ATTUALITÀ PEDAGOGICHE
UNIVERSITÀ DEGLI STUDI DI SALERNO

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

Environmental Challenges and EU Regulations: The Transformative Potential of Generative Pedagogy

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ABSTRACT

The article discusses the transformative potential of Generative Pedagogy to address global environmental and social challenges, emphasizing the importance of an educational approach that promotes social equity and environmental sustainability. It examines how the National Recovery and Resilience Plan (NRRP) and the European Green Deal aim to drive the transition to a zero-emissions economy, highlighting how these policies are influenced by industrial and energy lobbies. Generative Pedagogy emerges as a crucial scientific-cultural paradigm for training individuals and communities to be active agents of change, developing a critical understanding of environmental policies and lobby pressures, and actively participating in political decisions. The contribution highlights the need for education that supports authentic ecological sustainability as a transition of the Human, strengthening the ability to face and navigate the complexities of European environmental policies, training talents, and Knowledge-Sharing Communities, aware and responsible, ready to build collaborative and informed imaginable futures.

ABSTRACT

L'articolo discute il potenziale trasformativo della Pedagogia Generativa per affrontare le sfide ambientali e sociali globali, enfatizzando l'importanza di un approccio educativo che promuove equità sociale e sostenibilità ambientale. Esamina come il Piano Nazionale di Ripresa e Resilienza (PNRR) e il Green Deal europeo mirino a guidare la transizione verso un'economia a zero emissioni, sottolineando come queste politiche siano influenzate dalle lobby industriali ed energetiche. La Pedagogia Generativa emerge come paradigma scientifico-culturale cruciale per formare individui e comunità a essere agenti attivi del cambiamento, sviluppando la comprensione critica di politiche ambientali e pressioni delle lobby e la partecipazione attiva alle decisioni politiche. Il contributo evidenzia la necessità di un'educazione che supporti una sostenibilità ecologica autentica quale transizione dell'Umano, rafforzando la capacità di affrontare e navigare le complessità delle politiche ambientali europee, formando Talenti e Comunità pensanti, consapevoli e responsabili, pronti a costruire in modo collaborativo e informato i futuri immaginabili.

KEYWORDS / PAROLE CHIAVE

Generative Pedagogy; EU Environmental Legislation; Lobby Influence; Social Equity; Human Transition

Pedagogia generativa; Legislazione ambientale UE; Influenza delle lobby; Equità sociale; Transizione umana

