

An Evolutionary-Ecological Perspective in Teacher Education: A Transdisciplinary Approach in Ecopedagogy

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Abstract

The article seeks to answer the question “Can ecopedagogy mitigate the impact of unsustainable education?” The aim of the article is a phenomenological and hermeneutical reflection on some issues relevant to ecopedagogy at the beginning of the Anthropocene era, when education policy, its governance, the transformation of the holistic approach into a *more holistic* one and the biological origins and deep cosmological roots of the human species have started to diminish. These and other wicked problems have been used in a reflexive participatory action research setting, which was initiated in 2000 for the development of a teacher program and a reflexive ecopedagogy course.

The study adopts a *holistic evolutionary-ecological* perspective. Through this perspective, the indivisibility of the evolutionary-ecological phenomenon is highlighted, which opens, highlights and “fuses” the natural cosmic relation of human beings to the environment and society in the pursuit of *humanity’s goals*. The evolutionary-ecological framework of the phenomenon is considered in the context of the emergence and understanding of a transdisciplinary approach. *Two types of transdisciplinary platforms* developed within the evolutionary-ecological phenomenon are examined. Through the origins of these platforms, educators are offered the opportunity to discover the relation between the transdisciplinary approach and the evolutionary-ecological phenomenon in pedagogy and *the emergence of ideas or emergent recursion* in complex evolutionary-ecological processes at different levels, which is enacted through the teacher as living learning aimed at a noble humanity.

Keywords: Anthropocene, ecocentrism, evolutionary-ecological phenomenon, transdisciplinary approach, emergent recursion, ecological identity.

Limitations of the Anthropocene to Reflexive, Inclusive, Sustainable and Humane Education

The article seeks to answer the question “Can ecopedagogy mitigate the impact of unsustainable education?” This is not an easy task in the current context, where wicked problems have developed in all fields, which, through various *limitations*, have influenced the *perception* and *understanding* of sustainability and/or unsustainability phenomena by practitioners and education researchers. This has narrowed and created other meanings, already given and used, to several concepts of an academic nature that were clearly defined and developed over a long period of time in previous decades. At the beginning of the Anthropocene era, some of them were used in education at shallower levels of understanding with a *narrower perspective*. Currently, to illustrate such narrowing of the meaning, we can refer to *the concept of education ecosystem*, which has already been used in Europe and Latvia to develop education ecosystem strategies in municipalities and serve the purposes of the current education reforms. In recent years, the plans of these strategies have seen an overemphasis on *anthropocentrism* and economic interests, a narrowing of the holistic approach to a more holistic approach, and the use of technological platforms in the development and governance of education policy. The role of technology in monitoring and controlling teachers’ work, pupils’ and parents’ communication and actions has been overemphasized (Corredor & Olarte, 2019; Fernández-Batanero et al., 2021; George & Odgers, 2015). It uses a narrower perspective at the evolutionary-ecological level, which partially or even completely excludes the environmental

conditions that are important for the world and determine its development. *The concept of the education ecosystem*, as understood by current politicians and the majority of stakeholders involved in education, is only a “piece” of a concept that does not take into account the holistically fundamental importance of the evolutionary-ecological level of the pathway.

Answering the research question seems to be and will be quite problematic, because the few above-mentioned problems in education at the beginning of the Anthropocene era do not give credence to the issue of mitigating unsustainable education. The signs of the Anthropocene already cast doubt on whether we are currently looking in the right direction towards *reflexive, inclusive, sustainable and humane education*.

From an ecopedagogical perspective, this issue has not yet been sufficiently assessed and has begun to have a limiting effect on education, bringing unsustainability to education policy and its implementation, despite its supposedly ecologically oriented intentions. The recent reforms have turned ecopedagogy towards a broader search for opportunities to harness the power of ecopedagogy at higher education institutions and programs, which are not just for educators but for a wide range of professions, and which aim to use ecocentrism to mitigate anthropocentrism in both everyday and professional thinking and action (Kopnina, 2020, 2021).

