Education in the Anthropocene IRN-WERA

Engel, Francesconi, Kraus, Portera & Wallenhorst

SUMMARY

The Anthropocene is a new geological epoch characterised by a transformation of the Earth's habitability for human life in society and for living organisms broadly. Contemporary biogeophysical knowledge, organised around the paradigm of rupture (tomorrow is not an extension of today, and sudden and irreversible ruptures may be ahead of us), casts doubt on education that is usually conceived around a linear paradigm.

The aim of this IRN is to advance research and research-based knowledge in the educational sciences, in light of the transformation of bioclimatic conditions in the Anthropocene. The goal is to advance educational research worldwide by working to reshape educational thinking and practice on the basis of new paradigms that include the crucial thinking of the Anthropocene.

The IRN comprises 40 researchers from 10 countries (the UK, Italy, China, Austria, Australia, Canada, India, Sweden, Germany and France). Doctoral students whose subject is education in the Anthropocene, under IRN member professors, will be invited to participate. We also wish to promote up-and-coming researchers to contribute to capacity building and the dissemination of results in high-level publications.

THE WORK SCHEDULE 2024-2025 HAS BEEN AS FOLLOWS

- 16 December: Educational initiatives in the Anthropocene (leader: Nathanaël Wallenhorst)
- 3 March: Theoretical approaches of education in the Anthropocene (leader: Denis Francesconi)
- 28 April: Aesthetics education in the Anthropocene (leader: Mariagrazia Portera and Anja Kraus)
- 2 June: The postdigital Anthropocene - empirical and theoretical approaches (leader: Juliane Engel)

4 ARTICLES ARE CURRENTLY BEING WRITTEN BY THE COLLECTIVE (FOR INFORMATION, SEE THE DRAFT ARTICLES BELOW).

THE WORK SCHEDULE 2025-2026 (IN PREPARATION)

- From Environmental Education to Education in the Anthropocene: Epistemological Shifts and Emerging Convergences
- Agency in the Anthropocene
- Towards radical alternative education in the Anthropocene
- Education as a social tipping point for the earth system?

This will give rise to 4 articles.

The challenges of an educational conceptualisation of the Anthropocene

Nathanaël Wallenhorst[1], Charles-Antoine Bachand[2], Caroline V. Bhowmik[3], David R. Cole[4], Matthieu Ferrand[1], Renaud Hétier[1], Kristiina Kumpulainen[5], Reinhold Leinfeld[6], Pegah Marandi[7], Samuel Lopes Pinheiro[8], Nathalie Popa[9], Cécile Redondo[10]*

And other IRN members "Education in the Anthropocene" of the World Education Research Association

Affiliations:

[1] Faculty of Education, Université Catholique de l'Ouest; Angers, 49000, France.

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[3]

[4]

[5]

[6] Department of Geological Sciences, Freie Universität Berlin; Berlin, 12249, Germany.

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[9]

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*Corresponding authors. Email: nathanael.wallenhorst@uco.fr

Abstract

In view of the scale of global challenges (climate change, ecosystem collapse, fragile global food security, migration, etc.), the Earth system sciences are increasingly important in today's world, and the concept of the Anthropocene is being drawn upon with increasing frequency. The proposed new geological epoch provides a new way of understanding how the Earth system works, a new way of interpreting the world (a socio-political space in which a wide variety of life can co-exist), and a new way of initiating long-term sustainable transformations through education. Put differently, the Anthropocene is an interpretative framework for reality that enables education that emphasises a systemic view onto the Earth System, including the Anthroposphere as a new Earth System sphere, and the ruptures that are foreseeable as a result of that knowledge. The Anthropocene presents a major challenge for education, bringing with it paradigmatic shifts, away from an „environment" view that surrounds our socioeconomic world in a distance, to an systemic view of an „all-of-us-world" (in German: from the Umwelt to the Unswelt").

This article proposes to open up a new field within the educational sciences, that of education in the Anthropocene. The aim is to enable the educational sciences to appropriate the concept of the Anthropocene in its biogeophysical foundations, but also to augment it with the singularities of this disciplinary field. The method used is a meta-analysis of the work of recent years, which attempts to renew educational problematisations in the light of the ruptures of this new geological epoch. The results proposed are a reversal of the relationship between the Anthropocene and education, so as to go beyond an educational appropriation of the Anthropocene and enable the educational sciences to make their contribution to the conceptualisation of the Anthropocene. Indeed, can education not be one of the vehicles for an intellectually honest hope that is equal to the challenges of the Anthropocene in these troubled times?

Keywords

Anthropocene epoch, education in the Anthropocene, politicisation of the Anthropocene, rupture

INTRODUCTION

On 20 August 2018, the first day of a new school year in Sweden, 15-year-old Greta Thunberg went on strike to protest against political inaction on environmental issues. She took to the steps of the Swedish Parliament with her strike placard until the next elections on 9 September 2018. What happened to make a young European girl question her elders' responsibility in such a way, to the point of breaking away from school – the institution which typically passes on humanity's relationship with the world?

Both her speeches and her writings (Thunberg, 2022) reveal her understanding of the scientific knowledge of the Anthropocene. This young Swedish woman read scientific articles in English on the Anthropocene published in the most prestigious international academic journals (*Nature*, *Science*, *PNAS*, etc.) (Aubin, 2024). She discovered scientific knowledge of which she was unaware, and learned of the way in which human life in society was being compromised, at that very moment. Associated to this knowledge, she also discoverded emotions (fear, panic, despair) and experienced a difficult period of climate anxiety. Knowledge awakened something in her, made her grasp the world differently, attuned her to certain realities of which she had so far been unaware. Dealing with those emotions, transforming her perception, finding agency through her advocacy gave her much more than just gaining knowledge. It is about caring, empathizing, relating, daring to express rage toward authority, raising alarm among peers, taking action against norms, inciting strangers all over the world to mobilize.

It was certainly the unifying paradigm of this knowledge – the threat of rupture (Hamilton, 2016) – which has been a powerful driving force behind his commitment. Her reading of scientific articles seems to have helped her understand something along these lines: tomorrow is not an extension of today, because we are on course to trigger sudden ruptures, with no turning back.

The Nordic education model has for singularity to cultivate and encourage students' and young people's agency and voice in society. There is an opportunity to speak up and taken seriously, regardless of young age. Thunberg decide to start a school strike. We can hypothesise that it is because the body of knowledge learned at school, in Sweden and other European countries and, indeed, around the world, is organised around a completely different paradigm: extension or continuity, which young people internalise by understanding something that can be formulated as follows: because tomorrow will be an extension of today, it is important to work well at school, which lays the foundations for the future (Wallenhorst, Hétier, Pierron & Wulf, 2023; Wallenhorst & Wulf, 2023).

What happened next? After the Parliamentary election, Greta Thunberg continued to demonstrate on Fridays. This was the start of the *Fridays for Future* movement, which spread to many countries where the demonstrations garnered media coverage. However, the media impact of these activists should not blind us to the fact that they represent only a small proportion of young people – another group who are still marked by learned apathy (Bright and Eames, 2022), ignorance, disinterest, "soft activism" and being environmentally conscious through small, everyday actions (not covered by media tabloids) towards the world's major problems (Bright & Eames, 2022).

