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"The name of things": Lexical ecological literacy as *Bildung* in environmental and sustainability education

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ABSTRACT

Something important has been forgotten in environmental and sustainability education: teaching ecological literacy. The concept was introduced as an educational field by David Orr, who argued for systemic thinking as well as educating for a sense of place. However, Orr's ecological literacy did not include the basis for understanding functions of the ecosystems: the names of species and other nature phenomena. This knowledge has generally fallen out of education, so that detailed knowledge regarding nature is currently endangered. In this essay, I revisit Orr's educational programme, and reconceptualise its importance in a *Bildung* for environmental and sustainability education. In doing so, I emphasize the importance of naming as a tool for relating to nature and communicating about ecology. A conceptual framework for a lexical ecological literacy is constructed around the human-ecological triad of nature, society and person, combined with a classical *Didaktik* typology of what, why and how to teach.

KEYWORDS

lexical ecological literacy; environmental and sustainability education; names of species; Bildung; human ecology

"We never learnt about nature in school."

I am writing this essay because in environmental and sustainability education, we have forgotten something important. As teachers, we strive to prepare well-educated citizens who will be able to master major challenges related to biodiversity loss, climate change, ecological crises and social unrest. Unfortunately, there is a risk that, instead of educating for ecological insight, we enhance anthropocentric abstraction from the living world, as well as a sense of hopelessness. Academic debates regarding environment-related education have addressed issues of globalism, policy, ethics and radicalism, and need for political support and intensified transdisciplinarity (Hjort Warlenius, 2022; Kopnina, 2012; Reid et al., 2021).

These conundrums, however, are not in focus here, but rather what knowledge forms the core of environmental and sustainability education. During an urban excursion, I asked a student to point out and name a few plants or animals in the park. She shook her head apologetically and replied: "We never learnt about nature in school. We were too busy with sustainable development." Her statement stayed with me and ignited the writing of this essay. The main problem for environmental and sustainability education, I argue, is that we have forgotten to teach how to observe, recognize and name elements in the biosphere, how they are interrelated, in what ways we are dependent on them, how we threaten their existence, and subsequently, our own.

The issue with biological knowledge related to environmental and sustainability education is of professional as well as personal interest to me. Having worked for almost 30 years in higher education, teaching a number of aspects of human-nature relations in human ecology, environmental history, environmental studies and education for sustainable development, I have had rich opportunities to interact with Swedish as well as international students. My impression over the years is, that although students

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often are highly qualified and engaged young people, who plan to spend their professional lives saving the planet, they demonstrate decreasing levels of knowledge about the basis for our common survival: the ecosystem. Their engagement with the suffering of animals is tangible, but still, many do not know one species of a tree or bird from the next (compare Palmberg et al., 2015). Their insights into how society is dependent on ecosystem services come across as alarmingly vague. Some do not realize that below the city where they live, there were once forests and meadows. Others have blurry ideas about the water cycle, photosynthesis, nutrients and soil, how food is produced or how food chains connect species to each other. Where there could be a foundation of insight into systemic sustainability challenges, there are often impressionistic ideas of nature as a beautiful scenery or recreational arena, evoking few reflections other than vague concern. This led me to reflect on in what ways environmental and sustainability education lost its roots in fundamental knowledge about ecology and moved into an abstract and anthropocentric educational discourse. As illustrated by the student quoted above, there has been a failure in educating about ecosystems as the basis for our existence. We have forgotten to teach ecological literacy.

Orr (1992), one of the first proponents of the concept, stated that the "failure to develop ecological literacy is a sin of omission and of commission" (1992, p. 85). Orr claimed that ecological literacy was consciously pushed out of education. His statement hit the originally radical educational field of ecology at its weakest spot, since, as Sears (1964) claimed, ecology is at its core a "subversive subject," meaning subversive toward the destruction of our planet. According to Sears, well-grounded knowledge about biology and ecology is the epistemological foundation for challenging run-of-the-mill policies, which seem unable to efficiently address the alarming fact that humanity is transgressing an increasing number of planetary boundaries (compare Richardson et al., 2023). Surprisingly, Orr did not suggest names of species or other nature phenomena as a part of his ecological literacy, nor did any of his followers. The absence of words and naming is the point of departure for the following essay.

My aim is to revisit Orr's original idea of education for ecological literacy and reframe its central role in a *Bildung* for environmental and sustainability education. In doing so, I elaborate on *the importance of language,* specifically *naming,* as a tool for relating to nature cognitively and emotionally, and as a tool to understand and communicate about ecology and sustainability challenges. A conceptual framework for lexical ecological literacy is then constructed around the human-ecological triad of nature, society and person (Steiner, 1993), combined with a classical *Didaktik* typology of what, why and how to teach (Duit, 2015; Klafki, 1995).

The essay is organized in the following way: initially, I trace the capacity to read nature to preliterate days and discuss how detailed language is pivotal to knowledge about nature and to form a relationship with all things living, introducing the concept of *primal ecological literacy*. In the next section, the idea of ecological literacy as developed by Orr (1992) is contextualized in relation to the educational fields of biological literacy, ecoliteracy, environmental literacy and more recent academic debates on the subject. In the remaining sections, I conceptualize a *lexical ecological literacy*, with a focus on names for species and nature phenomena as relational tool, in a new *Bildung*-oriented didactical framework.