INTRODUCTION

The growing recognition of the interconnections between environmental challenges and social injustices signals an urgent need to reconsider and restructure approaches to the ecological transition. How can pedagogy, through the construction of generative educational practices, serve as a catalyst for an ecological transformation that is not only effective but also equitable and just?
In this context, Generative Pedagogy presents itself as the paradigm that allows us to address and integrate the dimensions of education and training, social equity, cooperation, and participatory innovation, as well as including the human, social, and, more generally, Culture, in the discussion around the environment, Nature.
The National Recovery and Resilience Plan (NRRP), as discussed by Barbera and Semenza (2022), introduces the need for an ecological transition towards a zero-carbon economy. This transformation, motivated by the climate crisis, requires a radical restructuring of production models and economic behaviors that profoundly influence businesses, workers, unions, collective bargaining, territories, economic sectors, public and social policies. An emblematic case is that of the ILVA of Taranto, which illustrates the direct impact on labor regulation systems and industrial relations, with legal and socio-economic consequences. The transition entails tangible social and economic costs that intensify inequalities between the North and the South of the world and between social classes, influencing the distribution of income. The effectiveness of this transition depends on the methods, timing and progressiveness with which it is implemented. Contrary to historical crises, driven by market dynamics, we are faced with a climate and environmental crisis. The ecological just transition, which originates in North American trade unionism, emerges as a fundamental principle to ensure that the transition not only combats climate change but also mitigates the social inequalities exacerbated by environmental policies.
With specific reference to the urban contexts of industrialized countries in the North of the world, Giudici (2023) highlights how social vulnerabilities are, in fact, amplified by the impacts of climate change. Through an approach based on ethnographic and qualitative methods, the scholar examines two main trends, intertwined by various transversal themes: vulnerability understood as exposure to multiple ecological damages, resulting from the combination of the effects of urban marginality and social inequalities, as well as possible disadvantages resulting from adaptation policies; the knowledge and practices considered more or less ‘sustainable’ adopted by different vulnerable groups, including migrants. The often overlooked experiences and perceptions of these vulnerable individuals and groups can offer significant contributions to sustainability debates. Giudici highlights the importance of considering how adaptation policies can sometimes intensify inequalities, highlighting the need for a deeper analysis that considers the intersections between material elements and cultural meanings in defining key concepts such as “sustainability”, “environment” and “nature”.
Climate change represents one of the most urgent and complex ecological and social challenges of contemporary times. At the same time, awareness is increasingly spreading, both inside and outside institutions, that the ecological crisis distributes its risks and consequences asymmetrically. The poorest and most marginalized communities, both globally and locally, are the most affected by environmental damage and have fewer resources to defend themselves (Agyeman et al. 2002; Anguelovski et al. 2019; Kartha et al. 2020). Furthermore, climate change intensifies and globalizes a series of social risks, such as those relating to health, security and poverty, particularly affecting the most vulnerable territories and populations (Beck 2010). In the latest report of the Intergovernmental Panel on Climate Change (IPCC), for the first time, colonization is included among the historical causes of the ecological crisis and structural inequalities are clearly identified as determining factors in the vulnerability of specific people and geographical areas to different types of environmental risks (IPCC, 2022). For these reasons, the report highlights the importance of fully integrating social sciences and qualitative approaches into the debate on climate change and the transformations necessary for our development model.

In the context of the possibilities for renewal of the Italian context, the NRRP emerges as an extraordinary opportunity to reformulate the country's educational and training approach. The NRRP places the ecological transition as an opportunity to build sustainability at an intra/inter-generational level, while promoting social inclusion starting from children's services and in educational institutions of all levels. Malavasi and Meneghel (2023) explore how the effectiveness of the NRRP can be influenced by the desire to innovate knowledge models to combat youth hardship and in particular the phenomenon of school dropout. The challenge includes rethinking school curricula from an ethical-social perspective, aimed at forming citizenship that deeply understands the values of co-belonging and sharing, essential to recognize our common responsibility in the irreversible time we live in. This implies education is understood as a participatory process that trains active citizens aware of their ecological responsibilities. The goal is to create a society in which education is a path of social transformation that recognizes and integrates the complexity of ecological challenges. According to Giovanazzi (2023), it is about developing a culture of integral education that enhances connectivity and cooperation. The educational sector is therefore called upon to support and strengthen pedagogical professions, promoting human rights and respect for the environment. This commitment is achieved through the increase of participatory processes and high-quality inclusive practices, which use the connectivity of different social contexts to expand knowledge, promoting an active and critical exchange that recognizes the potential and limits of collective intelligence.

The centrality of deep learning emerges which, in its generative matrix, configures an open and dynamic, cooperative system, capable of enhancing the story and self-knowledge, self-awareness, reflexivity, creativity and planning, in the dimensions significant experiences and culturally connoted relationships, aiming at the construction of "Knowledge-Sharing Communities" (Violante, Buttafuoco, Mannese, 2021), cohesive and supportive. It is about "generating communities to achieve the just ecological transition" (Buonomo, 2023).

It is clear that the environmental challenges of the 21st century represent an unprecedented threat to the well-being of the planet and future generations. Climate change, loss of biodiversity, pollution and depletion of natural resources require urgent and innovative political, economic and social responses. In this global context, who plays the role of key actor? And according to what power dynamics?