As it was outside the walls of the school that Greta Thunberg acquired the knowledge that is truly fundamental to the future of our societies, the responsibility of the school appears to be called into question in its mission to institutionalise a relationship with knowledge. Wouldn't educational practice and thought benefit from being questioned on the basis of the Anthropocene epoch (Zalasiewicz et al., 2024a, 2024b ; Turner et al., 2024 ; Waters et al., 2024, Leinfelder 2020a,b) and its knowledge, so that they don't run the risk of annihilating schools and any undertaking to pass on knowledge or any ambition to transform our societies? And, in so doing, is it not an educational conception – a holistic process that addresses epistemological, ontological and axiological perspectives – of the Anthropocene that we need to embark on, one that aims to understand the Earth in order to change the world and sustain its survival?

Greta Thunberg's action mobilises three poles: scientific knowledge, schools and politics. These will provide the structure for the meta-analysis proposed in this article of the main works in the

educational sciences referring to the Anthropocene, in relation to the positioning of previous environmental educations, in terms of their interests and their limitations. The corpus studied is that of the main works in English, German and French covering the period from 2013 (with one of the first mobilisations of the Anthropocene in education by Leinfelder, 2013) to 2024. In the first part, 'The Anthropocene between science and politics', we begin by (1) exploring the paradigm of rupture inherent in the Anthropocene, before (2) proposing a politicisation of this conceptual tool based on the chronostratigraphic debate on its dating. Then, in the second part, 'The Anthropocene in the educational sciences', (3) we look at the way in which the Anthropocene has been mobilised in recent years within the educational sciences, before (4) proposing a continuation of the work of educational conceptualisation of the Anthropocene. We conclude with a third part, 'Educating in the Anthropocene', comprising two sections. A reflection (5) on the way in which the Anthropocene is an analyser of the problematic relationship to knowledge in schools and (6) an exploration of some of the foundations of an education *in* the Anthropocene, which we can hope will be the seeds of necessary societal change.

I. The Anthropocene: at the crossroads between science and politics

1. The biogeophysical material impact of the Anthropocene

The concept of the Anthropocene – a proposed new geological epoch characterised by a lasting change in the conditions of Earth's habitability as a result of human activities – was first coined by Earth-system scientists, under the impetus of atmospheric chemist Paul Crutzen (2002), and has been worked on by the geological community and its official *Anthropocene Working Group* since 2008 (McCarthy, 2024).

The Anthropocene is a particularly complex conceptual tool, worked on by many scientific communities, whose understanding by a broad public can be facilitated by certain simplifications. It refers to the links between the climate, the biosphere and societies (Steffen, 2018) and their respective dominant processes: runaway change, collapse and acceleration (Testot & Wallenhorst, 2023). Scientifically well-founded and holistic in scope, it is also the conceptual vehicle for conveying the concerns of scientific communities about the fragility of the Earth's habitability to humans, and is sometimes used to reach out to the public or challenge public authorities. The Anthropocene also comes with a number of other conceptual tools, also at the intersection between scientific, political and existential dimensions, such as planetary thresholds and boundaries (Rockström, 2009; Steffen, 2015), the sixth mass extinction (Barnosky, 2011; Ceballos, 2017) and the transformation of economic models (Rockström, 2023). However, the use made of the Anthropocene in political circles is neither uniform nor unidirectional. It can be used to develop both Promethean, ecomodernist and policies of growth (Shellenberger, 2015; Ellis, 2023) and post-Promethean policies characterised by a critique of capitalism and the need for economic degrowth (Weber & Kurt, 2015; Parrique, 2019; Vogel & Hickel, 2023).

The geological epoch of the Anthropocene marks a rupture with the previous geological epoch, the Holocene. Because we face the prospect of ruptures (Hamilton, 2016; Chakraborty, 2024), we have to think a shift in the way in which our societies are organised, helping to contain the bioclimatic runaway we currently see, and allowing the human adventure to continue to roam across the Earth's surface (Wallenhorst, 2019, 2020, 2021, 2022, 2023). The Anthropocene is radically changing what we should expect from the human experience. Even if there are several possible futures, and even if the disappearance of the species is not guaranteed, it is not impossible, without a bifurcation in the way our societies are organised, it remains relatively certain that the Anthropocene will bring a significant increase in suffering and death in many parts of the world. This raises urgent questions about the educational finalities to be considered. Given the seriousness of the situation, we need to work to counter the simplistic ideas that fuel populism (Leinfelder & Hamann 2025).

The Anthropocene – a new geological epoch characterised by a permanent change in the conditions of Earth's habitability for all living organisms and for human life in society – refers to this biogeophysical reality. The time seems to be drawing near when the Earth system will continue its transitions beyond the influence of any human action. In other words, contrary to what is suggested by the very etymology of the term 'Anthropocene', human actions will only be the primary geological force for a very short period (a mere century if we date the start of the Anthropocene in 1950). This biogeophysical knowledge enables us to understand the extent to which the future is compromised and how much is at stake in the very fact of being able to continue to live together on Earth, as a society.

2. THE ANTHROPOCENE: A CONCEPTUAL TOOL TO BE POLITICALLY MOBILISED ON THE BASIS OF THE CHRONOSTRATIGRAPHIC DEBATE ON ITS DATING

After years of chronostratigraphic work by the Anthropocene Working Group (AWG) (Zalasiewicz, 2008, 2014, 2017; Zalasiewicz, Williams, Steffen & Crutzen, 2010; Zalasiewicz, Williams, Haywood & Ellis, 2011; Zalasiewicz, Williams & Waters, 2014), recent scientific news has been marked by AWG researchers' proposal to confirm the start of this new geological epoch as 1952 by voting on the proposal for a GSSP (*Global Boundary Stratotype Section and Point*, otherwise known as the 'golden spike'), using the sediments at the bottom of Crawford Lake in Canada as chronostratigraphic evidence (McCarthy, 2023). There is still some time to go before the Anthropocene becomes part of the geological time scale and is learnt by most of the world's schoolchildren (Waters, 2023). On 5 March 2024, the International Commission on Stratigraphy (ICS) announced that it was rejecting the proposal of the Anthropocene Working Group (AWG) for formal recognition of the Anthropocene as a geological epoch. This concept, as developed by the AWG since 2009 with the aim of giving it a chronostratigraphic definition, retains great importance even if it is not officially recognised by the ICS. The reasons given for its rejection have less to do with the chronostratigraphic evidence than with the epistemological broadening implied by a chronostratigraphic definition and its societal consequences: (1) 70 years is too short a time span for an epoch in the geological time scale, and stratigraphy deals with the past, not the future; (2) human impacts on the planet go back hundreds of thousands of years; (3) the nature of the analysis is multidisciplinary, representing not only geology, but also Earth system sciences, climatology, biology, etc, as well as humanities and social sciences disciplines that engage societal reflection; and (4) the formalisation has political and economic implications.