Primal ecological literacy: From specificity to abstraction

Reading nature is an ancient skill. In humanity's prehistory as hunters and gatherers, the capacity to observe, recognize and name phenomena in the surroundings was pivotal to everyone. It made it possible to memorize and communicate regarding where to find edible plants, where to drink water and how game moved. To survive and thrive in a prehistoric world, one had to be in command of what I suggest calling primal ecological literacy. This literacy required that the reader had the ability to recognize individual symbols or "letters," in this case represented by species or phenomena, in the landscape. The primally ecologically literate person needed to know or figure out the significance of each letter for overall meaning in the specific context. The reader also had to be able to observe and react to changes in the environment. Such changes could be the presence of a predator, traces of grazing animals or the turn of seasons. Tellingly, "reading" in Old Norse was a metaphor for foraging: *läsa*/*læse*/*lese*/*lesa* is etymologically related to picking or gathering (Hellquist, 1922). The Latin verb *legere*, forerunner to French *lire* and Italian *leggere*, also means to collect, gather or pick out (Latin dictionary, 2024). The English *read*, however, originates from a Proto-Germanic word (*raða*) originally meaning "to reason, count" (Online Etymology Dictionary, 2023).

Primal ecological literacy was a pre-literate, but not a pre-linguistic, capacity. In a society dependent on nature in a more direct relational way than ours, "text" as well as speech, surrounded humans at all times. For human cognition, language is the main tool to learn and transfer knowledge. Pointing out and naming phenomena in nature is still central when humans connect to the surrounding ecosystem, even for recreational purposes (Milstein, 2011).

Detailed linguistic variation regarding local phenomena was a common trait in premodern societies (Ryd, 2001). When humans interacted intensely with their immediate environment, language required a high level of detail in a mutually enhancing dynamic between speakers and surroundings. The issue here is how such a close relationship affects cognition and language, and vice versa. In the early twentieth century, Edward Sapir suggested a linguistic hypothesis based on Wilhelm von Humboldt's philosophy of language from the late 1820s (Mueller-Vollmer & Messling, 2022). Sapir claimed that the language we think in shapes how we perceive the world, and that the existence of different language systems implies that speakers perceive the world differently. The idea was developed by Whorf into the so-called Sapir-Whorf hypothesis (Al-Sheikh Hussein, 2012), or the linguistic relativity hypothesis. It suggested that how people think is strongly affected by their native language. The most radical application of the hypothesis implies that if a word, such as a name for a color, is not present in a language, the users of that language will have no perception of the color at all, or that the color would be seen as part of a larger group of colors (Witkowski & Brown, 1981).

The hypothesis has been much debated. Sharifian (2017) argues that Sapir and Whorf did not claim language to be determinant of how we perceive the world. Instead, Sharifian suggests, language should be seen as changing over time and between groups of people and individuals. He proposes applying the hypothesis "to explore a level of cognition that emerges from the interaction between the members of a speech community across time and space" (Sharifian, 2017, p. 89). Language, seen through this application, reflects the needs of speakers to observe, think and communicate in a shifting environment. It suggests that words and concepts attract our senses to phenomena, while the environment prompts need for words and concepts.

We do not have to turn to pre-historic communities to find examples of specific vocabulary relating to surroundings. Ryd reminisces about her childhood in northern Sweden in the 1950s, highlighting how generic concepts were of little use in the local discourse:

> […] there were a number of exact words for resources and phenomena in the surrounding nature. *Things ought not be lumped together*. […] Behind the rich vocabulary there was a detailed knowledge chiselled out in the struggle for survival and attempts to understand existence. We grew up with a resonance of this and got used to accuracy. For example, the forest was composed of different elements with such differing uses that there was no use for umbrella concepts. We were surrounded by undivided forests, but *there was no general concept* [for the forest] (Ryd, 2004, pp. 52-53), my translation and italics].

Abstractions or general concepts were not functional in an environment where communication demanded concretion. The tendency, however, as linguists suggest, is that language evolves from the specific to the general. Witkowski and Brown (1978), for example, found that specific plant names in most languages are older than generic names. The linguistic drift toward general naming seems to follow a physical distancing from natural surroundings, such as urbanization. Already Witkowski et al. (1981) suggested that "broad [linguistic] categories have probably developed in response to most individuals being removed from daily intimate contact with the world of plant [sic] and animals." The linguistic abstraction (in the original sense of the word: withdrawal) from primal ecological literacy to contemporary abstractions may look something like this: local name of oak - sessile oak—oak—Querqus petraea—tree—forest—greenery—biodiversity—sustainability. Calling on the Sapir-Whorf hypothesis, this might imply that even the capacity to notice something as specific as an "oak" might be endangered.