The European Union (EU) is committed to creating a regulatory framework that promotes sustainable development aimed at safeguarding the environment, society and the global economy. However, political efforts are often influenced by complex power dynamics represented by the antithetical interests of NGOs and industry lobbyists. This article aims to introduce current EU environmental legislation, aimed at steering economic activities towards greater environmental sustainability. In this context, the need for an educational intervention that can adequately prepare present and future generations to face imminent environmental challenges is highlighted. Therefore, we discuss the transformative potential of Generative Pedagogy beyond environmental education, aimed at the transition of the Human from a means to an end in itself, in the perspective of a profound understanding of both the increasingly interconnected and interdependent global issues and the generative union between Nature and Culture (Mannese, 2023b).

In this article, we aim to examine how Generative Pedagogy can effectively facilitate a fair and just ecological transition that restores the protagonism of Human becoming and, in general, of the Living, supporting the educational innovation necessary to prepare, accompany and support generations future to live, thinking and acting as an end in itself.

GLOBAL ENVIRONMENTAL CHALLENGES AND THE EU'S RESPONSE

The global environmental context is characterized by a series of interconnected challenges that require immediate and coordinated action. Efforts aimed at building green financial systems are increasing worldwide (Kawabata, 2023; Nedopil, Dordi, Weber, 2021). The EU has responded to

these challenges with ambitious sustainability goals, as demonstrated by the European Green Deal and the commitment to carbon neutrality by 2050 (European Commission, 2023). The Regulation (EU) 2020/852, one of the pillars of this strategy, was adopted by the European Parliament and the Council on June 18, 2020, and aims primarily to establish a framework to encourage sustainable investments in the European Union and promote sustainable and low-carbon finance.

EU Taxonomy

One of the highlights of Regulation (EU) 2020/852 (European Parliament and Council, 2020) is the European Taxonomy, which provides a classification system to guide investments towards sustainable economic activities. It is a classification system that aims to define a set of criteria to identify environmentally sustainable economic activities. It was introduced by the European Union (EU) to help achieve the objectives of the Paris Agreement on climate and to promote sustainable economic development in the EU. The European taxonomy is based on six environmental objectives:

- Climate change mitigation;
- Adaptation to climate change;
- Sustainable use and protection of water and marine resources;
- Transition to a circular economy;
- Pollution prevention and control;
- Protection and restoration of biodiversity and ecosystems.

Additionally, the Regulation on the European Taxonomy establishes four general conditions that an economic activity must meet to qualify as environmentally sustainable:

- Make a "substantial contribution" to at least one of the six environmental objectives;
- "Do no significant harm" to any of the other five environmental objectives;
- Comply with minimum safeguard measures;
- Comply with applicable technical assessment criteria.

Economic activities are assessed against these objectives and classified into four categories: sustainable, non-sustainable, subject to conditions, and awaiting assessment. Activities that substantially contribute to the EU's environmental objectives are considered sustainable, while those that do not significantly contribute to these objectives are deemed non-sustainable; activities subject to conditions are those that can be considered sustainable only if they meet certain criteria; activities for which there is not yet sufficient information to determine sustainability are defined as activities awaiting assessment.

Table 1 - Classification of economic activities based on the EU's environmental objectives

Activity Class	Definition
Sustainable	Contribute substantially to the EU's environmental objectives
Non-sustainable	Do not contribute significantly to the EU's environmental objectives
Subject to conditions	Can be considered sustainable only if certain criteria are met
Awaiting assessment	There is not yet enough information to determine sustainability

Source: Our elaboration.

Expert Groups

To ensure a fair classification of economic activities, and to promote the green transition through scientific foundations, the European Commission has established two entities that will play a crucial role in the implementation of the Taxonomy: the Technical Expert Group on Sustainable Finance (TEG) and the Platform on Sustainable Finance (PSF).

The TEG played its main role during the initial phases of the creation of the European Taxonomy. Composed of technical experts, including economists and scientists, its main role was to assist in defining objective criteria that determine whether an economic activity can be considered sustainable for investment purposes (European Commission, 2020). The group provided recommendations on a range of issues, including:

- the development of technical screening criteria to define which activities can be considered sustainable;
- the creation of guidelines for companies on how to report on their environmental impacts, thus facilitating sustainable investments;
- the recommendation of a methodology for calculating the climate impacts of investments.