A series of counter-arguments were then put forward: (1) the Anthropocene does indeed have a substantial chronostratigraphic record, clearly distinct from the Holocene and recognisable within sedimentary layers from the 20th century onwards; (2) the Anthropocene refers to a geological time insofar as its transformations have already caused the Earth system to evolve irreversibly beyond the variability of the Holocene; (3) the transformative effects of the Anthropocene cannot be erased or overprinted (current changes will have long-term effects : on the order of tens of thousands of years for the carbon cycle for example); (4) the Anthropocene does indeed represent a unique interval, it is a geological epoch materialised in sedimentary strata; (5) to be faithful to the history of the Earth, geology must take note of the planetary transformations underway (Zalasiewicz, 2024 ; Turner, 2024): « Regardless of the Anthropocene formalization, the stratigraphic signals of the planetary change will keep recording in rocks and quite likely more stratigraphic proxies and deposits will be found as scientific research on the Anthropocene proceeds and as long as society keeps on reproducing under the capitalist mode of production. » (Soriano, 2020, p. 8). It is essential to note that this remarkable controversy over the Anthropocene reveals the undeniable potential of the Anthropocene as a pedagogical tool for mobilising citizen awareness and generating positive social action because it is considered in a systemic way (and that systems thinking skills are connected to "agency in the Anthropocene", White et al., 2025). Moreover, the controversy is also useful in science education for exploring how is knowledge built and how science works.

Of the alternative conceptual proposals to the Anthropocene, the Capitalocene has received most attention. Put simply, it points the finger for the advent of the Anthropocene not at an undifferentiated *anthropos*, but at capital. Indeed, it is the limitless accumulation of capital, starting with an Industrial Revolution built on the burning of fossil fuels, that has altered the very functioning of the Earth system. The idea is attractive: the Capitalocene offers a politicisation of the Anthropocene. However, the concept may cause us to lose sight of the *anthropos* – not the few who actually bear responsibility for this new geological epoch, but all those who will bear its consequences: all human beings on Earth, starting with the most vulnerable. What is more, there is a fundamental difference between the Capitalocene and the Anthropocene. The concept of the Anthropocene already has a real *presence*, in the scientific and political debate. This concept is currently being explored by many scientific communities. In the academic search engine Google Scholar, for example, at the end of February 2025, there were 497 000 publications mentioning the term 'Anthropocene', compared with fewer than 20 700 for 'Capitalocene': a ratio of 24 to 1[1].

By politicising the Anthropocene, it is possible to show, within this conceptual tool itself, the deep-rooted causes of the threat to Earth's human habitability. There are over 200 alternative conceptual tools (Testot and Wallenhorst, 2023) that can be mapped and organised into eight main groups, each of which points to a key area of responsibility in the transformation of bioclimatic living conditions: Capitalocene (profit and speculative capitalism), Plantationocene (slavery and the post-Colonial world), Thermocene (thermo-industrial modes of energy production), Poubellian (overconsumption and chemical pollution), Phronocene and Agnotocene (the weight of lobbies in the production of knowledge and ignorance), Thanatocene (the impact of wars and the ability to wreak death on a massive scale), Pathocene (the gradual deterioration of health), and finally, the Entropocene (the impact of the digital age). All of these terms address items of the Anthropocene, but are just subsets of the Anthropocene. The interesting thing about the bottom of the Canadian lake is that it shows the sedimentary traces of numerous alternative -cenes proposed in the human and social sciences. The lake's sediments were altered in the 18th century, with the adoption of agricultural practices, and again in the 1870s, when the Crawford family of English immigrants set up a sawmill and cleared the land. A quantum leap occurred in the 1950s, when radioactive materials, plastic fibres and large quantities of heavy metals and ash from the burning of coal by thermal power stations became visible. The Anthropocene, as the AWG geologists are currently conceptualising it with the proposal of this 'golden spike', does indeed indicate some of the political, economic, social and cultural reasons for the destruction of life and the runaway climate that are destroying the Earth's habitability.

The 'alternative major -cenes' proposed in the human and social sciences thus appear to be so many facets of the Anthropocene. *Anthropos* here has a teleological relationship with the Anthropocene, which compromises the sustainability of human life in society. The current state of the chronostratigraphic debate on its dating opens up the possibility of politicising the notion of the Anthropocene. All these different facets of the Anthropocene demonstrate the extent to which we are dealing with a 'total social fact' (Mauss, 1925; but also Charbonnier, 2017 and Macé, 2022). In particular, they highlight the extent to which the social sciences are essential (Lövbrand, 2015) to understanding the very physics on which the Earth system operates.

II. The Anthropocene in educational sciences

1. THE ANTHROPOCENE AS A CONCEPTUAL TOOL FOR EDUCATION

The Anthropocene epoch is one of three levels of comprehension of an integrative Anthropocene

[1] The idea of a capitalian age/stage in the new Anthropocene epoch is interesting (Soriano, 2020). It acknowledges the fact that the Anthropocene will have an impact on every human and non-human form now onward while recognizing that capitalism has indeed played a determining role in the emergence of this new epoch and that not every human is responsible at the same level for its apparition.

concept that presently coexist in the scientific literature (Leinfelder, 2020a, b). The *systemic Anthropocene* emphasises the threat to Earth's habitability for humans over the course of this century. It refers to a particular science-based epistemology, whose objective is not the *production* of knowledge but its broad *dissemination*. The researchers who use this concept (Rockström, Steffen, Barnosky, Ceballos, etc.) organise knowledge into narratives: the very narratives that will enable it to be passed on. The *chronostratigraphic Anthropocene* refers to the geological debate on the dating of the dawn of this new geological epoch. The term *Anthropocene*, which has been used in the human and social sciences for the past fifteen years, has two facets. Firstly, it can be divided into concepts used in a raft of different disciplines: philosophy, sociology, psychology, history, education and so forth. Secondly, as we have seen, the mobilisation of the 'Anthropocene' within the human and social sciences is associated with the construction of alternative concepts such as the Capitalocene, the Plantationocene, the Thanatocene, etc., in an attempt to more accurately pinpoint where the responsibility for the advent of a new geological epoch lies.

From the point of view of epistemic uses, these three levels of comprehension of an integrative Anthropocene concept are linked to an educational debate (Wallenhorst & Wulf, 2023b): (1) once the voting process is completed (which still may need some other rounds), the chronostratigraphic Anthropocene will become part of the geological time scale learnt by pupils in the various countries of the world at school (formal education). (2) The systemic Anthropocene has had an impact on education on two levels. It is partly linked to non-formal education and informal learning, since many young people have been involved in militant associations. However, it has also had a direct impact on schools, as mentioned in the introduction, since the broadly publicised 'school strike' was sparked by Greta Thunberg's discovery of the concept, when reading biogeophysical articles on the Anthropocene. (3) Finally, the concept of the Anthropocene entered the field of educational science a few years ago. Sometimes, the relationship with biogeophysical knowledge is a distant one, making the conceptualisation only approximate (with a concept that is not very functional, referring to the uncertainties and fragilities of our time, and calling for remedial actions organised around the concepts of sustainable development or transition). However, the concept also makes it possible to think in terms of real ruptures.

The Anthropocene poses a growing number of questions for education (Leinfelder 2012, 2013, 2018, 2020a, 2022): (1) Does the looming spectre of collapse lead to engagement or disengagement? Should young people be worried? (Bendell & Cavé, 2020). (2) How can we pass on a vision of the world that is adapted to the present reality, informed by scientific knowledge, while also encouraging mobilisation and eco-citizenship (Slimani, Barthes & Lange, 2021; Lange & Kebaïli, 2019)? Building on the tradition of 'education to...' (Barthes & Alpe, 2012), how can we foster a reasoned opinion of the Anthropocene and its implications for human societies? How can we ensure that the relationship with the bioclimatic knowledge of the Anthropocene stimulates creativity, as could the knowledge in the context of education for sustainable development (Pache, 2016), rather than leaving us in a state of paralysed apathy? (Bright & Eames, 2022) Should we, as educators, focus on empowering children and fostering their confidence in the future, or should we instead concentrate on a form of *tragic* activism (laboring without [much] hope) (Warnick, 2023)? (3) What bodies of knowledge should be passed on to pupils and how should the scale of the risks be addressed? At what age? (Miléř & Sládek, 2011).