This is a topical issue and *the time is right* for it, since the beginning of the 21st century offers us an opportunity to reflect on the dramatic changes that have become visible as (1) *the natural evolutionary and ecological changes of the human species* and as (2) *contradictions between education and life style caused by human beings themselves*. These contradictions have become more and more obscure for a large part of modern society with the advent of the Anthropocene era. Education and education policy are now most affected by the strong changes in the nature-human relationship and the global changes in the perception of the human species towards the environment at the beginning of the Anthropocene era. Unfortunately, at the beginning of the Anthropocene era it is still difficult to determine the degree of irreversibility and reversibility of the changes that have already taken place. However, it is evident that the consequences of past human activities and current habits in human relations and attitudes to nature and the world are having and will continue to have a lasting impact on the planet’s evolutionary-ecological processes. This is, and seems to be for a long time, the perspective of *anthropocentrism*, which will offer a narrower view of reality for the human species in all areas. *Life and living* are and will be phenomena that anthropocentrism will continue to speculatively exploit for the variously nuanced goals of the human species through selfishly created human evolution-limiting perspectives. *Limiting factors for ecosystem development* are a traditional concept in ecology and they have a limiting effect on the viability or distribution

of ecosystems.

Limiting conditions can be very diverse; they can be both *biotic* and *abiotic*, and in all their diversity they indicate the existence, variability and potential changes of ecosystems under specific environmental conditions and at different levels of the nature-human relationship (Del Socorro, 2024; Wang et al., 2021). *By integrating these factors into a philosophy of perception, we can gain a deeper understanding of human nature and how we perceive and interpret our experiences and environment.* The Anthropocene era has given rise to complex wicked problems (Buel, 1999; McGregor et al., 2021), uncertainties that affect people and humanity in their daily and professional lives. However, the root cause of all the current wicked problems is the selfish *anthropocentric perspective* that has become dominant at the beginning of the Anthropocene era (Kopnina & Bedford, 2024). There are many related studies exploring this issue (Adefila et al., 2021; Clark & Szerszynski, 2020; Goller & Rieckmann, 2022; Quinn et al., 2016; Saiful & Setyorini, 2022; Salīte, Fjodorova et al., 2021; Salīte, Briede et al., 2021; Salīte et al., 2023).

Anthropocentrism has a history in which this philosophical perspective first sought a basis for its own identity, and later tried gentle ways of covering human interests at a time when the holism approach demonstrated the breadth of the ecocentric worldview based on evolutionary and ecological grounds.

This quest developed a broad discourse on the different shades of anthropocentrism, both slightly closer to the *ecocentric* perspective of holism, and harsher and closer to the selfish anthropocentric perspective of a ruthless human species (Rowe, 1994). In the middle of the last century, the ruthlessly harsh approach sometimes led its practitioners to feelings of shame and even to the conclusion that they *should look for other ways of living and being* without senselessly killing and more taking care of other forms of life (Rowe, 1994). This was called for in the 20th century by holism, which saw the need for education and educational research to focus on the phenomenon of *the noble human and humanity*, without excluding the themes of evolutionary succession and ecology, which cannot be bypassed in understanding and explaining educational issues (Zeyer, 2024).

However, alongside the slight mimicry of the expansion of anthropocentrism towards ecocentrism, the replacement of the natural evolutionary-ecological perspective of the natural world that had been established in previous centuries *continued*. This was carried out through the incorporation of human-made perspectives of evolution; it changed the foundations of the sensibility and view of the world.

New meanings become a resource for new ideas. From an evolutionary-ecological perspective, it is an idea that shows that, at least for the teacher, the repetition of the old does not bring anything new, *but takes away the strength*

to live. It seems that we should also think about freeing the school from the constant repetition of old knowledge. Reintegration is not the re-establishment of the former.

A Sense of the World and Sensitivity in the Context of Ecopedagogy

Various specific philosophies are important to ecopedagogy, which help sustain human life and the natural reactions and biological programs given to humans to ensure life and survival. For example, the aforementioned philosophy of perception, the philosophy of biology (Darwin, 1794/1796), the philosophy of phenomenology (Husserl, 1982), the ecophilosophy of reflection (Naess, 1973), and others look at the natural heritage of human beings and how this heritage affects our thinking, behavior and worldview, and how we use it in life and education. Philosophy of perception is a broad and deep field; it explores how people perceive the world and what are the underlying principles of this perception. Such philosophy is based on many theories, approaches and methods, including phenomenology, hermeneutics, complex methods, etc.

During the years of action research, we have encountered the excitement generated by the philosophical views of Erwin Laszlo (Laszlo, 1972) and Edgar Morin (Morin, 1999), which helped the research participants to understand and explain to others the relationship of their personally meaningful experiences to the environment and to an understanding of the depth of the world.

