ATTUALITÀ PEDAGOGICHE
UNIVERSITÀ DEGLI STUDI DI SALERNO

Vol. 6, N. 2, Year 2024
ISSN: 2704 – 873X

Education for the ecological transition.
Relational-system thinking for the inhabitation of the Earth despite *technocratic thinking*

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ABSTRACT
Several sectors are affected by the ecological transition: energy, industrial, and agricultural transition; urban planning with the creation of green spaces and shared energy efficiency; sustainable and shared mobility. All these areas involve actions that must be community-based to be effective. Consequently, the participation of citizens is fundamental to the implementation of this community transformation: it is necessary to develop forms of education based on relationships and fraternity. The commitment to denounce the dramas of contemporary society requires scientific and cultural reflection aimed at formulating an ethical project for humanity, considering the socio-economic implications and the global interconnections between human beings and all living beings.
The profound transformation of reality requires broad cooperation among people, valuing and interpreting individual efforts, and moving away from the logic of self-transformation. We must move from an instrumental and individualistic logic – *technocratic thinking* – to a community-based logic – *relational-system thinking* –. From the perspective outlined by Pope Francis in his encyclical *Laudato si'*, this essay proposes a critique of technocratic thinking and highlights elements for promoting relational thinking. The ecological transition must be interpreted as a mind-transforming experience for individuals and communities if it is to be directed toward the promotion of authentic ecological consciousness.

ABSTRACT
L'impegno a denunciare i drammi della società contemporanea richiede una riflessione scientifica e culturale volta a formulare un progetto etico per l'umanità, considerando le implicazioni socio-economiche e le interconnessioni globali tra gli esseri umani e tutti gli esseri viventi. La transizione ecologica, infatti, interessa diversi settori: energetico, industriale e agricolo; nonché la pianificazione urbana mediante la creazione di spazi verdi e l'efficienza energetica condivisa, la mobilità sostenibile e in *sharing*. Questi settori comportano azioni che, per essere efficaci, devono necessariamente coinvolgere l'intera comunità. Di conseguenza, la partecipazione comunitaria dei cittadini risulta fondamentale per l'attuazione di una transizione: è necessario sviluppare forme di educazione basate sulla relazione e sulla fraternità.
La trasformazione profonda della realtà richiede un'ampia cooperazione tra le persone, valorizzando e interpretando gli sforzi individuali e uscendo dalla logica dell'autotrasformazione. Dobbiamo passare da una logica strumentale e individualista - il *pensiero tecnocratico* - a una logica comunitaria - il pensiero *relazionale-sistemico*. Nella prospettiva delineata da Papa Francesco nell'enciclica *Laudato si'*, questo saggio propone una critica del pensiero tecnocratico e mette in evidenza gli elementi per promuovere il pensiero relazionale.

PAROLE CHIAVE / KEYWORDS
Education; Ecological transition; Relational thinking; Technocratic thinking; Ecological consciousness

Educazione; Transizione ecologica; Pensiero relazionale; Pensiero tecnocratico; Coscienza ecologica