Naming as relational practice: Lexical ecological literacy

Without intimate contact with nature and without names for the parts it is made up from, it is harder to relate both cognitively and emotionally. On this note, Wall Kimmerer (2013) has observed how being unable to name species causes alienation, and draws a parallel to human society:

> Names are the way we humans build relationships, not only with each other but with the living world. I'm trying to imagine what it would be like going through life not knowing the names of plants and animals around you. Given who I am and what I do, I can't know what it's like, but I think it would be a little scary and disorienting – like being lost in a foreign city where you can't read the street signs. Philosophers call this state of isolation and disconnection 'species loneliness' – a deep, unnamed sadness stemming from estrangement from the rest of Creation, from the loss of relationship (2013, pp. 208–209).

Wall Kimmerer also points to the worlds of knowledge being forgotten as increasing numbers of people lead urbanized lives. In her thinking, explicitly influenced by her Native American background and training as a botanist, humans are part of a network of relationships with the rest of the living world, kept alive through names and interaction. "Species loneliness" resonates with "extinction of experience" caused by being surrounded by an increasingly impoverished ecosystem (Miller, 2005). It can also be related to "plant blindness" (Wandersee & Schussler, 2001) or "plant awareness disparity" (Parsley, 2020), a tendency to observe animals rather than plants. However, the focus here is not preferences or lack of awareness, but the cognitive and linguistic incapacity, illiteracy, to discern and name natural phenomena, which, I claim, coevolves with a pervasive "disconnection from nature" (Beery et al., 2023).

There is a risk that as names for species and other nature phenomena disappear from public vocabulary, ecosystems fade further away into general "environment." In the words of Swedish botanist Carl Linnaeus: "If you don't know the name of things, knowledge of them too disappears" (Linnaeus, 1737). To bring naming back as a cognitive and educational tool, I emphasize two aspects of relevance for what I call a lexical ecological literacy: *naming things with specificity as pivotal for observation,* and *language as a tool for relating* to and *communicating about* the surrounding world. With this in mind, I take a closer look at Orr's ecological literacy from an educational perspective.

Intentions and discontents of Orr's ecological literacy

In a compilation of essays, David W. Orr (1992) summarized the environmental issues of his day, such as use of fossil fuels, global warming, population growth and soil degradation. Orr pointed to the vagueness of the concept of "sustainability" in relation to what had been achieved since the environmental crisis was brought to the fore in the early 1970s. At the root of the crisis, he claimed, was the educational system (Orr, 1992). For Orr, the main culprit was the division of knowledge into subjects, paired with prioritizing knowledge related to the human sphere with focus on economic development. Pinpointing what education should ideally involve, Orr built on a quote from Hardin, saying that ecological literacy is the ability to ask: "What then?" (Orr, 1992, p. 86) regarding environmental consequences of human behavior. The failure of the (American) educational system was that it had fostered "a generation of ecological yahoos without a clue why the color of the water in their rivers is related to their food supply, or why storms are becoming more severe as the planet warms" (Orr, 1992, p. 86).

Orr claimed that education should primarily be about formation of attitudes. As mentioned initially, he did not suggest specific "facts," names of species and other nature phenomena in his call for ecological literacy. Drawing on Wilson's concept of *biophilia,* defined as an innate interest in and fascination for all things living (Kahn, 1997; Wilson, 1984), Orr claimed that *a sense of wonder*, or kinship, with nature was key to ecological literacy. Here, Orr, like many scholars in the field of outdoor education, reflects Dewey's notion that *experience* is central to learning, evoking awe or even confusion, which leads to further exploration (Quay, 2020). Education, according to Orr, should develop the ability to *think broadly*, and to draw conclusions regarding ecological causes and effects. Throughout the book, he returned to how education should enhance cross-subject thinking. This idea had earlier been presented by Sears (1964) and Hardin (1985), who claimed that ecology and human ecology were inherently subversive disciplines, questioning economic growth and increasing environmental destruction. If taught in a transdisciplinary way, ecology and human ecology would prepare students for radically new ways of relating to the world and addressing environmental issues. Ecological literacy, in Orr's version, would consist of a thorough understanding of concepts from natural science, and subsequently, a good understanding of the "speed of the crisis which is upon us" (Orr, 1992). He called for education for ecological literacy on a grand scale, setting up a curriculum and a reading list to go with it (1992, pp. 109–124), containing themes

such as thermodynamics, systems ecology, civilisational critique, feminism, progress, the role of modern science, human nature, engineering, the concept of nature, as well as religion and ethics.

The debates following Orr's book picked up on ethical, epistemological and educational aspects of ecological literacy. Prakash, in a review essay, examined the central elements of Orr's postmodern ecological literacy (Prakash, 1995). "Postmodern" was a central concept in Orr's theory, suggesting an aesthetic and moral paradigm where diversity and local knowledge was to take precedence over fragmented and placeless pedagogies of modern times. Prakash highlighted Orr's call for a new moral education, based on Dewey's statement that all education is somehow moral (Prakash, 1995). A central message was that ecological literacy should be about growing an intimate knowledge of *place*. The details of this knowledge, however, remained vague.

Uno et al. (1993) developed a suggested curriculum for what they called *biological literacy* for the American school system. Although touching on the same scientific themes as Orr, they did not refer to ecological literacy. What they called "nominal biological literacy," the basis for understanding biology, should consist mainly of scientific concepts. Surprisingly, none of the authors mentioned learning names for species or nature phenomena. Their biological literacy started on a general, conceptual level. From their writings, it is hard to discern whether they thought students already knew the names of plants and animals, or if recognizing and naming was not considered of interest.

