martin Heidegger, who saw disclosure as revelations or insights that come to us from the depth of the Earth. Heidegger assumed that these revelations by definition revealed true knowledge, because they come from deeper levels of wisdom [30]. I rather follow Hans-Georg Gadamer’s interpretation of disclosure, as ‘dialogical truth’, where disclosure brings insights to the surface that still are open to a dialogical process of questioning and testing, to assess their credibility

[31].

Meaning of meaning or transdisciplinary knowing is therefore an emerging property of the activity of engaging in transdisciplinary hermeneutics as a systemic activity including heterogeneous forms of knowing on various levels of Reality, and cannot be reduced to knowledge of the parts. I call it the creation of ‘Ecologies of Knowing’ that are, like any ecology, systems of knowing with their own system elements and dynamics, like their emerging properties, feedback and feed-forward loops between the various ways of knowing and organs of perception. Transdisciplinary knowing is not the sum of direct, autobiographical and formal knowing, but is a multiplier creating something beyond the three forms of knowing [32]. It is in the “beyond” where meaning of meaning can be found and we need to create complex systems in order to be able to allow such emerging – beyond - properties to manifest themselves.

5 Steps to Teaching Embodied Transdisciplinary Hermeneutics

Can we convert the previously presented ideas into concrete steps to teach and learn embodied and embedded transdisciplinary hermeneutical knowing? In the subsequent part of this article, I will make an attempt to do so, distinguishing among 7 different steps that touch upon different aspects of the ways of knowing previously outlined. The first and the last step focus on the learning process as a whole, and formulate some conditions for the learning process to be successful. Steps 2 until 6 focus on particular ways of knowing.

5.1 The First Step: Creating a Learning Environment of Being-in-the-World

The first step is to stop thinking in terms of most of what we know about traditional learning and teaching. When we imagine a school for embodied and embedded transdisciplinary hermeneutics, its central orientation must be towards the practice of tuning in and listening to how we allow the world to disclose itself. It is a school for being in the world, both the external world in which the student is embedded, as the internal world in which he or she is embodied. It is a school where education is not based on teaching units - knowledges, skills, aptitudes or attitudes - but on facilitating students to build relationship with

their lifeworld. Connectivity is key, as is the shaping and sensitizing of the various organs of perception. Students do not enter the school in the morning and leave in the afternoon, to spend most of their time in classrooms, engaging in cognitive learning activities. They do have in-house activities, but the school is primarily a point of many points, where students prepare themselves to go out, allowing a particular lifeworld – a concrete and tangible environment – to disclose itself, on multiple levels of reality. It is the place where they return later to dialogue and share experiences, impressions and images, and to do additional studies in the form of data collection and analysis. But in that order: first connecting with the lifeworld, and only later data collection and analyses. The school is totally situational, problem-based, participatory and experiential, from day one onwards. Fieldwork is not to test previously learned insights, theories or concepts, but to build connectivity and apprehension.

5.2 The Second Step: Training the Body to be an Organ of Perception

The second step focuses on training the body to be a better organ of perception. Most of us never really learned to use our body as an organ of perception, and this training or teaching should be added to the standard list of skills in – preferably – all schools and educational programs. Listening to our body, breathing in conscious ways and being mindful in all our bodily processes, should be seen as a skill, like a communication or a collaboration skill. It opens doors to knowledge and connectivity with the world that are otherwise closed. It equally contributes to our long-term personal development, as the brain changes under the influence of prolonged practice of meditation, yoga, mindfulness and various artistic practices.

This step is mainly realized as a series of in-house activities, with practices that have the capacity to clear our minds and to open ourselves to the outside world, in ways very different from traditional knowing. Within the context of transdisciplinary hermeneutical knowing, these practices *lay the groundwork* for what I previously called direct and phenomenological knowing. This is a truly embodied form of knowing which presents itself not as a result of deliberate thinking processes, but rather emerges in moments when we consciously try “not to think”, and clear our minds. In such moments

we open ourselves to receive insights, revelations or illuminations that present themselves, in the words of Charles Sanders Pierce, “just like that”, in “a flash” [33].

The very first activity to engage in should be to teach students how to breathe consciously, and how to nourish well their body and brain with oxygen. We normally take this most basic – yet most essential – human activity for granted, even though many do not breathe in adequate ways. Yoga essentially is a practice of breathing in different bodily positions thus nourishing various parts of the body, while the beneficial effects of yoga are now scientifically proven and recognized [34]. Meditation practices stimulate mindfulness – a state of intensified attention to the present – as well as our intuitive capacities of knowing, and these effects as well are scientifically proven [35]. Such practices literarily nourish and train the body to be a better organ of perception, and should be standard practices in all training in transdisciplinary hermeneutics. This training may also include bodywork, as a group of healing techniques to liberate blockades within our energetic bodies. Exercises to train embodied interactions with others – like martial arts – may be included, as well as the art of consciously touching the body, or the use of body language. Various artistic activities can be included, like creative writing, painting, dancing or acting, as well as simple physical activities like walking, hiking or running.