Our experience in the years of participatory action research gives us hope that there is a path in ecopedagogy where people can find their humanity. It follows evolutionary-ecological paths through *a sensitive subjective perception of reality*, through an opening and experience of the undifferentiated forces of nature, which is the first step in the perception of an undifferentiated perception, an ecological “self” and a sense of the ecological reality and the real world.

The long-standing participatory action research that has been going on since the beginning of the 21st century has been extended with the Journal of Teacher Education for Sustainability (JTES), which, especially after 2016, invites international actors who are committed to publishing their research and are willing to expand the possible contexts of their research. We have realized that a piecemeal research approach is deeply embedded in current education for sustainability research. This approach requires the courage for authors to look at the research presented in their articles from the outside and see that in this approach it is more likely to find signs of unsustainability, while sustainability research requires broader models of evolutionary experience and holistic perspectives (Dewey, 1938; Miller, 1997). However, the courage to see more broadly and, above all, make sense of the reality of one’s experience, find what is personally significant in the world and build one’s ecological “self” and ecological

identity is the vocation of every human being to whom nature has given an evolutionary-ecological heritage that works if humans do not let it go to waste.

Being Complex and Transdisciplinary in Ecopedagogy

In the second half of the 20th century, complexity and transdisciplinarity approaches were explored from the perspectives of different sciences and also from environmental and sustainability perspectives. Evolution and ecology were recognized as fundamental to an ecological culture (Finke, 2013), and it was believed that the issue in ecopedagogy was not a question of *choosing a way to solve a problem*, but a *question of choosing a problem*.

The choice of the problem for this article was made with the aim of identifying what *limits the use of ecopedagogical perspectives in education*. As we have explained above, the most appropriate concept to use when it comes to emphasizing the natural relationship of human beings to nature and society is the *evolutionary-ecological phenomenon* and the *transdisciplinary approach* included therein as an extension and application of this natural process in science, practice and social interaction. In the action research, the theme of integration has become central and the research has found its way towards a transdisciplinary approach. The different variants fit well into the structure of the evolutionary-ecological phenomenon; they have searched for the essential things to recognize the overarching content of transdisciplinarity that we see in the noble development of human being and humanity. It is clear that the transdisciplinary approach is about integrating content and that it goes beyond the combination of “interdisciplinary” academic knowledge. The transdisciplinary approach attempts to transcend disciplinary boundaries but does not transcend their content, and there are views that the transdisciplinary approach aims at transcending disciplinary boundaries (Nicolescu, 2014). The transdisciplinary approach focuses on solving specific problems and involves stakeholders who represent the interested actors in society.

In the action research, we approached the problem of ecopedagogical possibilities from different perspectives. The research combined theoretical ideas on systems thinking (Bertalanffy, 1968), information flows and feedback (Wiener, 1985), human communication and ecology from the perspective of anthropology and systems thinking (Bateson, 1972), general evolutionary theory (Laszlo, 1972) and transdisciplinary approaches (Nicolescu, 2014), among others.

We combined the ideas of fundamental theoretical works and insights from specific philosophical fields with the most salient views of the research participants, which have been gained from evaluating the attitudes of people in the current Anthropocene era in terms of their personally meaningful experiences and identities.

The phenomenon of *undifferentiated identity* has attracted the interest of the action research participants because it corresponds to the idea of the evolutionary-ecological phenomenon, which we have chosen as the broadest and most ancient in origin and ever-present basis for explaining and understanding ecopedagogy. Philosophical views of cosmic evolution and the development of complex systems are, for many philosophers, based on the original unity or undifferentiated nature of the universe, which structures and differentiates through evolution (Laszlo, 1972). A state of universal unity existed in the early stages of evolution in the form of an undifferentiated whole of “holos”, thought of as an initially undifferentiated field of shared energy and information. Laszlo recognizes that life and consciousness evolve from *open, self-organizing systems* that are initially undifferentiated but acquire new properties through adaptation and interaction with the environment. Laszlo stressed that *undifferentiated unity* or *original unity* is not only a philosophical principle, but also a fundamental one. The universal background of information does not disappear. It allows systems to self-organize.