In a viewpoint article, Bowers commented on the fact that Orr did not clarify how language reproduced cultural patterns. He pointed to a risk that "more destructive forms of environmental education will be perpetuated by the educational reform efforts we are now witnessing" (Bowers, 1996). Surprisingly, Bowers did not relate to language as a tool *for* ecological literacy, but on the contrary viewed language as a tool for learning to think like a modern, distanced, industrialized citizen. He considered (liberal) education to be at its core anthropocentric, focused on the individual and "based on the same cultural assumptions that gave legitimacy to the Industrial Revolution" (ibid.).

Biological illiterates and "the feeling for nature"

The issue of declining knowledge about nature stirred a debate in Sweden, a small nation taking pride in conservationist progressivity. Sjöberg, a naturalist author, published an opinion piece warning that Swedish children knew a decreasing number of species (Sjöberg, 2001). He claimed that the next generation would be one of *biological illiterates*: "Knowledge of species is like a language. If you don't know the language, the connections are hard to grasp. Furthermore, I think that what we call the feeling for nature is at least partially a product of this biological literacy" [my translation]. In the Scandinavian context, "the feeling for nature," *naturkänslan*, is a strong cultural trope, denoting a profound awe for all things living, engagement for conservation and environment, observance on seasonal change as well as an embodied experience of place and belonging. It is a recurrent theme in Scandinavian outdoor pedagogy tradition, found for example in the writings of Szczepanski (2001), Sandell and Öhman (2013) and Häggström (2019), and is often claimed to be central in developing environmental engagement. Magntorn and Magntorn, in a Swedish anthology about outdoor didactics, caught on and demonstrated how knowledge of species could foster the feeling for nature (2004). A similar debate was ignited in the Anglophone world with Louv's *Last Child in the Woods* (2005), with focus on the psychosocial development of children. More recently, the Anglophone version of the feeling for nature has been presented as "connection to nature" or "nature connection" (Beery et al., 2023; Chawla, 2020). However, the Scandinavian concept has somewhat wider connotations.

In the early 2000s, several publications ventured into the bushy educational field of ecology, environment and sustainability. Morrone et al. (2001), for example, developed a metric to test general ecological ideas, but included neither knowledge of species nor other nature phenomena. Cutter-MacKenzie and Smith (2003), found that primary school teachers in Australia were not able to teach ecological or environmental literacy in an efficient way. They drew the conclusion that teachers tended to dismiss the importance of knowledge, while preferring to focus on values and attitudes. Cutter-Mackenzie and Smith suggested that a shift in educational ideals, where "content" had been downplayed, could have caused the lacking ecological literacy among the teachers themselves (ibid.). An anthology from 2005 (Stone &

Barlow, 2005), titled *Ecological Literacy*, contained chapters regarding bioregions, values, place and pedagogy, as well as native or traditional ecological knowledge. Ecological literacy was framed partly as general environmental awareness and partly as sense of place, but there were few, if any, mentions of naming. In a conceptual paper, Jordan et al. (2009) set out to formalize a common language and metric for educational achievements regarding ecological literacy. They connected education in scientific knowledge to understanding key ecological concepts, which should, according to them, foster sustainable behavior.

With his PhD thesis, Magntorn (2007) was an exception in the debates on what ecological literacy should consist of. He stated that "naming of biotic and abiotic parts" was the first step toward ecological literacy, which he defined as a systematic, scientific understanding of ecological functions. He emphasized the outdoor context and the importance of fieldwork when learning to "read nature" (Magntorn & Helldén, 2007). However, not everyone embraced ecological literacy. Mitchell and Mueller (2011), in a philosophical analysis, criticized Orr's idea for being exclusive and anthropocentric, and claimed that it invoked fear regarding the future. On the other hand, Menzies (2014) read Orr's ecological literacy as "everything needs to be understood as in relationship" (p. 93). Her take on ecological literacy leaned heavily on participation and experience, as she suggested it should be about "learning not to read just a text, but the land" (2014. p. 88).

Ecological literacy was, in the early 2010s, increasingly treated as a forerunner to environmental literacy or to ecoliteracy (also spelled eco-literacy), and with this, some of its radical claims were lost. McBride et al. (2013) developed a typology of these educational fields. According to them, ecological literacy had sprung from scientific ecology and was closely connected to an experiential, cognitive tradition. Environmental literacy pointed to general environmental education, while ecoliteracy related to the social dimension of sustainable development. Goodwin (2016) found that neither the term ecological literacy nor environmental literacy were adequate for his educational goals. To combine these with a strong sense of place and personal history, he referred to the concept of ecological identity. To develop such an identity, Goodwin wrote, an individual must start seeing themself as part of the ecosystem rather than as a dominator, and experiences will allow the individual to form an emotional bond to nature. In his subsequent curricular sketch, physical experience as well as systemic and scientific thinking took precedence, while names for species were not mentioned.