INTRODUCTION

We are more aware of the ecological challenges of the present. However, this awareness reveals the undeniable urgency of a necessary and effective commitment to building a more *just* and *sustainable* society, towards a *fraternal*, *prosperous*, and *supportive* future. Several ongoing wars and crises threaten the existence of life on earth, strong inequalities and injustices are increasing, creating huge economic and social disparities, and the pollution of the environment and ecosystems seems unstoppable in the short term. Situations of pollution and degradation (such as the poisoning of natural ecosystems and the constant loss of biodiversity, the problem of drinking water linked to the increase in climate migration, global warming, and its dramatic consequences, the increase in extreme weather events, and the "un-inhabitability" of large areas of the planet - IPCC, 2023) require an urgent response and a global commitment, through new ways of understanding the economy and progress, and new lifestyles for all the inhabitants of the planet. In this context, expressions such as "ecological transition" or "green transition" are becoming more frequent and bolder. They imply an energy, industrial, and agricultural transition; urban planning with the creation of green spaces and shared energy efficiency; and sustainable and shared mobility (European Commission, 2019). The term "transition" alludes to a new and different model of development under the banner of *environmental*, *social*, and *economic* sustainability; also, *partnership* and *peace* are included. The concept of sustainability is therefore a key element in the interpretation of development processes, in the design of new lifestyles, and educational and professional choices.
The *European Commission* proposed in 2019 the *European Green Deal*, an ambitious plan to provide a concrete response to climate and environmental threats while promoting sustainable growth. It is about transforming the European Union into a modern, resource-efficient, and competitive economy, ensuring that by 2050 there will be no net greenhouse gas emissions, economic growth will be decoupled from resource use, and no person or place will be neglected (European Commission, 2019). However, since the ecological transition must be understood as a *transformation* experience for individuals and communities, as it seeks to foster authentic "ecological consciousness", it becomes a matter of primary importance for the world of education. The task of educating for sustainable development in the different stages of life can rightly be called imperative since the indiscriminate exploitation of the planet's resources has caused such serious damage, the consequences of which threaten the very possibility of the future of humanity (Malavasi, 2020).
The heuristic path of the essay thematizes the educational implications that the ecological transition presupposes, highlighting the elements capable of bringing about a change of perspective, a true transformation of relationships within the human family, with other living beings. The research aims to promote the discussion on a subject of strict educational relevance, tracing in integral ecology existential and community nuclei generative of change, in the sign of that ethical-educational renewal that sustainability requires, beyond the culture of indifference and irresponsibility. Thus, the need arises for global co-responsibility, that is, a conscious and responsible choice to constitute oneself as a community of persons, in an educational direction understood as the moment that decides whether we love the world enough to take responsibility for it and thus save it from the ruin that is inevitable without renewal, without the arrival of new beings, of young people (Arendt, 1961).

A PERSPECTIVE ON THE HUMAN-ENVIRONMENT RELATIONSHIP

A study conducted in 2020 by researchers from the *Department of Plant and Environmental Sciences* at the *Weizmann Institute of Science* (Elhacham, Ben-Uri, Grozovski, Bar-On, Milo, 2020) estimated that the mass incorporated into solid inanimate objects produced by humans will equal the total global mass of all living taxa, including humans themselves. It is reasonable to say that the planet Earth is currently being "crushed" mainly by inorganic masses of anthropogenic origin and processing, and that man, confirming the physiognomy of *homo poieticus*[32], is experiencing a transitional phase in terms of the increasing impact of his activity on the life of the planet and the further appropriation of the power acquired over millennia[33]. Humans have come to modify the most basic physical processes of the Earth, thus becoming a "geological agent" (Chakrabarty, 2009). The human component, although minimal in terms of carbonaceous biomass-about 0.01 percent (Bar-On, Phillips, Milo, 2018)-has, through intense telluric action on Earth's matter, given rise to what some scientists, in several voices, identify as the geological epoch of the *Anthropocene*[34]. Moreover, in the face of a disproportionate number of extinctions of plant and animal species in extraordinarily short periods, science is now observing the reflections of a sixth mass extinction, in which many currently living life forms may be eliminated or on their way to extinction by the end of this century (Ripple, Wolf, Newsome, Galetti, Alamgir, Crist, Mahmoud, Laurance, 2017). The Anthropocene corresponds to the invasive conditioning of the Earth's environment (in its totality of physical, chemical, and biological characteristics) by the effects of human activity, which has caused rising concentrations of CO2 and CH4 in the atmosphere. It has led to such processes of innovation and production to alter the Earth's ecosystem and to change the dominant position over reality and, consequently, the ontological relationship between man and his environment. This is a journey of centuries or even millennia, but one that has certainly received a strong evolutionary boost from industrialization, massive exploitation of fossil fuels, and nuclear testing in recent centuries.

The relevance of the study, conducted by the *Department of Plant and Environmental Sciences* at the *Weizmann Institute of Science*, lies both in noting the capacity to produce human artifacts, a result of human creativity and intelligence aimed at improving the quality of life and in noting how we are increasingly overwhelmed by the concrete and asphalt with which we have filled our surroundings. Moreover, a more incisive reflection allows us to recognize that there has never been a historical period in which humanity has had so much power to transform reality, and how urgent it is to recognize how the environment in which we live influences the way we see life, feel and act, fueling the phenomenon of "practical relativism"[35] in the postmodern world, where everything is irrelevant if it does not serve to satisfy immediate interests.