He describes a cosmological foundation based on modern science and quantum physics as an information field that acts as the basis for the evolution of all systems and phenomena. In Laszlo’s view, the stage of undifferentiated unity is not simply *something that has passed*, but rather remains as a universal “background” or source of information that is *present at all stages of evolution*. In the process of undifferentiated evolution, unity differentiates, giving rise to structures and diversity, but *the universal background of information does not disappear*. It allows systems to *self-organize*, respond to environmental changes and evolve to higher levels of complexity.

Morin (1999) stressed that *reality* is a unity of wholeness and diversity in which different levels – biological, social, psychological and ecological – are inextricably linked, and self-organizing systems build new properties and structures from undifferentiated states in response to environmental stimuli. According to Morin’s philosophy, the undifferentiated unity is implicit in his ideas of *complexity, self-organization and evolution*. His view of reality points to an *original unity* that is still present at all stages of development and differentiation.

Integration and Feedback: Learning Through Action Research

We have started the action research with the idea that there is a need to reorient teacher education towards sustainability. At the beginning of the 21st century, we had already embarked on the path towards this goal through our interest in the then current topic of integration in education. For practical use, it came in handy in the dialogues on the integration of environment, sustainable education and education. We encountered some cases of educational researchers

being attached to a quantitative understanding of integration, with some researchers counting on their fingers the number of disciplines involved and then declaring that it was an interdisciplinary or transdisciplinary study. A number of books on interdisciplinary or transdisciplinary approaches have been published in previous years. However, trying to understand these differences, we often found that describing the interdisciplinary approach, the authors went off topic and continued to describe the transdisciplinary approach under the interdisciplinary approach without giving it its proper name. This seems to have been a problem of recognition and is still a problem if researchers or teachers **have not accepted** the complex and adaptive nature of the real world. In education, this is a matter of serious concern. And in the current circumstances, when education needs to be pulled out of the “mire”, can we stunt education on rigidly formulated characteristics that are obviously dogmatic? The traditional view of the transdisciplinary approach is more complex and must be explained in terms of dynamic changes that cannot be defined as a set of elements. Other ways of explaining the specific features of the transdisciplinary approach must be sought. However, for the time being, let us agree that integration must be seen as a dynamic, adaptive and reflexive phenomenon, whose *origins* must be sought in the undifferentiated interaction between the environment and the individual human being, and only then in broader differentiated structures such as ecological identity and the human understanding of the phenomena of life and living.

Participatory action research was based on the use of *lived experience*, which through a holistic perspective allowed us to see the teacher as an *adaptive system* that can function both in self-organized adaptive life and in life-embedded undifferentiated lived experience. In this research, we have directed more attention to the natural interaction between the environment and the human being in the earliest origins of this relationship, trying to reconstruct through memories and verbal engagement the personally meaningful experiences of the undifferentiated world.

In the early stages of the action research, evolutionary and ecological foundations were seen as two important frameworks for global development. In the course of the action research, the two frameworks gradually merged naturally into one indivisible phenomenon through holistic phenomenological and hermeneutical reflection. This led to the evolutionary-ecological double framework, which is important for the transdisciplinary approach, and which was integrated in action research.

In the use of lived experience through reflexive holistic, phenomenological and hermeneutic approaches, among others, the need to go deeper in understanding the complex and adaptive nature of complex problems emerged, which required taking into account the multidimensional and multilevel participation of both

the world and complex problem structures in the processes of self-development. The disciplinary content of evolution and ecology in reflection went beyond the traditional disciplinary content; the inseparability of the two phenomena became visible, as they complemented each other in a holistic evolutionary-ecological phenomenon. Thus, an indivisible framework of living complex adaptation emerged and the transdisciplinary approach, which was used as an action research methodology in participatory action research, was incorporated into it.

The phenomenon of feedback is also operating in the use of lived experience, which is also natural in the case of lived experience questions. Different levels of experience and their different structures can be seen as both undifferentiated and differentiated changes of experience towards higher level structures ("upward direction") and the effects of higher level structures on lower level structures. In the action research, we encountered "first reactions", where the "upward direction" was more frequently recognized and the influence of structures on lower-level structures of experience was much less recognized. We also noticed this in many cases where the framework of Gebser's integral thinking theory (Gebser, 1985) was used. In these cases, the action research participants were more likely to see an "upward" change in thinking. The reason for this response was usually found in the "habits" of the anthropocentric perspective that characterized the early Anthropocene era. The recognition of a feedback relationship led to the possibility of learning that this relationship might be influenced by a reassessment of the perception of "upwards" in the differentiated processes of structure formation. Furthermore, these findings provided an opportunity to look at the idea of emergence, which occasionally surfaced in the evaluation of action research experiences.