(4) Because the concept of the Anthropocene brings science and politics together, increasing numbers of education researchers are considering how to rethink education in depth, given the gravity of the biogeophysical phenomena of the Anthropocene (Mychajliw, Kemp & Hadly, 2015). An axiological approach has been developed, proposing a rejigging of educational thinking in light of the systemic challenges posed by the Anthropocene (Hétier, 2021; Wulf & Zirfas, 2020; Wulf, 2021, 2022a, 2022b; Tannock, 2021; Paulsen, Jagodzinski & Hawke, 2022; Wallace, 2022). This new axiological approach may relate to the type of citizenship in reference to which to educate younger generations, with international variations (Kovách, 2021). For various researchers, the Anthropocene is, as such, a pedagogical tool for supporting profound transformations in the way in which our societies are organised (Dalby, 2016; Jagodzinski, 2018; Lysgaard, Bengtsson & Hauberg-Lund Laugesen, 2019) and

a study of pedagogical approaches for developing forward-looking skills with regard to the Anthropocene has been carried out (Priyadharshini, 2021; Hervé, 2022). Some researchers suggest deploying a teaching strategy from the Anthropocene onwards – one that is capable of rising to the challenges of the ecological and climate emergency (Landivar, 2021; Prouteau, Hétier & Wallenhorst, 2022) or condensing Anthropocene knowledge so that it can be drawn upon in teaching situations (Wallenhorst, 2021; Testot & Wallenhorst, 2023). In the link between education and the Anthropocene, we regularly focus on narratives (Jagodzinski, 2018; Wallenhorst, 2022, Leinfelder 2018, 2022), and one of the key contemporary issues concerns the educational methods for bringing about an ecological bifurcation or redirection (Monnin, 2023). And the question is to know what the students should know and be able to do as active citizens?

2. FURTHER CONCEPTUAL CLARIFICATION IN EDUCATION SCIENCES

If we are to commit ourselves collectively to rethinking education for the Anthropocene, it is important to continue the work of clarifying the concept, so we can grasp the Anthropocene effectively without falling into the same shortcomings as education for sustainable development. While the latter has raised awareness of environmental issues, it has not achieved its full potential in transforming the world and the advent of post-capitalist and post-growthist societies, trying to contain the runaway of the Earth system. Through its association with 'good practices', the most important of which is recycling, education for sustainable development has comforted a whole generation in practices of over-consumption, promulgating the idea that as long as the waste is properly sorted, wasteful consumption is not a problem and has failed to foster real collective capabilities let alone substantial societal changes.

The pursuit of a conceptualisation of the Anthropocene in the educational sciences, the aim of which is to move towards an educational conceptualisation of the Anthropocene (i.e. one which is of use in other scientific disciplines and useful on a social level in the construction of public policies) and contribute to the formalising a new disciplinary field within educational sciences, can be carried out at three levels.

1st level. Looking at the Anthropocene on the basis of the chronostratigraphic and systemic debate reveals the unifying paradigm of this knowledge: rupture. However, as has already been mentioned, the entire body of knowledge taught at school is organised around a linear (and thus, by definition, unbroken) paradigm. This is an important observation: it means that it is not only the capitalist and growthist economic logics that are incompatible with the biogeophysical reality (Parrique, 2019), but also all our educational practices and conceptions. This means that educational sciences need to be rebuilt on other paradigmatic foundations. In fact, educational practices and therefore educational thinking are the result of the entry into the previous geological epoch, the Holocene, whose bioclimatic stability and predictability made it possible for humans to control ecosystems and generate the agricultural surpluses that led to the emergence of civilisations – admittedly, an evolution which was constrained by the destruction of the megafauna (Testot, 2017, 2023). Is it not the case that the entry into a new geological epoch characterised by a change in bioclimatic conditions of existence brings profound epistemological ruptures (as consequential as those that led to education – this has far-reaching consequences, particularly in terms of renouncing the projection of our existence into an unending time, or preparation for uncertainty)?

2nd level. In the concept of the Anthropocene, informed by the debate in the social sciences, do we not have an ideal conceptual tool to guide civic and political education? As it weaves together biogeophysical and socio-political knowledge about the links between the climate, the biosphere and our societies, the Anthropocene appears to be an important conceptual tool we have that is both holistic and science-based. Because our scientific knowledge of the Anthropocene is steering us towards a rupture, it is politically difficult to ignore it. Therefore, the Anthropocene is an interpretative and operational framework for challenging and reorienting public policy, supporting a politicisation of

ecological issues commensurate with what is at stake, nurturing the struggles for justice, but above all devising and deploying the policies of degrowth (Parrique, 2022), which are the only strategies capable of containing the bioclimatic runaway (with the necessary dismantling of whole sections of our economy – Bonnet, Landivar & Monnin, 2021; Monnin, 2023). The Anthropocene concept as an epoch helps to educate critical thinking and enables us to move away from current transition policies, which are illusory and cannot contain the bioclimatic runaway – and therefore in no way enable us to sustain human life in society.

3rd level. The complex issue of the Anthropocene must be accessible to as many citizens as possible around the world. This is an educational and pedagogical task that must incorporate biogeophysical and sociopolitical data relating to the risks of the fragilisation of living conditions. The biogeophysical and socio-political knowledge of the Anthropocene, while transforming our understanding of the Earth system, is also reshaping our understanding of human existence – and therefore of human educability. The two are now inextricably linked. It can be said that human existence, on the one hand, and the Earth system, on the other, cover these three fundamental dimensions. Firstly, there is the planetary dimension, which relates to the climate and whose main process is runaway climate change. Then comes the terrestrial dimension, with the collapse of the biosphere's ecosystems as the main process. Finally, there is the global dimension of our societies, where the dominant process is acceleration. The three processes (runaway, collapse and acceleration) feed into one another and have an impact on the three dimensions of the human adventure (existence, space and time).

Je ne suis pas sûr que vous ayez besoin de cette référence à Ricœur ici, je pense que vous pouvez exprimer l'idée sans elle. Ou si c'est une idée particulière / spécification théorique que vous voulez intégrer à ce niveau de la discussion, peut-être inclure quelques mots clarifiant ce que Ricoeur apporte. En tant que lecteur, je ne comprends pas très bien pourquoi il apparaît dans ce passage.

On the strength of this understanding of the inseparable destiny of the Earth system and human existence, in order to enable a 'good life, with and for others, within just institutions' (Ricœur, 1990, 7th study), the purpose of politics with which education is partly linked, it is important that:

- *Our planet's climate* be stable and favourable, as it has been for the last 11,700 years during the Holocene, the previous geological epoch (interglacial).
- *The ecosystems of the earth's biosphere* live in balance between a wild and cultivated state, conducive to symbiosis with human life so that we can generate agricultural surpluses.
- *Our globalised societies* be organised to prepare for the future in a responsible and hospitable way, through democratic institutions that take account of planetary boundaries.