They all have the potential to (re)-connect us with our body and our emotions, and to make our body better organs of perception. Training them should be the first step in all education, as our body is totally entangled with our brain and our knowing capacities depend on this entanglement.

5.3 The Third Step: Engaging Students in Phenomenological Ways of Knowing

While step two prepares us, step three invites us to really *engaging* in direct and phenomenological knowing, and aims at deepening our way of ‘being in the world’, through entering in contact with our lifeworld in embodied, embedded and mindful ways. It is about connecting and feeling the environment, allowing it to disclose its essence, energy, forms, colors, movements and sounds. This step is obviously mainly realized outside of the school, in a particular organization or community, in a natural environment or in contact with other people. One of the first to

write about knowing as direct sensorial experience was Johann Wolfgang von Goethe. For him it was a way of creating images in the mind (imagining), rather than constructing categories or assigning formal characteristics to phenomena (conceptualizing). He looked at conceptual knowing as subjective, since we are imposing our ideas (concepts) on reality. By contrast, he looked at feeling the world and restraining as much as possible from judgment and verdict, as the objective way of knowing [36].

An essential characteristic of direct and phenomenological knowing, in the context of transdisciplinary hermeneutics, is that it allows us to see, feel, experience and therefore know in ways that are very different, and complementary, to other ways of knowing. In direct or phenomenological ways, we can know what remains to be veiled when we only know in logical ways. In this context as well, Gregory Bateson made valuable observations. In his book “Mind and Nature” he asked: “What is the pattern that connects the crab to the lobster and the orchid to the primrose, and all four of them to me? And me to you?” [37]. Bateson showed that logic is very limited in answering such questions, as it is above all a matter of abduction that requires a certain sensibility to the patterns that connect [38]. Direct knowing, through intuition, abduction, feeling and sensing, opens up a category of knowing that otherwise remains closed, and opens levels of reality that otherwise remained veiled.

In process terms, the essence is to be-in-the-world and to be-in-the-presence. In this context, Otto Scharmer formulated his so-called U-shaped theory, which visualizes both a downward movement (the left part of the “u”), and an upward movement (the right part of the “U”) []. The downward movement represents the process of acquiring knowledge – a downloading process, while the upward movement represents that what we do with that what we learned and acquired, an uploading process. Scharmer emphasizes the importance of suspending the download of past patterns and past ways of knowing, and advocates instead to see with fresh eyes through what he calls ‘sensing from the field’ as a phenomenological way of connecting with the world. The important claim he makes is that this phenomenological way of knowing allows us to be more creative in applying our knowledge, in the upward or uploading movement on the right side of the ‘U’. It helps the mind to (re)-arrange information in free-floating ways, and

allows us to tune in with the future that we see emerging.

Frances and Wride describe how presencing, direct or phenomenological knowing, sensing from the field or being sensitive to the patterns that connect, is taught and practiced in the Schumacher College [40]. A preliminary stage, they explain, is to ‘feel the world’ with its particular energy and presence. This is followed by a stage of ‘exact sensory perception’, as a conversation with the world suspending all form of personal judgment and evaluation. The next stage is that of ‘exact sensorial imagination’, as a way of consciously recreating the observed phenomenon inwardly. Various models exist that can help us create a concrete educational program to teach and facilitate students to engage in direct or phenomenological knowing. It is essential that this enters teaching practices in all education, and certainly in teaching transdisciplinary hermeneutical knowing.

5.4 The Fourth Step: Facilitating Students to Engage in Reflective Practice

The fourth step facilitates students to know in experiential and dialogical ways, through engaging in reflective practice. The difference with the previous step is that the students now aim at transform the world, like felling a tree, working with a community or an organization, a technology, a patient, a natural area or a plant. Reflective practice is acting upon the world, inviting her to “talk back” in the form of telling us why some actions lead to positive change and others not. In terms of Paolo Freire: “The act of knowing involves a dialectical movement that goes from action to reflection and from reflection upon action to a new action” [41].

As Donald Schön explains, it is like engaging in a double dialogue with on the hand the situation in front of us and on the other hand our inner self [42]. It is like an open experiment that serves to transform that what we act upon, while it simultaneously generates a new understanding of that reality in our mind. An important characteristic of reflective practice is its experimental nature. It essentially means engaging in an experiment that we do not (aim to) control completely [43]. We are part of it, but do not control it entirely, thus allowing the process to go in unforeseen and unplanned directions. This really stimulates intrigue, surprise and wonder and allows for “emergent properties” to

present themselves, as in *ecopoiesis* [44]. This as well serves creativity and the creation of something new, rather than the repetition of that what we know and have.