This led to a deeper picture, which made it possible to see the idea of reversibility in the light of emergent ideas, and it resulted in the emergent recursion approach, which was sometimes already addressed in systems theory and complexity theory with other concepts.

What did emergence mean for us? And we have found it in complex systems thinking to explain more complex processes through the principle of emergent recursion, which is essentially consistent with the processes of the transdisciplinary approach. Especially for teacher education and teacher professional thinking, this approach opens a window on the complexity processes of transdisciplinarity. However, the most essential for the use of emergent recursion is the experience of the undifferentiated sense of the world and of the natural world, which in the action research we call the natural evolutionary-ecological platform of transdisciplinarity, which emerges as a legacy of the original natural platform or the whole. Education that takes into account social, economic, educational policy platforms, where the evolutionary-ecological basis is used for mimicry or the semblance of "progress", the most sensitive aspects of

ecopedagogy and essential issues to the phenomenon of humanity will not be touched upon. It will also be protected by the anthropocentric thinking of the Anthropocene era that dominates societal and educational thinking of the 21st century. This is a serious limitation that hinders the recognition of the complexity of the transdisciplinary approach.

The Emergent Recursion Approach from the Perspective of Transdisciplinary Integration

For the purposes of the action research, we have used the concept of emergence for many years. We used it to refer to the new cases that surfaced in the reintegration results when the old experiences were reviewed and combined with the new ones that came from the additions of the lived experiences. In participatory action research, the content of individual experiences and instances of lived experience varied and reflection turned in hermeneutic or phenomenological areas. The circulation of differentiated experiences and the reflexive complexities was pointed out. At different levels, they are characterized by the emergence of processes or structures. In recent years, we have started to use the principle of emergent recursion. In the context of complex systems, this principle can be seen as a demonstration of holism. This phenomenon is based on self-organization and iterative feedback. In teacher education, this principle can contribute to learning processes that take place in the mind and actions of the teacher. Emergence can refer to the appearance of new properties or structures from simple components when they interact. Recursion implies the repetition of self-references or processes at different levels. In general, it is the repetition of ideas or actions through refinement, leading to deeper understanding or new solutions. In combination, these two concepts describe how complex systems are able to evolve through repeated self-analysis and adaptation, such as the development of a teacher's mind and action. Self-reflection is an essential pedagogical tool to help teachers understand their effectiveness and to foster personal and professional development.

The undifferentiated beginning of the impact is the integration of wholes (subjective sense of the world; contact with nature, perception of the environment and sensitivity of the subject, limitations or possibility of multiple contacts in these and other stages of the formation of undifferentiated relations). This can only happen if we *recognize and acknowledge* the oldest level of experience, which is shaped by the interface between the environment (nature) and the subject, and accept that *the transdisciplinary approach seeks to build wholes*. At the undifferentiated relational level, this wholeness is formed from the subject's contact with nature and the environment, where the undifferentiated identity, through the subject's experience, creates a sense of the world that is integrated

into the world view as a *wholeness* of undifferentiated experience. We refer to this as a *transdisciplinary platform of undifferentiated experience*, from which the differentiation of experiences, the formation of personally meaningful and different structures of experience and the gradual transition to higher levels of the system begin.

Through the subjective perception (mediated by personal experience), a unique multifaceted picture of the world of subjective experience is formed, where the subjective sense of the environment (reality) depends on the perceptual abilities of the subject. Differences in feelings sometimes do not correspond to reality. This can create a need in a self-evolving system that challenges the revision or *reintegration* of experiences, where higher levels (wholes) can “come back” and influence lower levels, changing their structures and dynamics.

Reintegration becomes relevant at the levels of a complex system when ideas or perceptions that have already been generated are returned to the lower levels of the complex system for re-influencing. Information transfer is an essential feature of this process, as *the complex system seeks new meanings through lower level involvement*. New meanings become a resource for the generation of new ideas and, in addition, new energy and experience are brought into the process. Reintegration will therefore produce a different result and will not be a multiplication of previous ideas. Through reintegration, differently nuanced and adapted ideas will emerge.