Contemporary political trends are undermining each of these fundamental dimensions of existence. Does this not require the educational system to take a stand, both for the sake of the transmission of scientific knowledge and the very possibility of a future, and enabling young people to inherit a world that is hospitable, sustainable, humane and enjoyable?

III. Education in the Anthropocene

1. The Anthropocene as a symptom of the problematic relationship to knowledge in schools

The extent and precision of knowledge about ecosystem collapse and runaway climate change are considerable. Although the situation is particularly grave, there is still considerable doubt as to the anthropogenic nature of bioclimatic rupture. For example, the '*Fractures françaises*' survey, published by Ipsos & Sopra-Steria in partnership with Cevipof and the Fondation Jean Jaurès, involving 12,000 citizens representative of the French population, shows that only 61% of French people believe that the climate crisis is linked to human activity. Another study, also published in 2022 (Obs'COP, edited by Didier Witkowski and Daniel Boy), shows that 63% of French people believe there is a correlation between climate change and human activity.

We are faced with an educational paradox that has political consequences: the knowledge exists, but we have not sufficiently integrated it, which does not help us to take decisive and appropriate action. The knowledge is there, at the tips of our fingers, in scientific articles, libraries and IPCC reports. Few students of school-leaving age are capable of taking stock of the state of the Earth system. Few are able to explain the interactions between the climate system, the biosphere and human societies. This is because this knowledge is not widely covered in school curricula (Testot & Wallenhorst, pp. 343-348), but also because we have not worked hard enough to develop a critical, problematised, historicised and politicised relationship with this knowledge.

Without schools to institutionalise a relationship with scientific mediation, don't we run the risk of understanding how the future will be in the Anthropocene through our senses alone? Because it has been hot and dry in recent summers, we would have understood and would *now* be in the process of initiating the long-awaited major transition that would enable us to understand bioclimatic change and the need to contain it. Yet it must be said that our senses are poor informants when it comes to understanding our changing planet. Moreover, they only allow us to gain partial awareness. Looking at the coming decades from the perspective of what we have experienced in recent years immediately means we are trapped in the linear paradigm mentioned previously (the paradigm of continuity) as if the environmental problem could be summed up as an increase in average temperature, decade after decade.

The institutionalisation of biogeophysical knowledge of the Anthropocene within the school system is currently lacking beyond the strictly chronostratigraphic question on the dating of the Anthropocene's onset by the community of geologists . Given the scale of the shifts currently under way, we also need to ask whether biogeophysical knowledge alone is sufficient, because we need to identify the causes and see what levers are available to us to drive political action. We might even wonder whether it is possible for students to understand what is happening to the matter that makes up the Earth without drawing upon knowledge from the social sciences. We might ask whether school curricula are overly influenced by the promises of sustainable economic development that do not take sufficient notice of the planetary boundaries and the risks inherent in growth – and bring the students themselves to ask those questions.

School, the institution through which knowledge is primarily shared, does it allow us to relate sufficiently to these forms of knowledge to integrate them into our thinking? Thus, our education systems don't they appear to be faced with a choice? Do we place sufficiently the biogeophysical and socio-political knowledge of the Anthropocene at the heart of our students' education, in order to bring about the essential transformation in our societies (in addition to work on aspirations, capabilities, attitudes and political thinking)? Schools, which were institutionalised in the 19th century, are steeped in the narrative of progress and historically have not always contributed to social transformation toward justice (Matasci, Banderira Jéronimo, Gonçalves Dores, 2020). They perpetuate a problematic relationship with the world by developing a strict instrumental rationality (Curnier, 2017, 2021). They teach us that we can act on our environment in whatever way we please, to mould it to our needs – without any concern for the systemic component and without any awareness of our ineluctable immersion in the natural world with which we are one. Isn't is this instrumental rationality that lies at the beating heart of contemporary capitalism (Hétier, 2021), which is destroying the bioclimatic conditions upon which our existence depends?

2. SOME CHALLENGES FOR EDUCATION IN THE ANTHROPOCENE

2.1. Firming up the links between education and politics

The question is how to rethink education in such a way that it can play its rightful part in addressing the greatest challenge in the history of mankind: containing the bioclimatic runaway in such a way not only to ensure Earth's habitability but to foster just social orders respectful of the diversity of human

collective aspirations. The changes needing to be made here are by no means cosmetic or superficial: as described above, educational thinking and practice, as a whole, needs to be overhauled as we enter a new geological epoch which requires an awareness of human responsibility. The task is immense, and can only be accomplished through collective reflection and debate, with the aim of creating new norms. What is the purpose of education? Is it to allow pupils to learn to read, write and count? Is it to shape our children to fit our societies, which are currently structured around consumption, in the process of destroying the bioclimatic conditions that support our very existence? Is it, on the other hand, to give them the tools to help transform our societies? In itself, though, this raises serious questions, because children should never be viewed as a means to an end that is beyond them. They are the very purpose of education, but always in a process of decentring themselves. By refusing to give students the tools they need to create the world they will want to inhabit while understanding the issues that the Anthropocene brings but also the power relations that are working against a real social transformation, education is working against the citizen they are becoming.

While environmental education and education for sustainable development have remained rather silent on the effects of capitalism on the Earth's habitability (Arenas, 2021) – and have even sometimes been associated with misleading ecological education as part of *greenwashing* (Álvarez-García & Sureda-Negre, 2023) – the concept of the Anthropocene, with its bioclimatic knowledge, brings something new to the table. The Anthropocene raises questions for educators, teachers and education systems as a whole about the relationship between education, politics and social transformation (Wallenhorst, Hétier, Pierron & Wulf, 2023). Education systems ought surely to undergo a radical reorientation in light of the moral and ethical challenges posed by the Anthropocene (Olvitt, 2017). How can teachers support political reflection on the biogeophysical reality? Is it then possible to be committed to the transformation of societies through problematisation that respects students' freedom of conscience (Hétier & Wallenhorst, 2023; Fabre 2011, 2016, 2017)?

Let us illustrate these issues with an example. Today, the 'good students' produced by the school system can gain access to the highest and most prestigious schools (including business schools), join the banking world, become traders and speculate on food commodities, which are becoming increasingly rare – all completely legally. Indeed, it is allowable – and even often rewarded – to become rich through the impoverishment of populations throughout the world. How do you tackle this type of issue in a school where teachers have to remain neutral? This ‘educational neutrality’ (understood differently in different countries), whereby a teacher cannot take a position on the conduct of world affairs, is now part of a society in which it is possible to appropriate ever more resources, building mountains of gold and silver for the exclusive benefit of a few. But in such a world, to not take a position is still taking sides for the world as it exists (Freire, 1968; Kendi, 2023). Even UNESCO, in its recommendation for peace education of 2024, ask for an axiological position of educators. How can neutrality make way for engagement in teaching ethics? How can the teacher's 'tools' move away from digital resources, making room for scientific knowledge, critical thinking and problem-solving (Fabre, 2011).

In view of what we know about the Anthropocene, it is patently obvious that a genuine educational revolution is required (O’Brien, 2013). The challenge, then, is to develop a radically alternative form of education. In this case, however, it is not merely a question of wresting free of the web of capitalism to enable those select few who benefit from the current system to rediscover harmony within themselves and with the living world. We need to conceive of a type of education that strips capitalism of its power, by controlling the pleasure of taking, possessing or destroying, as proposed by French philosopher Renaud Hétier (2021, 2022). Here one of the issues is that education must buy as time to think outside of the current situation, must afford us an escape by giving us time to think and act (Cole, 2021).