In a recent article, Woods et al. (2024) suggest understanding ecological literacy through Menzies' concept *implicated participation*. Woods et al. propose that learning should be done *with,* not *of,* and *from* a place, rather than *about*. They call for a profound shift in what it means to study to become ecologically literate: engaging in intimate interaction with one's closest surroundings. The implication of this is that the *about*-teaching and -learning has been theoretical, lacking in sensory impressions and agency. I agree with their call for implicated participation and a shift in how to interact with all things living. However, due to their strong emphasis on sensual and emotional connection to the land, there is a risk that once again, ecological literacy will be taught as a set of values, while the species, i.e. the letters, and the meaning they convey as text, are once again omitted. To the contrary, I claim, learning *about* (as in finding, naming, even systematising) is in no way competing with learning *with* and *from*.

In summary, ecological literacy was an idea launched by ecologists of the 1960s and conceptualized by Orr in the 1990s. *Systemic understanding* was framed as an overarching educational goal for understanding threats to the planet and for students to become profoundly ecologically aware citizens. Orr himself emphasized *experience* as a basis for developing ecological literacy. Connection to *place* and land, central to Orr's notion, was subsequently mentioned sparsely, but was brought back by Goodwin (2016) and more recently by Woods et al. (2024). Neither in Orr's own writing, nor in the related educational debates except for in the works of Magntorn (2007), was there any emphasis on the letters with which to read the text, that is, knowing the names of species in an ecosystem.

Lexical ecological literacy as *Bildung* for sustainability and environmental education

Orr's educational idea of ecological literacy (Orr, 1992), still holds relevance more than three decades later. However, the fundamental knowledge with which to educate ecologically literate citizens was

omitted by him and most of his followers. So, in this second part of the essay, I propose a lexical ecological literacy, built on names of species and nature phenomena, as a foundation in a *Bildung* for environmental and sustainability education.

The *Bildung* concept draws on a long European tradition regarding how learning and personal development occurs, and what it means to individuals as well as to education and society. As Horlacher (2016) demonstrates, *Bildung* as an ideal grew out of religious discussions on self-development, mainly in the Protestant world. Eventually, the concept transferred into the educational sphere, where it was considered an ideal in an early modernizing world. *Bildung* was seen as improvement of the individual's knowledge and morals. It could also be used as a means to obtain status in a time of rapid social change (ibid.). Eventually, *Bildung* has been utilized when discussing the role of the individual in relation to society, preferably in a democratic or emancipatory context (Blenkinsop & Wilhelmson, 2024).

Wilhelm von Humboldt, in the early nineteenth century, viewed *Bildung* as a process as well as a product (Klafki, 1995). *Bildung* can be explained as a state of constant curiosity and learning, leading to enriched life experiences and deeper personal and moral development, stimulating new waves of curiosity. *Bildung* as process reflects the status of scientific knowledge in Enlightenment, as well as the imagination and sensuality of early Romanticism. According to von Humboldt, in a hortatory passage, interacting with Nature with all our faculties is a duty as well as an exercise in self-development:

> Using all of these as so many different tools, he must try to grasp Nature, not so much in order to become acquainted with it from all sides, but rather through this diversity of views to strengthen his own innate power, of which there are only differently shaped effects. For only the world comprises all conceivable diversity, and it alone possesses so complete an independence that it counters the obstinacy of our will with the laws of Nature and the decisions of Fate" (von Humboldt, 1793/2010, pp. 59–60).

I read von Humboldt as suggesting interaction with nature as an exercise with dual purposes: to strengthen the confidence and creativity of human observational powers and fantasy, while also enhancing a sense of awe, a humbleness, toward how nature works and how we, as humans, are not always able to control what happens. This reading is relevant for lexical ecological literacy in the sense that intimate interaction with "the world," nature, has the capacity to move us as humans beyond an anthropocentric worldview and to foster humility toward the rest of the ecosystem. von Humboldt was also, as mentioned above, one of the first to suggest that language forms the mind, which forms language, in a mutually enhancing manner, the idea later propagated in the Sapir-Whorf hypothesis (Sharifian, 2017). Thinking, according to von Humboldt, requires "the collection of the manifold into unity" (cited by Losonsky, 1999), that is, the capacity to observe patterns, and categorize with names.

Klafki (1995) operationalized *Bildung* in his *Didactic analysis as the core of preparation of instruction*, originally published in 1958. He emphasized skills required by teachers to translate curriculum to classroom context. The content should, according to Klafki, be consciously presented in education not for its own sake, but for "the world of the mind, the habits of the young person as a whole" (Klafki, 1995, p. 23), clearly reflecting von Humboldt's idea of *Bildung* as personal development. He also clarified that education should be "critical," implying constant reflection regarding the world outside the classroom. Klafki organized teaching preparation around three main inquires: *What* to teach (the content), how to teach it (the method aspect), and *why* to teach it (the *Bildung* aspect), with the sub-question of *for whom*, since the student should be at the center of the teacher's attention.

Blenkinsop and Wilhelmson (2024) suggest considering an ecologised take on *Bildung* with the help of Klafki's didactical questions, designed to offer "a potential entrée to developing a rich pedagogy for our current times" (Blenkinsop & Wilhelmson, 2024, p. 116). These authors explore educational responses to three sustainability-related problems of our day: Anthropocentrism, self as individual and species elitism. They construct a framework of how to create dialogue with the more-than human. What I miss in their framework, however, is the cognitive and relational tools with which to perform such a dialogue.