From an evolutionary-ecological perspective, it is an idea that shows that, at least for the teacher, the dogmatic repetition of the old will not bring anything new, but will take away the strength to live and to teach. It seems that nowadays we also need to think about freeing the school from the constant repetition of old knowledge. Both these cases again indicate that narrower frameworks, where the evolutionary-ecological and subjective experience is acquired through which the individual finds a sense and understanding of the world, will limit the basis for ecopedagogy and the development of a deep evolutionary relationship with the environment and the world, which the subject recognizes as a personally significant experience and a personally recognizable ecological identity.

Transdisciplinarity creates new knowledge and new understanding of the complex evolution of the world and of new frames of knowledge that are built around wicked problems, through the integration of the known and the holistic and complex evaluation of complex and dynamic relationships. It is a *direct engagement with complex personally meaningful experiences, ecological “self” and ecological identity processes in ecopedagogy*. This happens through a *reintegrative and emergent recursion approach to initiate the self-developing powers of teacher participation in ecopedagogy*. The mismatch of individual feelings, well-being or personal behavior with reality or teachers’ perceptions of professionally desirable pedagogical action *can create the need for reintegrative processes*

valuable for self-development in a non-adaptive human system. Higher levels (wholes) can then "return" and influence lower levels, changing their structures and dynamics. Such influences are known in systems theory and complexity theories (Bertalanffy, 1968; Laszlo, 1972; Morin, 1999). Reintegration becomes relevant in complex systems when ideas or perceptions that have already been generated are returned to lower levels of the complex system for *re-influencing*. The essential feature of this process is information transfer, where the complex system seeks *new meanings through lower level involvement*. The emergence of new ideas or personally meaningful experiences in action research has become a common phenomenon in action research. New perspectives emerged when we encountered a more complex explanation of the idea of emergent recursion.

However, we cannot forget about the transdisciplinary platform that aims at integrating experiences, ways of life, knowledge into human living and diverse learning, when building a transdisciplinary worldview platform with the aim of integrating the whole of content. From our experience, it comes out that the evolutionarily oldest level of undifferentiated identity, through the formation of undifferentiated relationships in the processes of nature perception, creates an evolutionarily determined whole of undifferentiated identity, which through differentiation of experiences begins to form the foundations of personally meaningful experiences, ecological "self" and ecological identity, where the evolutionary-ecological framework shapes the transdisciplinary approach to the formation of wholes. Furthermore, the formation of two platforms of transdisciplinary approaches and their dynamic interaction are fundamental processes for the phenomenon of emergent recursion. The processes involve a platform of transdisciplinary undifferentiated experience with a world-view experience and a platform of transdisciplinary content integral unit experience with a world-view formed without transgressing the boundaries of interdisciplinary and multidimensional disciplines. These two types of transdisciplinary platforms have enabled us to see that action research has allowed us to interpret the two layers of content and surface identified in the first model in a more complex, dynamic and adaptive perspective, which shows the self-development and integration of two transdisciplinary platforms for the transdisciplinary purpose of lived experience, indicating an understanding of the meaning of humanity in real relationships and in the search for the future.

Through the content of action research and the gradual expansion of the traditional view of transdisciplinary approaches into a more complex perspective, we have guided teachers to see teaching as a living and fluid process. The principle of emergent recursion and its holistic and complex understanding and interpretation are a ray of hope that teachers, through reflection and a deeper understanding of emergent recursion, will change their understanding of the new meanings of pedagogical mastery needed to develop habits of self-reflection,

empathy, resilient action and mindset that, through ecopedagogy, can diminish unsustainability in education made unsustainable by the reforms and educational policies of recent years. There is a need to seriously reconsider the meanings that have brought unsustainability into education through the limiting thinking of the Anthropocene.

Undifferentiated Lived Experience in the Transdisciplinary Perspective

The use of lived experience in participatory action research requires a holistic phenomenological and hermeneutic reflection that starts with perception, perceptual sensitivity, perceptual capacities and environmental exposure through the acquisition of undifferentiated experiences and their gradual maturation for interaction at different levels (subjective, personally meaningful and integrated at different levels).