The natural environment has always been subject to transformation and modification by man, according to the primary purposes of utility and overcoming material constraints, accompanying, and

[32] Humans capable of designing, building, and modifying their own habitat (Floridi, Sanders, 2003).

[33] The Weizmann Institute of Science study shows how the human presence on the planet began to have an impact with a relevant and progressive trend, starting with the Neolithic Revolution (from 10,000 B.C.), otherwise the First Agricultural Revolution, which became increasingly significant about 3,000 years ago, leading to the halving of biomass. Among the most important causes in terms of the impact of biomass loss - and related biodiversity - are the extensive use of land for cultivation and livestock: deforestation, desertification, and land consumption; along with other human activities such as ranching, hunting and overfishing.

[34] The term was coined in the 1980s by wildlife biologist Eugene Stoemer, then used and popularized by Nobel Laureate in Chemistry Paul J. Crutzen in 2000 to denote the current interval in the planet's geochronological scale in which the set of physical, chemical, and biological characteristics in which life on Earth is created and evolves is being profoundly altered by human intervention.

[35] Pope Francis (2015) states, "When human beings place themselves at the centre, they give absolute priority to immediate convenience and all else becomes relative. Hence we should not be surprised to find, in conjunction with the omnipresent technocratic paradigm and the cult of unlimited human power, the rise of a relativism which sees everything as irrelevant unless it serves one's own immediate interests" (no. 122).

indulging the possibilities offered by things themselves. However, in antiquity and in the Middle Ages nature was "immediately given" to men and they dominated it "by inserting themself into it" (Guardini, 1950), using their energies and developing its forms, without affecting its essential content. With modernity, there has been a departure from nature as a result of a different perspective on reality, which in recent centuries has given rise to a dimension of the power of action and transformation over the things of reality, which has turned into a form of "super-predatory" domination over the earth, which has become the stage for "the highest animal expression" and no longer for sublime human experiences (Guardini, 1950). Knowledge and progress not oriented toward the pursuit of the good have given way to the tendency to dominate, appropriate, and control reality, fueling the human desire to place itself beyond good and evil under the aegis of technological progress.

We recognize how the current paradigmatic approach to the relationship between humans and the environment has produced a lack of self-awareness of the physical and abstract limits of nature, with a view to an environment that is hostage to humans and experienced as distant from itself. A "false assumption" (Francis, 2015, no. 106) of an infinite availability of goods and possibilities offered by the planet, subservient to the desires of the human hand empowered with the faculty of cosmic governance. Such an option privileges a diffuse and unequal understanding of the bond that humans ontologically weave with the natural environment fuels human material and intellectual sovereignty and generates the belief that further ecosystem drift can leave the survival of human life intact. Such a narrative legitimizes an abysmal distance between humans and nature, where the latter is revealed to be the property of the former, and even culturally elides the influence that environmental degradation has on the preservation of human civilization itself, seemingly free from a catastrophe of any kind.

FOR AN UNDERSTANDING OF *TECHNOCRATIC THINKING*

In his encyclical *Laudato si'*, Pope Francis proposes a reading of reality by contrasting a "reductionist approach" with a "systemic-relational approach". The first approach is based on the analytical and logical-rational method and follows a gnoseological-linear process that does not consider the complexity of connections and interactions between human, social, cultural, and natural phenomena. It adopts only the use of technical tools as a way of solving existential problems. Let us analyze, for example, the issue of technology: because of the extraordinary achievements produced for the improvement of the quality of human life, and in the name of these achievements and the potential and continuous Promethean promises, technology has been assumed as a "homogeneous and unidimensional paradigm" of knowledge and understanding of reality (Francis, 2015, no. 106). As a result, it has been proposed as the only possible solution – or at least the most effective solution – in response to humanity's diverse and multifaceted problems. However, the adoption of a single logical-rational perspective, which prevents the perception of the totality of reality, has produced a "reductionism that affects human life and society in all its dimensions" (Francis, 2015, no. 107). All this leads to considerable difficulties in having an overall vision, losing the sense of the totality, of the relationships that exist between things, and of the broader horizon that thus becomes irrelevant (Francis, 2015, no. 110). As a result, man has ended up adopting an attitude of detachment from the natural environment and of possession from the things around him, both of which are subjugated to control and power according to the logic of the techno-scientific. Thus, a man is born who is ordered to technology, who does not feel nature as a valid norm, because he "sees it without a hypothesis, objectively as space and matter in which to make a work, in which to throw everything and no matter what will result". An operation of Promethean character in which "being or non-being is in question" (Guardini, 1950). Man is confronted with a reality that is available for his manipulation, thinking that he can dispose of everything in favor of economic gain. Here, then, is the main problem: technoscience has made itself independent of social life, subjugating economics, and politics (Francis,