The Platform on Sustainable Finance, on the other hand, is a permanent advisory body created by the European Commission aimed at further developing and managing the European Taxonomy. The roles of the PSF include:

- the continuous updating and refinement of the Taxonomy's technical screening criteria based on scientific and technological evolution;
- assisting in the assessment of the effectiveness of the Taxonomy and providing advice on its possible extension to other areas of sustainability beyond the environment, such as social matters and governance;
- supporting the creation of tools and resources to facilitate the adoption of the Taxonomy by companies and investors.

ROLES OF INDUSTRIAL AND ENVIRONMENTAL NGO LOBBIES IN THE INCLUSION OF NATURAL GAS AND NUCLEAR ENERGY IN EU TAXONOMY

Although designed to provide clear guidelines on the conduct of sustainable economic activities, this EU Taxonomy has sparked a lively debate regarding the inclusion of natural gas and nuclear energy as sustainable activities. On one hand, environmental NGOs raise concerns about the environmental impact of gas and the risks associated with nuclear energy, while on the other, giants in the energy sector emphasize the central role of these energy sources in the transition to a low-carbon future.

The lobbying pressure from the energy industry, after months of negotiations and participation in meetings within the scope of the Taxonomy's approval, played a key role in the decision of the European Commission to approve the Delegated Act 1214/2022, which establishes the conditions for adding certain nuclear and gas activities as transitional activities to those already present within the Regulation.

The decision of the European Commission highlights the influence of economic interests in the approval of such regulations and underscores our economy's dependence on the energy industry. Although introduced within the Taxonomy as "transitional," the economic activities related to natural gas and nuclear power delay the achievement of the European Union's environmental goals and underscore the governmental difficulties associated with efforts towards a greener economy.

Similarly to other EU green finance policies, the political process that led to this decision included extensive consultation of stakeholders and the contribution of experts. This is another example of entrenched interests resisting change, although their power has proven limited, evidencing the strong role of the European Commission in implementing an ambitious green finance policy. However, some scholars argue that financial institutions exert regulatory influence in the EU and can financialize sustainability, limiting progress towards greening the financial system (Ahlmstrom, Monciardini, 2021). The challenge for future generations, therefore, will be to create a market structure that can withstand economic and financial shocks and at the same time, be detached from economic activities considered harmful to the environment.

As emerged from the case of the European Taxonomy, the main obstacle in the fight against climate change is linked to the inability of governments to incentivize economies independent from

unsustainable activities. At the European level, the major obstacle is to resist the pressure of lobbies representing the interests of the industrial pillars of the EU's economy. To address the problems characterizing this complex global scenario, it is important to focus on creating knowledge. In this context, Generative Pedagogy emerges as a key tool to prepare future generations to understand and address the environmental, social, and economic challenges of the future. Direct experience and active involvement, key factors of this educational approach, can contribute to the development of an informed and responsible global citizenship, which does not see national borders in the context of global issues, but only the need to face the challenges that unite the entire population cohesively and collaboratively.

THE TRANSFORMATIVE POTENTIAL OF GENERATIVE PEDAGOGY

The dominant thought TINA (*There Is No Alternative*) persists in influencing our perception of financial, social, cultural and economic crises, proposing a false dilemma between socialism and capitalism as the only possible paths. Marjorie (2021) proposes an alternative vision, suggesting a shift from an ego-centric economy to a more ecological approach, which takes into account the needs of the planet and not just big businesses. The author talks about a generative economy that goes beyond the idea of resource and wealth extraction, focusing instead on a sustainable and regenerative model of life, where companies not only survive but thrive, respecting the environment and contributing to social well-being. This model requires overcoming judgment, cynicism and fear, fostering an environment where creativity and a sense of community can flourish. In line with this vision, Sanders (2015) also provided examples from the non-profit sector that demonstrate how the social mission can effectively integrate with market dynamics.