As mentioned at the beginning of this article, solutions to the wicked problems of the Anthropocene often ignore fundamental perceptions of the natural environment and the diverse experiences that come from it. Explaining environmental impacts through perception and the self-development of ecological identity are essential features of the holistic approach, which is based on a dialogue between nature and humans that starts at the beginning of an undifferentiated relationship between nature and humans that initiates through contact between the two. It is the common language of primordial experience, which is the uninterpreted subjective lived experience of reality. It is usually described as the primary experience that individuals have in their immediate relationship with nature, when the beginnings of an undifferentiated identity start to emerge, which manifests the establishment of a dialogue between nature and the individual. The integration of the different experiences of undifferentiated identity creates a whole that is essentially the natural experiences integrated into the wholeness of the undifferentiated experiences of the experience of the world.

Dewey recognized experience as a fundamental phenomenon in pedagogy, and in his view experience is a continuous process and its exploration in pedagogy begins with the undifferentiated relationship between human beings and their environment, which he related to his model of evolutionary experience. This model also includes the phase of the undifferentiated relationship between nature and individuals, in which primary experience does not distinguish between the subjective and the objective, because “primary experience” is an undivided, unified and fluid flow of experiences in interaction with the world around us (Dewey, 1938).

The ecopedagogical perspective starts with the effects of the environment on the organism. Various metaphors are known that explain the formation

of undifferentiated relations in primary experience, which becomes more differentiated. For example, in the interaction between the environment and organisms, a metaphor of “sender” and “receiver” is known. The metaphor that comes from the philosophy of biology (Ruse, 1973) also fits well with reflection on some issues in the philosophy of perception at the level of undifferentiated identity relations. The contact between the environment and the organism at the beginning of the non-differentiated relationship is important for exposure to reality, where organisms gain the experience that there is no difference between the environment and the organism. A sense of the environment is formed, where the experience of the world with the experience of reality becomes a sense of the world. Ecopedagogy, through this relationship of undifferentiated identity, already manifests the limitations of the philosophy of anthropocentric perception, as well as other limitations of models if they are socio-economic or limited by educational policy, if they do not take into account the experience of undifferentiated identity.

Conclusion

In this article, we have initiated the discussion of the issue of transdisciplinarity in the context of the aforementioned evolutionary-ecological phenomenon. This way we have chosen to emphasize the natural relation of human development to nature and society, and through the transdisciplinary approach we will consider the application of this natural process to the activities in science and practice that emerge and develop around and through the approach. Furthermore, we have touched upon the processes sustained in ecopedagogy and transdisciplinary approach, which are often simplified in education and their fundamental importance is underestimated.

When people become aware of the relationship between nature and their own perceptions, these experiences can become the basis for a deeper ecological understanding. This corresponds to the nature of the transdisciplinary approach. The most personally meaningful differentiation is the point at which the transition from initial unity to more conscious understanding begins. When a human is able to consciously reflect on their experience, a new understanding emerges in which previously undifferentiated relationships are consciously integrated into a holistic perspective. In this phase, a human begins to use nature to develop self-understanding and ecological identity.

The principle of emergent recursion invites the teacher to think of teaching as a living and fluid process: not a static method, but a self-renewing system. The teacher's mind acts as a continuous feedback mechanism: learning experiences, learners' reactions and other external factors constantly influence the teacher's thinking, which is dynamic and reflexive. A variety of contextual questions arise

naturally and help discern and distinguish the different nuances of the teacher's work that shape the classroom learning environment and adaptation in action. The principle of emergent recursion invites the teacher to think of teaching as a living and fluid process: through repetition and reflection, the teacher develops their professional skills and helps learners understand the world more deeply. This requires the teacher to develop self-reflexivity, empathy and flexibility, while creating a dynamic and adaptive learning environment.

Returning to the research question of whether ecopedagogy can mitigate the impact of unsustainable education, we conclude that this is possible if the educational context emphasizes holistic ideas rather than an economic approach as the only framework and if we understand that we have come from nature and destroyed the vitality of nature and also the consciousness and health of our species. Questions of nature experience open up ecopedagogical possibilities for emergent inquiry and provide opportunities to reduce unsustainability in education. We need to think about reducing the defects of previous reforms that narrowed the perspective without the natural environment – based only on the framework of human-made needs.

Such studies should be continued, as they will certainly lead to ecopedagogy “opening eyes” to questions about mental health, health limitations and other aspects. The worldview as a whole is not yet holistically mature – it is full of illusions, false, limiting factors, and influences that cause wicked problems.

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