A second essential aspect of reflective practice is that we engage in the outside world using our inner mental map that is like a storage place of all our previous life experiences, in the form of a variety of images and descriptions, experiences, formal knowledge, emotions, tacit knowledge and more [45]. Engaging in the double dialogue of reflective practice means seeing the world in its full complexity, combining and associating our senses with our emotions, with our previous experiences and with formal knowledge, all around certain actions and practices we engage in at such present moments. Because of that, it is truly transdisciplinary as it allows us to work over various levels of reality integrating various ways of knowing.

Situational, problem-based, participatory or experiential learning has similarities with reflective practice as presented here. There are however also important differences. A lot of situational or problem-based learning, especially in higher education, is restricted to a mere cognitive, analytical and conceptual way of exploring the outside world. They usually do not include our inner map and how we feel or sense the problem or situation. Moreover, the projects are usually very well planned and are considered to be of better quality, precisely when they are well planned. This leaves much less room for surprise and intrigue, and for unexpected emerging properties and *ecopoiesis*. That is why it is important to ensure that reflective practice uses the whole mental map and links in with feelings, emotions and experiences, and has an open character, leaving room for the unexpected.

5.5 Step 5: Facilitating Students to Engage in Dialogue

The fifth step teaches students the art of dialogue, as a really transdisciplinary hermeneutical practice. As Mikhail Bakhtin pointed out, dialogue is not only a concept related to communication or discourse, but expresses fundamental aspects of how we know reality [46]. A particular way of expressing in words how we see the world, he argues, illuminates some aspects of it yet obscures others. Therefore, a more comprehensive understanding of the world by definition implies ‘heteroglossia’ or multilingualness.

In a novel this is presented in the different storylines that interact with each other, and in social life, heteroglossia is found in the words of different classes and communities that dialogue with each other. It also is found in the different levels of reality that we include in dialogue, as the levels of logic, emotion, experience or revelation. A true dialogue has heteroglossia and is therefore transdisciplinary.

David Bohm characterized a dialogue as a stream of meaning flowing among and through those engaged in the act of dialoguing. The aim is not to arrive at one single truth or best way of seeing reality, but to arrive at shared meaning relevant for those involved in the dialogue. The essence is creating an open dialogue space as a listening circle, which is little by little filled with heterogeneous contributions allowing the participants to build upon that what all bring forward [47]. Participants do not act upon each other by means of agreeing or disagreeing; they all contribute to the dialogue from their own perspective, yet they may be encouraged by the contributions of the other.

The dynamics is as follows. The group selects a certain topic – a public space, a community, a polluted river, domestic violence – (basically any topic is possible) and sits down in a circle. All participants reflect upon the common topic in any way they want: descriptive, theoretical, persuasive, poetic, metaphorical, through an experience, a proposal, a particular feeling. Little by little, the open space in the middle of the participants is symbolically filled with the heterogeneous contributions of the participants, and serves two purposes. It shows the rich – transdisciplinary – way of looking at the selected topic (the outer world), and serves as a mirror for each participant as it touches upon their internal mental map (the inner world). Each participant learns, in an experiential way, the many and diverse ways to understand and relate us with the chosen topic and, through that, with the world in general. It is a genuine experiential way of knowing through conscious dialogue.

Yet it needs to be learned, taught and practiced. According to Richard Sennett, engaging in dialogue is like a craft that goes beyond a mere logical exchange of words, allowing us to feel, see and imagine the relevance of all that is put forward in dialogue [48]. It is a specific form of both problem seeking and problem-solving that, like regular craftsmanship, involves combining head and hands and depends on

a certain sensitivity and responsiveness to the materials one works with. It requires practice, discipline and concentration to master, and calls for a certain disposition and way of being in the world. Therefore, training in mastering dialogues as well should be included in the education of transdisciplinary hermeneutics, and is an essential step in creating ecologies of knowing the nourish the mind as ecology.

5.6 The Sixth Step: Facilitating Students to Learn in Analytical and Conceptual Ways

After exploring the world through conscious picture building, reflective practice and dialogues, it makes sense to bring the exploration process to the level of analytical and conceptual knowing, in terms of formal descriptions, hypothesis and generally accepted theories or concepts. This brings us to the sixth step of cognitive, analytical and concept-based ways of knowing. In higher education, it involves the well-known variety of activities as searching for and analyzing literature, building a conceptual – theoretical – framework, and doing empirical research using adequate scientific research methods. In basic and secondary education it involves learning facts and figures, from mathematics towards history or geography. My intention is by no means to exclude this part of formal and cognitive knowing, as this as well opens particular doors to specific knowledge, which otherwise remains veiled. On top of that, a scientific way of knowing requires a methodological mind that I see as a real virtue, more than worthwhile studying and teaching.