2.2. Developing Anthropocenic literacy

What is needed, then, is genuine Anthropocenic literacy, linking science and politics, so we can understand the influence of human activities on the Earth syst

em and vice versa. Such literacy would require access to knowledge about how the climate and biosphere work, not forgetting the political and social interpretation of biogeophysical reality, as mentioned above. It would mean learning to live with the uncertainty of the future (and we can imagine a pedagogy that embraces uncertainty – Morin, 2020); knowing how to think about the complexity of the biogeophysical and geopolitical processes that are underway; knowing how to transform the world of the future, and how to build up our resilience to the current changes in the Earth system, without ever giving up on our efforts to contain them; knowing how to contribute to the social transformation required by the Anthropocene while remaining aware of existing inequalities and the potential risks of exacerbation posed by certain technological solutions. Such literacy would include (Gibert, 2020; Testot & Wallenhorst, 2023, p. 343-348, Sippl & Wanning 2023 ; Masny & Cole, 2009):

- (1) General scientific literacy (familiarity with how scientific knowledge is produced, access to scientific knowledge and awareness of how it is popularised by the various media, knowledge of how the idea of progress has been problematic, identifying fake news, populism, etc.).
- (2) Earth system literacy : climate literacy (awareness of the systemic functioning of the climate in its interplay with the biosphere and societies) ; biospheric literacy (awareness of the systemic functioning of the biosphere in its interplay with the climate and societies) ; energy literacy (knowledge of ways of capturing energy, lifestyles linked to energy sources, sustainability) ; and technological literacy (consciousness of the role of technology in altering the Earth system, of the avenues currently being explored, and the ability to reflect). Here it's important to have an understanding of the rhythms (how the rhythms of individuals, societies and nature affect and are affected by the challenges of the Anthropocene): the ritmanalysis ( ) can contribute to the interpretative articulation of the different rhythms in an education in and with the Anthropocene.
- (3) Political literacy (knowledge of how institutions work, where power does and does not lie in politics, a politico-social interpretation of biogeophysical reality, developing a critical mindset with regard to increasingly insidious neoliberal tactics, adopting political and citizens' agency and their power to create social changes to implement adaptation and mitigation strategies and to identify the politico-social levers needing to be mobilised, etc.).
- (4) Economic literacy (knowledge of different economic models, degrowth and post-growth theories).
- (5) Emotional literacy (the ability to label the emotions we experience as a result of knowledge, in order to recognise them, integrate them and regulate them).
- (6) Futures literacy (the ability to imagine, explore and prepare for different possible futures. It holds an understanding that future is not predetermined but can be shaped through knowledge, creativity, critical and strategic thinking).

Conclusion

A meta-analysis of the work carried out in recent years using the concept of the Anthropocene in education highlights a number of points.

1. When the Anthropocene is mobilised in education on the basis of biogeophysical ruptures, it calls into question those involved in education, the knowledge transmitted and the aims of education. It is a powerful political stimulus for revitalising the relationship between education and the community. Today, more than at any other time in history, education appears to be the guarantor of democratic preservation. Indeed, it is in our relationship with knowledge that the democratic struggle is fought.

When we can no longer agree on the facts, we leave the democratic fold and gradually give way to the spectre of totalitarianism.

2. The Anthropocene, as a new geological epoch reconfiguring the Earth's habitability, and not as an object of learning, renews - if not exceeds - the field of 'education to'. It is a field of educational sciences that needs to be established at international level (the Anthropocene being a global and systemic issue), with the aim of reorienting the educational sciences as a whole. This is the purpose of the International Research Network (IRN) 'Education in the Anthropocene' that we set up with the World Education Research Association (WERA) in April 2024, which currently comprises 20 researchers from 10 countries (United Kingdom, Italy, China, Austria, Australia, Canada, India, Sweden, Germany and France).

3. Today, wherever we look, massive transformations are taking place as a result of the various ways in which humans are forcing the Earth system's ecological processes (IPCC, 2021, p. 8, 15, 18, 82; Sjoukje, 2022). We are seeing an increase in the intensity and frequency of heatwaves, droughts and ruptures of the water cycle, torrential rain and landslides, hurricanes and earthquakes, partly caused by the melting of the ice caps (Munier, 2020). While the Anthropocene brings us back into touch with reality and allows us to understand the planet's entry into an epoch marked by a decline in the Earth's habitability, it is important not to become locked into a fatalistic reading of the Anthropocene. It's a question of thinking about how to thwart determinisms, as an extension of the educational tradition, in order to devise 'counter-ruptures' that are sufficiently powerful to contain the runaway nature of the Earth system. So it's not just a question of rethinking education in the light of the tragedy of the destruction of bioclimatic conditions for existence. It's about enabling educational power to be at the heart of the scientific, economic and social challenges facing society – including in order to enable the creation of a new world or the emergence of new ideas while remaining rigorously grounded in reality, its complexity and the power relations that currently exist. The Anthropocene requires action and educational thinking, precisely at the point where the future seems to be disappearing – and this is the whole issue of pursuing an educational conceptualisation of the Anthropocene.

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Education in Planetary Societies

Juliane Engel[1]*,

And other IRN members "Education in the Anthropocene" of the World Education Research Association

Affiliations:

[1] Goethe-Universität Frankfurt, Institut für Pädagogik der Sekundarstufe, Germany.

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*Corresponding authors. Email: j.engel@em.uni-frankfurt.de

Abstract

[**Education in Planetary Societies**]

This article explores educational figures in the context of planetary crises, analyzing how subjectivation unfolds at the intersection of climate change, digitalization, and global inequality. Drawing on empirical research with youth, it reconstructs how young people articulate futures, nature, and environmental justice in digital media. The paper challenges dominant educational discourses by conceptualizing education as relational, power-sensitive, and entangled with planetary transformations in the Anthropocene.

A particular focus is placed on postdigital educational processes, in which analog and digital worlds can no longer be perceived as separate. These processes are shaped by algorithmically structured orders that influence patterns of thinking, acting, and perceiving. Education is thus understood not merely as an individual acquisition of knowledge but as a situated practice within media-technological infrastructures that co-constitute subjectivities and world relations.

Keywords

English: education – planetary society – justice – power – subjectivation

0. Introduction

For a long time, numerous discourses have debated why human behavior has not undergone a more fundamental shift toward sustainability. In these discussions, educational science is frequently addressed as the discipline expected to explain why people fail to relearn — why, despite rational insight, they do not change their behavior. This conceptual framework appears in many crisis discourses (Allert/Hummrich 2024), in which transformation is (mis)understood as a pedagogical figure (Meseth 2024; Thompson/Schäfer 2013).

This article adopts a different approach by integrating insights from social critique and theories of inequality into argumentative frameworks of transformation and education. Planetary Studies examine climate change as a justice crisis (Otto 2023; Engel/Hummrich 2023, Engel/Terstegen 2023). Within this line of thought, educational figures can be critically analyzed regarding their entanglement in modern paradigms — such as that of progress (1.) — and the associated exploitation of people and nature (2.). This contribution contrasts these reflections with empirical studies from a project in which young people articulate their stances toward the future. Based on these studies, subject positions can be traced in their digital-technological entanglement.