Discussing *Bildung* as related to scientific literacy and environmental education, Sjöström et al. (2017) trace the genealogy of *Bildung* to three traditions of thought: Enlightenment, Romanticism and early critical theorists. The trinity is highly relevant for lexical ecological literacy, consisting of (a) scientific

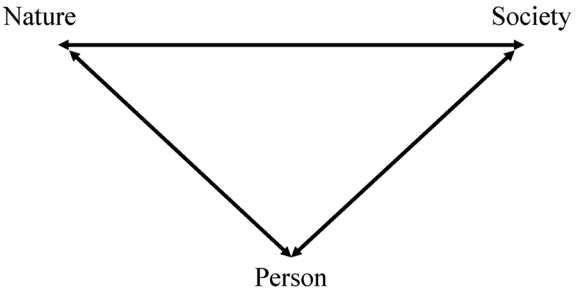


Figure 1. The "human-ecological triangle," suggesting a visualization for transdisciplinary analysis about relations between the three dimensions.
Adapted from Steiner (1993, p. 57).

knowledge, (b) "a feeling for nature" and (c) a questioning of the state of affairs, that is, critical thinking. These three aspects are central when conceptualizing lexical ecological literacy in a *Bildung* context.

To transcend the dualism of human-as-opposed-to-nature of modernity, Steiner (1993) formulated a triangular and more dynamic framework for thinking about how humans interact with the environment (see Figure 1). By "environment," Steiner referred to the biophysical circumstances in which we live, both biotic and abiotic elements. However, in the lexical ecological literacy context, I prefer to call this category "nature," since it denotes more precisely the ecosystems that we focus on here. By "society," Steiner meant social structures such as law, politics and education. Nature shapes what kind of society is possible, whereas society affects nature, for example causing climate change or loss of biological diversity, or, in some cases, enhancing biological diversity. "Person" in Steiner's model represented the consciousness and identity of the individual, related to sensual, aesthetic and spiritual sides of human existence.

In the following, I cross-fertilize the classical *Didaktik* triad with the human-ecological triangle (Figure 1). In doing this, I build on the systemic thinking and sense of place emphasized by Orr, adding naming and knowledge about ecology, and clarify how they relate to the dimensions of *Didaktik* (for a conceptual overview, see Table 1).

What and how? Nature in lexical ecological literacy

In a *Bildung*-oriented education for lexical ecological literacy, the first didactic question is of course the subject matter around which teaching should be planned (Klafki, 1995), answering the question "what." However, the foundational "what" for lexical ecological literacy, *knowledge of names of species and nature phenomena*, must be preceded by a "how," aiming at *recognition based in experience*. The possibility for physical encounters with nature, including vision, smell, taste, hearing and tactile experience, form this basic introduction to surrounding ecosystems, corresponding to what Orr (1992), Menzies (2014) and Woods et al. (2024) call *place*. Recognition does not only include plants, animals and insects, but also abiotic factors such as cliffs, pebbles, water, wind and sun. Providing opportunities for this experience has been demonstrated to enhance children's social functioning, physical health and development (Hansen Sandseter et al., 2023; Söderström et al., 2013). It may also counteract a negative affective attitude toward nature, so called *biophobia* (Soga et al., 2023). In an increasingly urbanized world, there is a risk that spontaneous contact with natural surroundings and free play becomes a privilege for the few. If we are to foster the sense of place that Orr saw as fundamental, letting children spend time outdoors in natural surroundings is pivotal for all groups in society. Less curated outdoor spaces stimulate children to explore, climb, get dirty and interact spontaneously with what they encounter (Mårtensson, 2013).

Table 1. A conceptual overview based on aspects of Bildung paired with human-ecological dimensions and didactic questions.

Bildung aspect	Enlightenment	Civilisational critique	Romanticism
Human-ecological dimension	Nature	Society	Person
Didactic question	What? & How?	Why?	For whom?

The didactic "what," which is most central to this essay, corresponds to the Enlightenment aspect of *Bildung*, and is *learning the name of things*. These "things" can be biotic and biotic factors as listed above. The "what" relates intimately to von Humboldt's theories of linguistics and to the Sapir-Whorf hypothesis, supporting the idea that language, in this case words, forms cognitive structures, learnt and applied in a social setting (Sharifian, 2017). From an educational perspective, knowledge of species and attention to detail was once considered core practice to support students' general observation capacities, learning and thinking, as elegantly captured by Youmans in *The First Book of Botany. Designed to Cultivate the Observing Powers of Children*: "…there is also a language written by Nature on the leaves that grow: we will now learn to read that" (1870, p. 15).

Learning to observe, discern and name phenomena in the ecosystem should be seen as the basis for *lexical ecological literacy*, in that it happens in a mutually enhancing interaction with the environment. "The world" in von Humboldt's terms, that is, nature, prompts recognition or awe, followed by a human urge to point out and name (Milstein, 2011), which tends to be learnt and taught in a social setting, that is, through "society" (Nyberg et al., 2021). The instructor can be a teacher, a peer or elder. It is also *Bildung* as process in the Humboldtian sense, meaning that intimacy feeds knowledge which feeds further curiosity, and that curiosity feeds new recognition and new mental/linguistic categories.