2015, no. 109). Technoscience has become inseparable from capitalist logic, thus becoming "technocracy" (Francis, 2015, no. 20, 108).
If taken as a paradigm of reference, *technocratic reductionism* – that is reductionism applied to technocracy – fails to see the mystery of the multiple relationships that exist between things, and for this reason, as if by "domino effect", risks solving one problem while creating new ones (Francis, 2015, no. 20). The greatest risk is to analyze and interpret complex phenomena by chasing the contingency of the moment, without allowing the connections of systemic realities to emerge. For this reason, when faced with a problem, people will look for the most effective and efficient solutions to address the contingent situation or root cause that generated the emergence of that problem, without questioning the deep connections it weaves with different situations. Thus, we can say that today man responds to problems with the use of technology. Not only that: he has more confidence in technology than in his own abilities and possibilities, and the relationships he experiences take on instrumental characteristics. When technoscience is understood as the main resource for interpreting existence, life inevitably becomes "a surrender to circumstances conditioned by technology" (Francis, 2015, no. 110) and, for this reason, at the mercy of the normative instruments of efficiency, performance, and productivity, that is, deprived of a plurality of human projects that guide generative social action. Finally, the technocratic paradigm tends to exercise a hegemonic dominance over politics and economics, the latter being ready to adopt any technological progress from the point of view of profit maximization, without paying attention to any negative consequences for human beings (Malavasi, 2019). The risk is to helplessly witness the progressive diminution of specific human characteristics, such as "the capacity to make decisions, the most authentic freedom and the space for alternative creativity of the individual" (Francis, 2015, no. 108), that is the foundations of the educational, human phenomenon.
We then observe how life itself risks becoming easy prey to such an approach; in fact, the greatest risk lies in placing technical reason above reality (Francis, 2015). According to the technocratic logic, thinking about life is modeled solely on the logical-analytical dimension of technoscience, unwittingly generating a culture that observes a plastically simplified reality, led to consider everything as a "commodity of consumption" and thus in a condition of legitimacy to become a "waste" to be discarded after consumption. The emphasis of the technocratic paradigm operates a reification of existence, making relations with other living beings functional and instrumental, because they are placed in a perspective that provides the techno-economic value of function and use. Therefore, because of the interdependence that characterizes life on Earth, even humans can easily fall into this trap, creating a *culture of waste* (Francis, 2013). According to this perspective, "people themselves are seen as consumer goods that can be used and then discarded" (Francis, 2013, no. 53) when they are no longer productive. The main ethical problem with this type of capitalism is the creation of waste and the attempt to hide or cure it so that it is no longer visible.

EDUCATION FOR ECOLOGICAL TRANSITION: THE WAY OF *RELATIONAL-SYSTEMS THINKING*

In contrast to the *reductionist approach*, we can find a *systemic-relational perspective*: a human orientation that knows how to give up the illusion that problems can be solved through the exclusive use of technology, instead of a relational and interdependent conception of reality. Such a view aims at an acceptance of the complexity of life, which embraces both corporeality and materiality, the transcendence of the individual, and the relationship between man and the environment. A paradigm capable of uniting abstract thought with the concreteness of existence, leading us to new lifestyles for the ecological inhabitation of the earth. In the perspective outlined by Pope Francis (and in ecological studies), we recognize a necessary *ontological* and *epistemological* paradigm shift, capable of thinking about and repairing the existing relationship between human beings and the environment, and capable of changing the model of development. Making a factual change in an ecological