Accordingly, the article reflects on educational figures in the context of planetary crises and explores how they are constituted within the **entangled dynamics** of climate change, digitalization, and global inequality. 1. The analysis begins with a systematic differentiation of historical educational figures – ranging from the neo-humanist to the postdigital – each characterized by a specific logic in the human–nature relationship. 2. The argument then turns to two discourse fields that have rarely been examined in an integrated manner: first, the discourse on youth and climate change; second, that on youth and digitalization. Both fields open up distinct, and at times conflicting, understandings of education and modes of subjectivation. 3. Building on these theoretical considerations, the article analyzes empirical data in which young people articulate their perspectives on nature and the future. In doing so, it reconstructs media, societal, and ecological entanglements as implicit orientations that are constitutive for contemporary processes of subject formation. 4. The aim of the article is to theoretically delineate the climate crisis and digital transformation processes as central conditions for contemporary educational figures in the Anthropocene.

1. Education in Planetary Societies

Educational theories are not merely historical concepts but are always also cultural constructions – visions of who is considered educable and how the relationship between human beings and the world is constituted. Two guiding questions enable a historical differentiation of key educational figures: First, how is the human subject positioned within a given educational conception? Second, what kind of relational logic between humans and nature arises from this positioning? The following discussion addresses these questions in the form of an overview.

Especially in the era of neo-humanism, the human being is conceived primarily as a free, self-determining subject who develops themselves through engagement with the world. Education is seen as an end in itself, unbound by considerations of social utility or origin (Böhm 2013; Ehrenspeck 2008). From this perspective, »[the human being, JE] seeks to grasp as much of the world as possible and to bind it as closely to themselves as they can« (translated by the author; Humboldt 1793, p. 6) – not in the sense of economic appropriation, but as a process of experience and understanding. The logic of relating to nature is epistemic and participatory: Nature appears as a counterpart that facilitates the subject's self-formation. The human being is central, but not as a dominating agent – rather as part of a larger whole, to which they are to relate in freedom (Henning 2022; Schluß/Klär 2022).

This figure shifts significantly with the emergence of modernity. Education becomes instrumentalized and tied to societal demands (Baumgart 2007; Benner 2008; Rieger-Ladich 2020). The human is no longer viewed primarily as a free, educable subject, but rather as a role-bound and performance-oriented individual who must be prepared to meet the demands of industrial society and scientific progress. Education becomes a means of social integration and efficiency enhancement (Oelkers 1992; Dollinger 2011; Thiersch 2008). Accordingly, the human–nature relationship is fundamentally transformed: Nature is no longer a realm of understanding or co-existing but a resource, an object of technical penetration and scientific control (Paulsen/Sandberg 2013; Bilgi et al. 2024). The dominant logic here is one of mastery: the human, armed with objectifying knowledge, confronts nature as a rational, calculating designer (Zirfas 2024).

In contrast, poststructuralist and hegemony-critical theories of education deconstruct classical educational figures. The human is no longer assumed to be a universal subject but is understood as an effect of historically embedded discursive power relations. Education is never neutral but shaped by processes of inclusion and exclusion (Wrana

2019; Wrana 2021; Künstler 2020). This also transforms the view of nature: no longer seen as outside the social realm, nature is understood as a discursively constructed category shaped by power (Ricken 2012; Ricken/Rieger-Ladich 2004). The human–nature relationship here is relational, entangled, and asymmetrical – it exposes nature not as a passive object but as a site of social inscription and political contestation (Haraway 1991; 2016). From this perspective, education becomes a practice of deconstruction — tasked with unsettling the hegemonic constructions that normatively frame the relation to the world, to nature, and to the Other (Barad 2023; Latour 2008; Latour/Schultz 2022).

Postcolonial educational theories offer an especially urgent extension of these hegemony-critical perspectives (Castro Varela/Dhawan 2020). They foreground the colonial genealogy of modern educational concepts and show how deeply educational models are entangled with racist and exploitative structures (Diz Muñoz/Engel 2024; Fritzsche et al. 2024). The white, male subject of the Global North historically serves as an implicit point of reference – a silent standard against which other forms of humanity are rendered deficient. Education thus functions not only as a vehicle of social inequality but also as a mechanism for reproducing colonial hierarchies (Knobloch/Drerup 2022).

This perspective sharpens the focus on the entanglement of education, human–nature relations, and planetary exploitation. Kathryn Yusoff's study »A Billion Black Anthropocenes or None« (2018) demonstrates that Western discourses on the Anthropocene often remain blind to their colonial foundations. She argues that slavery was not merely a social crime but a geological process: the labor of enslaved Black bodies was constitutive of the extractive economy that shaped the planet — a »black anthropocene« (ibid.) that remains largely absent from canonical educational narratives. Educational figures that neglect this history perpetuate a form of epistemic violence, presenting human–nature relations as homogeneous, neutral, and ahistorical (Engel/Hummrich 2023).

Climate scientist Friederike Otto (2023) also highlights that climate change must be understood not solely as an ecological phenomenon, but as a deeply social one rooted in inequality. Her research distinguishes between societal models that contribute disproportionately to climate change and those that disproportionately bear its consequences — often without having caused them. Thus, climate change emerges not only as an ecological crisis but as a justice crisis, one that also challenges dominant understandings of education: if education does not critically engage with these unequal global realities, it remains complicit in the problem (Engel/Terstegen 2023).

In this light, educational theory must radically reconceptualize the human–nature relationship — not as an abstract subject–object relation, but as a historically entangled, conflictual configuration shaped by colonialism, capitalism, racism, and ecological destruction. Education becomes a political practice: one of making visible, disrupting hegemonic narratives, and developing transformative perspectives interlinking planetary justice and ecological responsibility (Engel 2023).

A more recent and increasingly relevant educational figure is the postdigital subject. Drawing on the work of Felicitas Macgilchrist and Benjamin Jörissen, this subject is not simply defined by the use of digital technologies but is constituted in, with, and through them – within a media environment shaped by cultural, social, and technological dynamics that are neither pre-digital nor post-digital, but fundamentally mediated (Jörissen 2014; Macgilchrist 2023). The postdigital subject is part of a sympoietic assemblage of subjectivation, technology, and aesthetics (Haraway 1991; 2016), in which subject formation, technology, aesthetics, and sociality are inseparably intertwined.

This subject is not passively subjected to digital technologies or platform logics but engages with them creatively, experimentally, and reflexively – even, or especially, when confronted with power structures, algorithmic selection, and normative regimes of visibility (Engel/Burchard 2025). Platforms like TikTok, Instagram, or YouTube impose specific formats, rhythms, and economies of recognition (likes, views, followers), yet users imbue them with meaning, reinterpret them, or use them subversively. Education in postdigital contexts thus goes beyond adapting to digital formats as it involves negotiating new aesthetic and discursive forms – from memes and filter aesthetics to digital protest culture, ecological storytelling, and collaborative knowledge practices (Engel/Schreiber 2024).