Learning *about* does not have to be a distanced, abstract learning of theoretical concepts. It could also be the profoundly relation-creating practice of recognizing and naming species and nature phenomena, as suggested by Wall Kimmerer (2013). The letters need to be integrated into a lexical ecological literacy.

In this context, we need to address the cognitive relationship between the specific and the general. Should we teach details, or wholes, to start with? Magntorn suggests teaching ecological literacy from a bottom-up perspective, where recognizing and naming of species takes on a role of social interaction with the non-human world: "who they are and what they are doing here" (Magntorn, 2007, p. 12). The opposing teaching method is that of *synecology*, which departs from a point where all species are studied as integrated units (Magntorn, 2007, p. 12). My thinking here is that there will never be a clear boundary between parts and totalities, just as there is no clear boundary between knowing letters, words and text. As teachers, in private or professionally, we are often instinctively aware that the name of a plant or bird is a basic requirement for getting to know it, while as the synecological aspect, responding to "what is it doing" is part of relevant information to prompt the learner into their own *Bildung* process of curiosity and further investigation. For teaching lexical ecological literacy, the dynamic between levels of concretion and abstraction needs to be further investigated. Is it enough, to start with, to recognize and name a dandelion? Or do we need to know which of the 34 macrospecies or 2000 microspecies it is? Do we need to learn the species name and the Latin name or is "dandelion" enough? Which level of abstraction is optimal for a *Bildung* leading to systemic thinking?

So, lexical ecological literacy should ideally consist of *recognition* based in (physical) experience of *place*, and of *naming*, with the didactic goal that knowledge of species as letter leads to knowledge of ecosystem as text. Such an intimacy should also equip students with the capacity to detect and trace changes in the environment and understand what caused the changes.

Why? Lexical ecological literacy as systems thinking and civilisational critique

The didactic question of "why," I relate mainly to the *Bildung* aspect of critical thinking (Sjöström et al., 2017), and to the human-ecological aspect of "society." Lexical ecological literacy here forms the basis for a civilisational critique. As Hjort Warlenius (2022) pointed out, education for sustainable development has unfortunately been "mainstreamed" since the Sustainable Development Goal 4.7. was first formulated. Orr himself (1992), reflecting the writings of Sears (1964) and Hardin (1985), claimed that ecology is a subversive subject. Hardin even called it a "conservative" subject, not in the political sense, but as in conserving nature and halting the exploitation of the basis of our survival. However, in the educational debates of our days, the knowledge and skills in question are seldom explicitly connected to ecology. Instead, they remain either vague, abstract, or focused on inter-human relations. My main argument here is that the "what" and the "why" need to be integrated in lexical ecological literacy, so that students can venture into a process of *Bildung*. This integration then makes makes it possible for them to compile

information regarding human impact on the ecosystems, place it in a context and be truly critical thinkers and active participants in discussions on how society needs to tackle systemic challenges. As Klafki poses the didactic question: "Does this content play a vital role in the intellectual life of the adolescents and adults the children will become?" (1995, p. 24). In the framework presented here, I interpret "intellectual life" as life as ecologically literate citizens, able to reflect critically and with sufficient knowledge. Without lexical ecological literacy there is a risk that environmental and sustainability education will not move beyond anthropocentrism or abstraction.

Some level of abstraction, however, is needed to consider and address system challenges. We should educate growing generations to be knowledgeable about ecological concepts that bind species, ourselves included, together. Systemic concepts regarding photosynthesis, food production, natural and human-made climate change, biodiversity and ecosystem services need to be embraced, like the understanding of systemic interrelatedness in ecosystems, such as thermodynamics, nutritional cycles and population dynamics. Every human action has a consequence to the ecosystem. Knowing the names of the parts as well as how they interact as a whole is pivotal to encourage students' capacity to ask the "what then?"-question as suggested by Orr.

Environmental and sustainability education have tended to focus on good practices inside business-as-usual, such as environmentally friendly consumer choices regarding food, transportation and recycling. However, through the decades since Orr's book, subversive or radical aspects of ecological literacy have been watered down. Making environmentally friendly choices can be considered basic personal hygiene, but it is not equivalent to lexical ecological literacy, and it does not foster agency outside the private sphere. A deeper understanding of one's own and humanity's role and position in relation to the ecosystem, is needed to evoke student's agency as future responsible citizens and decision-makers. The argument that too much information about environmental doom may invoke fear in young adults, see for example Mitchell and Mueller (2011), may not be entirely irrelevant. However, a lexical ecological literacy may counteract alarmist news, stating, for example, that humanity will be wiped out in the near future. Such discourses foster hopelessness. Ecosystems are threatened, undoubtedly, but they can also be resilient, and with lexical ecological literacy, we will be better equipped to protect them.