The current crisis, seen as a moment of dispersion and disorientation, requires a new generative freedom and a redistribution of value, to find meaning in a rapidly evolving world. Generativity offers a new temporal and spatial perspective, opening up to collaboration and the formation of strategic alliances that go beyond the mere logic of financial or geographical expansion. In this context, the capability approach, as defined by Sen (2014) and Nussbaum (2011), promotes human and social development through individual and collective empowerment. The ability to act and interact becomes a fundamental resource for a more just and integrated society, where each person is valued for their skills and abilities. The active and creative involvement of individuals in their learning process is at the center of the scientific-cultural paradigm of Generative Pedagogy theorized by E. Mannese (2016, 2019, 2021, 2023). The epistemological foundations and theoretical references at the basis of the system (Mannese, 2023b) are expressed on the methodological and operational level in approaches and practices aimed at promoting an education capable of generating learning and deep thinking, significant changes both at the individual and collective. The philosophical roots found in Husserl's phenomenology (1964) and the psychological ones that sink into Erickson's (1959) theory of psychosocial development of generativity evoke the ability to create and transform reality and pose the need to deepen the link between creativity, generativity and learning processes, underlining the importance of the extraordinary discoveries of dynamic neuroscience relating to neuroplasticity (Bach-y-Rita, 1967, 1969, 1972, 1995; Merzenich, 1983, 1984, 1999, 2001; Doidge, 2007, 2014, 2015, 2016), interpersonal neurobiology (Siegel, 2009, 2013) and relational consciousness (Noë, 2004, 2009, 2010).

Generative Pedagogy emphasizes the interaction between Nature and Culture, considering human experience rooted in both spheres and promotes meaningful learning as it enables the subject to modify the context. The transformative potential of Generative Pedagogy concerns not only the subject in his singularity but also the collective dimension of communities and, in general, society. It consists of training aimed at developing critical thinking and responsible action, in the perspective of the co-construction of shared meanings and the co-evolution of collective well-being and innovative solutions to complex social problems.

The Methodological Protocol of Generative Guidance and Organizational Systems (Mannese, 2023a) creates the conditions for setting up educational contexts to be conceived, planned, managed and finalized according to the principles of pedagogical generativity from early childhood. It outlines the apparatus of techniques and tools that can allow, in terms of practical applications, to implement strategies capable of activating generative learning. The ecological challenge of the education system is to solicit creativity, direct involvement, active participation, and collaboration, to generate critical thinking, production of authentic knowledge and self-training of the Human, through the discovery of talents, the exploration and construction of futures, and the definition shared interactive tracks for self-determination.

The emerging innovative and profoundly humanistic educational model therefore seeks to respond to the contemporary needs of meaningful and transformative learning, enriching educational practice with new epistemological and methodological perspectives.

The perspective of Generative Pedagogy and the World System (Mannese, 2023b) offers a theoretical-practical framework to effectively address the educational challenges related to the ecological transition and combat inequalities. In this context, we assume that the transition can be said to be fair and just if education, as an active and collaborative process, oriented towards self-realization and community participation, stands out in a World-System that frames educational dynamics more broadly, integrating natural, cultural and social influences, which shape pedagogical thought and action in a co-evolutionary way with the external environment. This integration amplifies the impact of education, making it more sensitive and responsive to the needs of a rapidly changing world and its ecological disorders.

According to Mannese (2021, 2023), pedagogical generativity focuses on dynamic learning as a development process that enhances the creative power and the transformative act of the subject-person who forms their talents by building their own identity. Self-determination and self-realization of one's life project are accomplished in an educational path that intertwines existential and community plots and discloses the unpredictable scenarios outlined by biographical trajectories capable of overcoming "cultural" boundaries and emancipating oneself from their biological roots. The search and the tension towards new horizons describe and connote the evolutionary dynamic towards Eidos. It is a non-linear, cultural, affective-cognitive and epigenetic learning, which takes the form of actions that transform the subject from a simple recipient of information to an active protagonist of his human development. This process is intrinsically linked to individual and collective freedom and responsibilities and evokes the personal and universal value of education.