Yet, facts and figures, like theories within ever more specialized scientific domains, need to be contextualized. After all, this is one of the essentials of hermeneutics: a practice of understanding the whole in the context of the parts, and vice versa. Disciplinary knowledge should be contextualized in experiential and direct knowing, as it should be evaluated in the context of an interdisciplinary framework, allowing the specialized knowledge parts to be integrated in larger bodies of knowing. In this context, it is highly recommendable to teach students to construct and use mind maps that characterize a certain part of reality through linking different conceptual ways of seeing it. The mind maps I envision here are conceptual and have the virtue that they position a part of reality within the context of multiple concepts and disciplines, creating a rich conceptual

ecology of knowing.

This sixth step of cognitive, analytical and conceptual knowing should focus on teaching students a methodological mind, and should teach them an interdisciplinary and systemic way of working with concepts, data and scientific insights. Finally it is essential that students learn to contextualize scientific knowledge in the larger knowledge ecology they create in life in general, and through the steps previously outlined in particular.

5.7 The Seventh Step: Seeing Education as a Dispositive of form and Content

The seventh and last step sees education as a dispositive of form and content. Education has objectives, strategies and content, yet equally has a form. This form is not only represented in the teaching materials but equally in the physical and social context or environment where it takes place. It is a heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions and – very crucial – it applies to both that what is said as much as that what is unsaid. Any educational institution is therefore, in terms of Foucault, an “apparatus” or “dispositive” where the whole of the multiple elements work together to realize the objective [49].

When thinking in embodied and embedded education to teach transdisciplinary hermeneutics, it is immediately clear that the environment is part of the student’s minds and must be shaped – pedagogically, socially, culturally, physically, architecturally – in such ways that it supports the objectives of the educational programs. It is obvious that the school needs spaces fitted to do yoga and meditation, and that it needs to be an open space where students go out to connect with the world in phenomenological ways, and act upon the world in reflective ways. There will be a room for computer use, as there will be rooms for dialogue, but there will be little or no space for traditional classrooms and neither for traditional teachers or traditional rules and traditional expectations. In terms of the ‘U’ theory of Otto Scharmer, it cannot be build by downloading old ideas of the past and present, but must be created by uploading new ideas that we can create when we tune in with the emerging future we want to realize.

It depends on a culture that embraces embodied and embedded ways of knowing, and looks for meaning of meaning beyond single ways of knowing. This must be expressed by the teachers in word and in their actions, in the rules and regulations of the school and in the way the school is physically build and spatially organized and designed. The unity of teaching is not any longer the student, but the orientation is towards how the student tunes in and listens to how he or she allows the world to disclose itself. It is in other words focused on the complexus body-brain-social-physical-environment, in particular and concrete lifeworlds.

6 Conclusions

In this article I explored the concept of embodied and embedded mind, and the consequences this has for knowing en education. I observed that the mind as ecology, a concept introduced by Gregory Bateson, needs to be nourished by an ecology of knowing, in order to function well. This ecology of knowing consist of uniting and integrating various ways of knowing, direct, autobiographical and formal ways of knowing. I then explored the consequences of this for education, and formulated seven steps for an education in embodied transdisciplinary hermeneutical knowing. The final question I want to raise is how a teacher should function within this metaphor of knowledge as ecosystem, and the idea I want to put forward is to see the teacher as a gardener and a steward, whose task is to facilitate and help creating the right conditions for the knowledge ecosystems to be and to become, to flourish and to be maintained. A gardener chooses plants and plants them, taking the special characteristics of the garden in consideration, such as its physical dimensions, availability of water, light, oxygen, nutrients, and other plants. The gardener also prunes and reorders yet does this in response to how the garden develops and becomes, with the intention to make it flourish. The steward is particularly keen on maintaining equilibrium and facilitating emergence, and observes, listens, senses, feels, and facilitates through occasional provisions, interventions, planting and pruning. The teacher of the knowledge ecosystem is basically doing the same. Occasionally he or she plants and prunes as in traditional teaching and correcting. Yet most of the time he or she observes, listens, senses and feels, and based on that facilitates: stimulates emer-

gence, creates space and provides where so is desired. All with the intention of stimulating a fruitful dialogue between the multiple knowledge elements of the system. It is this metaphor that, I think, is the best starting put to create education for transdisciplinary hermeneutical knowing, incorporating the seven steps previously mentioned in the metaphor.

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