For whom? Lexical ecological literacy for the person in the world

The didactic "for whom" aspect of lexical ecological literacy relates to exploring and becoming one's true self, a person in intimate relationship with the natural world. It clearly connects to the Romantic aspect of *Bildung*, where the spiritual, sensual and aesthetic aspects of individuality are thought to be enhanced (Sjöström et al., 2017). This dimension is of a personal kind, simultaneously evoking emotions and soothing them. It positions the person in an organic relationship with surrounding nature and actively participating in society. As von Humboldt points out, interacting intimately with the world brings us a sense of wonder as well as a sense of humility (1793/2010). By fostering curiosity and life-long learning about species and nature phenomena, anthropocentric "species loneliness" (Wall Kimmerer, 2013) may be lessened or avoided. Humans are not parasites or cancer cells on the ecosystem, two dystopian metaphors expressed by my students, but one species among others, albeit with unprecedented capacity for transforming the planet. Recognizing, naming and communicating with the living world is anything but anthropocentric, contrary to what Orr's critics Mitchell and Mueller (2011) claimed. Staying open to the diverse impressions from beings other than ourselves, knowing their names and "what they are doing there" (Magntorn, 2007), can bring us out of our anthropocentrism on a deeper personal level.

As discussed above, "the feeling for nature" has long been considered central to conservationist attitudes in Scandinavian debates on environmental and sustainability education. It is a concept closely related to "nature connectedness" or "nature connection" (Beery et al., 2023; Chawla, 2020), but with more existential and conservationist dimensions. The feeling for nature is, historically, corresponding to a Romantic tradition of aesthetics and self-development, as well as the Enlightenment ideals of learning and categorizing. When educating for lexical ecological literacy, the didactic question "for whom" prompts to consciously connect students' cognitive and linguistic capabilities to their sense of place as well as to a well-founded sense of self in the world.

Additionally, from a didactic "why" and "for whom" perspective: I claim that lexical ecological literacy is of importance to cultural heritage as well as for the feeling for nature. Lyrics of songs, literature, poems, metaphors, hymns and idioms contain names of species and nature phenomena in most languages, strongly connecting cultural expressions to landscapes, ecosystems and seasons. This cultural biodiversity may go extinct if not kept alive, not only in print, but in the active understanding of human beings. Knowing the names of things substantially strengthens the relationships to places (Menzies, 2014; Woods et al., 2024) as well as other species (Wall Kimmerer, 2013). Learning through lyrics and literature is also a strategy that enhances lexical ecological literacy and brings it into the more humanistic realms of *Bildung*.

Concluding remarks: Lexical ecological literacy

In this essay, I have revisited Orr's suggested ecological literacy and reframed its central role in environmental and sustainability education, landing in an elaborated version which I call lexical ecological literacy. In doing so, I initially discussed how language, especially detailed and specific naming of species and nature phenomena, was pivotal for human survival in a premodern world, forming a primal ecological literacy. Language, to this day, forms the cognitive tool with which to observe, recognize and intimately connect to other species and to places. Drawing on this linguistic understanding, I recapitulated the core contents of Orr's ecological literacy and the debates that followed, and argued that the lexical aspect, the letters with which to read the text, was generally forgotten or omitted.

In environmental and sustainability education, I claim that learning "the name of things," in the words of Linnaeus (1737), should be the most fundamental aspect. Not primarily learning *about* nature in a detached, abstract way, but learning *with* and *from* through physical experience, that is, in and from what features of nature that are to be found in a *place* (Menzies, 2014; Woods et al., 2024). This first dimension of lexical ecological literacy corresponds with the didactic questions of "what" and "how," with the human-ecological aspect of "nature" as the focus of interest, and with the *Bildung*-aspect related to Enlightenment, or, more in more contemporary terms, scientific curiosity. It should also equip students with the capacity to detect and trace changes in the environment and understand their causes.

The second dimension of a lexical ecological literacy corresponds to the didactic question of "why," the human-ecological aspect of "society" and the *Bildung*-aspect of civilisational critique. The educational goal should here be to strengthen *critical systemic thinking* when it comes to environmental issues, based on the fundamental knowledge and insights gained in the previous dimension, but also to encourage students' capacity to ask the "what then?"-question as suggested by Orr. A lexical ecological literacy containing this dimension does not have to be political in a traditional sense of the word, but ideally, it should aim at encouraging students to think critically about their society and its functions as well as their own role in it, based in the ecological fundamentals upon which we are dependent.

The third dimension of lexical ecological literacy corresponds to the didactic question of "for whom," the human-ecological aspect of "individual" and the *Bildung*-aspect of Romanticism. It aims to connect the individual intimately to their natural and cultural surroundings, so to strengthen a sense of belonging or anchorage in human-nature contexts of choice. Educating through aesthetic, sensual, musical or other methods are central elements in enhancing "the feeling for nature" or "nature connectedness" which is based in what is around us, rather than what has been destroyed or lost.

I am convinced that the more we as educators, and our students, become lexically ecologically literate, the more we are in a cognitive, social and verbalized relationship with the ecosystems, the more we will be able to act in a conscious way to protect them. Actions should start in our own lives, but more importantly, we need to act as a society, so that we take ecological consequences into consideration on a systemic level and acknowledge the interdependence with which we are alive.

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