Generative Pedagogy promotes an education that respects and values diversity, integrating knowledge into a system that is open and dynamic. This approach promotes the emancipation and formation of Knowledge-Sharing Communities, where learning is a collaborative and continuous process, focused on education for self-training to prepare individual and collective subjects to be active agents of change by developing a critical understanding of environmental policies and lobbying mechanisms, giving them the tools to actively participate in political decision-making.

The ecological transition as a Human transition

Educating for the ecological transition to combat inequalities through the lens of Generative Pedagogy and the World System requires an approach that deeply integrates the human and environmental dimension, which is based on the generative union between Nature and Culture, valuing each subject not only as a participant but as a person, author of his own life project, active agent in his own social context, architect of ecological balance.

The ecological transition arises as a process of metaphorization that allows us to internalize the concepts of sustainability and justice and transform them into concrete actions. Educational action is called upon to guide the subject in critically reflecting on the impact of their actions on the world. Through intentional and active actions, subjects can learn to recognize and respond to inequalities

and environmental challenges, and explore sustainable lifestyles to be adopted at a personal and community level.
Educating for self-realization through sustainable life projects means creating learning environments in which individuals can conceive of themselves as agents of change in their own lives and in the community, developing biographical and planetary skills (Balducci, 1985) that respect and enrich their environment. Epigenetic dynamism and plasticity require a flexible and adaptable education, capable of evolving in response to scientific, technological and socio-cultural changes, intentionally structured to encourage critical reflection, conscious action, reflective evaluation, through integrated curricula, projects based on participation in communities, collaboration with local organizations and territories, to address sustainability issues concretely.
Educating for the ecological transition through Generative Pedagogy implies a deep commitment to recognizing and nurturing the potential of each individual as a co-creator of the future, transforming education into an act of liberation and empowerment that promotes equity and sustainability in the connection between the human and its environment. The approach offers a deeply integrated vision of the subject and its context, of Life and Earth, highlighting the potential of each person to be a thought and action of change, beyond the limits of the Human reduced to a mere instrument.
The ecological transition as a Human transition defines an evolutionary, systemic, relational process capable of generating authentic transformations, the empowerment of talents and Knowledge-Sharing Communities to face immediate challenges and actively participate in the construction of fair and sustainable futures, such as creators of worlds.

CONCLUSIONS

Generative Pedagogy stands as an essential pillar in the ecological transition, integrating environmental challenges with social justice. This approach promotes an education that makes individuals active and responsible co-creators of their context.
In the framework of European policies, as highlighted by Regulation (EU) 2020/852 and the European Green Deal, the European Union is committed to driving sustainable investments and achieving carbon neutrality by 2050. Generative Pedagogy supports this vision by preparing citizens to be not only participants but active protagonists in responding to ecological challenges.
This educational model not only promotes the deep and transformative learning necessary to address the complexities of the contemporary world, but also offers the skills to manage the power dynamics that influence environmental policies. The discussion on the inclusion of natural gas and nuclear energy in the EU green taxonomy illustrates the conflict between industrial and environmental interests, showing the importance of education that trains citizens to critically evaluate the impacts of energy lobbies.
Generative pedagogy can strengthen community responsiveness to Green Deal policies, ensuring that innovation and sustainability are driven by critical awareness and participatory engagement, crucial to the well-being of the planet and future generations. This is the way to build Knowledge-Sharing Communities capable of dealing equitably with environmental challenges, strengthening the ability to overcome lobby pressures and address the complex networks of influences that characterize European policies.

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ACKNOWLEDGE

The article is the result of the joint work of the authors. However, it is possible to refer the Abstract, the Introduction and the paragraph "Transformative Potential of Generative Pedagogy" to Maria Ricciardi; the paragraphs "Global Environmental Challenges and the EU's Response", "Roles of Industrial and Environmental NGO Lobbies in the inclusion of natural gas and nuclear energy in EU Taxonomy" and the Conclusions to Chiara Villanacci.
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