direction implies adopting a systemic orientation that invokes the transversality of the term "environment", including the complex web of life (Malavasi, 2020).
The degradation of our planet is both material and "noological"[36]since it erodes the mental structures of our habits of thought at deep and partly unconscious levels (Bateson, 1979). The antidote, then, is a material philosophy that welcomes a new dawn of corporeality rooted in and connected to the common-sense experience, avoiding doctrinal forms of concealment of reality, and establishing an ever-renewed dialogue with it and its phenomena (Francis, 2015, no. 17, 116). In this regard, Bateson's call for a systemic and unified thinking of mind and nature as a possibility to consider the existence of a co-evolutionary network, initiating a process of epistemological re-foundation and re-positioning of human beings in a whole made up of interconnections, is fundamental (Bateson, 1979). The notion of "system" applied to complexity can acquire the function of an interpretive paradigm of reality through a circular and reticular reading of phenomena and an understanding of complex entities and their interactions.
The theme of complexity is central to thinking about a new paradigm for interpreting and understanding reality. This is especially true when one considers that the lack of a comprehensive perception of existence leads to a weakening of the sense of responsibility and solidarity since each person becomes responsible only for what he or she specializes in and perceives only the connection with his or her own reality. In this regard, E. Morin (1999a) suggests that complexity exists when the different components that make up a whole are inseparable and when there is an interdependent, "*interactive*" and "*interretroactive*" fabric between the parts and the whole and vice versa. Consequently, the consideration of complexity identifies a new anthropological perspective of constant mutability, the result of the interweaving of different relational histories; a perspective also of unity between identity and diversity, dictated by the need to think together; it calls into question pedagogical thinking capable of valuing individual and cultural diversities, overcoming the fragmentation of knowledge, to arrive at a "reform of thinking" in the sign of an authentic communication of knowledge (Morin, 1999b).
If the human causes of the ecological crisis can be traced back to a culture of waste generated by technocratic reductionism and uncontrolled power over reality, the solutions must concern a different way of conceiving human relationships and those interwoven with the entire universal family of living beings, embracing complexity as a way of thinking. There is a need to get out of the technocratic logic of efficiency and immediatism: there is a need for a vision capable of overcoming a "deviant anthropocentrism" and of living a universal communion with the relational reality of which we are a part. We need to embark on an educational path towards a "planetary citizenship" that depends on the "right value of every creature" (Giuliodori, Malavasi, 2016). It is therefore easy to understand the need for an integral ecological approach to education to promote lifestyles that support the transition from an anthropocentric ethic, which reduces nature to a set of entities with a mere instrumental value, to an ecocentric ethic that recognizes the different forms of life as having an intrinsic value (Mortari, 2017).
In conclusion, an ecological transition of the whole society begins from locally woven bonds of responsibility and care, through simple daily gestures that break the logic of violence, exploitation, and selfishness. In fact, the totality of every single human action decisively influences the *destiny* of the world: if the actions and relationships we weave are characterized by attitudes of domination and evasion, the entire planet Earth will fall prey to this domination; on the other hand, if actions are characterized by care for others and for the world, the destiny of the world will also be marked by *care*. That care represents the pedagogical aspiration of *integral human development*: an education understood as freedom and gift for personal and communal, intragenerational and intergenerational discernment, capable of channeling all dimensions of the person into a path of "ecological transition".

[36] The study of the cognitive functions proper to reason in modern philosophy.

CONCLUSIONI

If the reductionist approach has authorized and inspired the figure of a super-predatory man with a "pantoclastic" tendency to rethink a new paradigm, it is necessary to rediscover our inhabitation of the world, the phenomena that occur in it, and the ontic and ontological categories with which science's view of reality is conceptually structured. Consequently, an integral view of reality becomes a new perspective for interpreting reality itself: making environmental ecology interact with economic ecology, sociocultural ecology, and human ecology.
Sustainable development has a purely moral character because caring for the Earth is a duty and takes on an educational value on which our very survival depends (Malavasi, 2020).
The ecological transition can only be community-based.
To foster the development of a sense of community, each of us must develop a sense of self as an "ontological *being-in-relation*" to others.
Learning to be responsible to others and oneself.
Designing scenarios of formation for ecological transition means moving towards an integral formation of the "*person-in-relationship*" and, therefore, valuing fraternal and peace-building bonds.
Integral human development is central to promoting the awareness of inhabiting a common origin and destiny.
Systemic-relational thinking is the main way to develop an authentic ecological transition. Such a vision is built through the sensual and intellectual experience of belonging to a common destiny in the common home with all living beings, the consequent operational extension of a renewed "human fraternity" (Morin, 2019).

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