At the same time, the human–nature relationship is shifting in the postdigital realm. Nature is no longer understood solely as a physical space of experience but increasingly as a mediated phenomenon – appearing in forms such as

real-time climate data, as visual narratives in influencer videos, as morally coded messages in activist social media posts (Silkenbeumer et al. 2023), or as a space of collective imagination in AI-generated future scenarios. Digital media practices in the context of planetary crises operate on two levels: on the one hand, they support the representation and reflection of global-ecological entanglements, enabling new perceptual and articulatory modes of subject formation; on the other hand, they are themselves part of the material-digital infrastructures contributing to ecological degradation. While digital representations of nature may reinforce hegemonic aesthetics, they can also provoke critical reflection. The postdigital educational figure should thus be understood as a nodal point where subject formation is constituted as an ambivalent process through which subjectivity, mediality, and ecology are (re)configured.

The development of critical educational theory is thereby challenged to analyze the structural conditions and power relations of postdigital societies, while also tracing the creative, aesthetic, and relational potentials unfolding in youth subjectivation processes within these postdigital entanglements. The subject here no longer appears as stable or autonomous, but as fluid, situated, and networked – a subject that does not merely present itself on social media but invents, negotiates, and positions itself.

These developments open new perspectives on the human–nature relationship: nature is no longer seen merely as an object of scientific observation or externalized resource but as a culturally coded, affectively charged, and media-mediated entity – an element in the symbolic repertoire of postdigital subjectivations. In this constellation, education appears not primarily as the cultivation of an autonomous subject, but as a relational practice within a complex meshwork of digital media, ecological processes, and social power structures. Educational processes unfold in the interplay of techno-ecological infrastructures, affective resonances, and cultural representations. Orientations emerge not through individual action alone, but through situated relations in which forms of responsibility, sensitivity, and belonging are co-constituted.

In sum, this historical and theoretical differentiation demonstrates how educational figures – understood as cultural-historical models of the subject and its relation to the world – are differently positioned in their respective eras and generate specific logics of relating to nature. It becomes clear that in planetary societies, education is always also a question of subjectivation — and that dominant educational figures embed deep-seated cultural and historical assumptions. A comparative view reveals a profound transformation in the positioning of the human and their relation to nature.

1.1 Educational Figures in the Context of Climate Change: Between Pedagogization and Political Articulation

The simultaneous negotiation of discourse fields concerning youth, climate change, and digitalization suggests that education in the Anthropocene no longer presents itself as a coherent project centered on an autonomous subject. Instead, it appears as a contested web of relations in which subject positions, technological conditions, and experiences of ecological crisis mutually shape one another, and in which various understandings of education are discursively negotiated.

Within the discourse on *youth and climate change*, pedagogical-normative approaches predominate. These approaches attribute to young people a need for engagement with nature that is intended to motivate more sustainable thinking and action. The underlying rationale is heavily action-oriented, assuming that contact with nature – often conceived as direct, ideally authentic encounters with ecological environments – promotes climate competencies and a heightened sense of environmental responsibility. In this line of reasoning, nature is not understood as a discursively mediated or socially coded construct but rather as an experiential field to be pedagogically harnessed for producing specific effects in the subject. Education, in this context, is conceived as a means for shaping desired subject behaviors – aiming to generate particular attitudes and actions through targeted programs, didactic interventions, or nature-based experiences in school settings (Feindt 2021).

This pedagogizing figure becomes particularly evident in studies on the attitude–behavior gap (Kollmuss/Agyeman 2010; Schlögel et al. 2024). Many such studies note a discrepancy between knowledge of

ecological crises — often conveyed through visualized information – and actual behavior. The prevailing finding is that, although young people are familiar with facts, images, and forecasts regarding the climate crisis, their behavior changes only to a limited extent. The educational response frequently derived from this is a further intensification of didactic efforts (de Haan 1993; Kagawa/Selby 2010), such as through digital simulations, virtual reality environments, or gamified learning formats (Tillmann/Wunderlich 2023). In these approaches, digitalization is primarily understood instrumentally — as a medium for improving instructional delivery, enhancing learning efficacy, or facilitating targeted behavior modification. The digital subject here is construed less as a co-creative agent and more as the addressed target of pedagogical intervention.

In contrast, a second discourse field — thus far underexplored in educational theory but increasingly gaining relevance — focuses on youth culture in the context of planetary transformations. Here, young people are not primarily addressed as objects of pedagogical measures but as entangled subjects who employ digital technologies to articulate their own perspectives on planetary futures. Drawing from youth cultural studies, sociology, and cultural studies, these discourses illuminate how young people connect in digital spaces, articulate uncertainty, anger, or hope, experiment with collective forms of action, and cultivate political subjectivities.

Social media platforms such as TikTok, Twitter/X, Instagram, or Discord give rise to diverse forms of generational climate subjectivation — from activist commentary and ironically distanced memes to documentary formats and algorithmically amplified micro-publics. These practices can be interpreted as political subjectivation processes in which the relationship between subjectivity, digitalization, and the climate crisis is configured. Young people do not merely participate in digital communication about climate change — they actively shape it, negotiating belonging, responsibility, and affective states within these spaces. From this perspective, education advances as an emergent practice of articulation, positioning, and public visibility, rather than as a controllable process of upbringing.

At the same time, these practices — both explicitly and implicitly — address the entanglement of digital mediality, planetary uncertainty, and political subjecthood. Young actors often possess a clear understanding that there is no simple, linear relationship between knowledge and action — and that their own capacities for agency are situated within a mesh of structural powerlessness, algorithmic dynamics, and ecological urgency (Engel/Terstegen 2024). Precisely for this reason, it is noteworthy how they actively seek new forms of expression and alliances in order to assert collective interpretive power. Digital spaces, in this regard, also facilitate emancipatory practices of subjectivation (Engel 2023).

This juxtaposition of two largely separate discourses — on the one hand, a pedagogizing »figure of upbringing« and, on the other, a politicizing »figure of articulation« — points to a central challenge for contemporary educational research: the need to conceptualize education in the context of the climate crisis not merely as a transmission of knowledge or a modification of behavior, but as a relational, political, and media-mediated process of subjectivation. Such a reconceptualization must encompass pedagogical as well as cultural, technological, and affective dimensions. Only in this way can we reconstruct educational figures that are adequate to the complexity of planetary transformation processes — and that open up spaces for subjects to negotiate who they can be in this world.

1.2 Educational Figures in the Empirical Field: Subjectivation Processes Between Media Practice, Sustainability, and Climate Crisis

Theoretical considerations indicate that educational figures in the context of climate change and digitalization cannot be conceived as one-dimensional models focused solely on education or technology. Rather, they must be understood as historically evolved, media-mediated modes of subjectivation. Empirical studies on the intersection of youth, digital media, and the climate crisis reconstruct these figures along tensions between external ascriptions

and self-positioning, knowledge transmission and action paralysis, as well as individual reflection and collective publicity.

Numerous studies illustrate the ambivalent perception of youth within the climate crisis. Young people consciously employ digital media for sustainable action and are thereby addressed as morally responsible consumers. At the same time, they express distrust toward media information — subjectivation appears as an orienting practice amid conflicting claims to truth. Other studies emphasize a stronger pedagogical framing: adolescents translate sustainability knowledge into everyday practices, positioning education as a means of individual behavioral regulation — while political or structural dimensions often remain unaddressed.

In contrast, Casata (2022) identifies youth as active agents in shaping digital publics. Here, subjectivation unfolds performatively, through visibility and recognition. Platforms like YouTube emerge as informal educational spaces that enable cultural participation and discursive negotiation. Youth are not mere recipients but co-producers of meaning — including in conflictual forms.

A counterpoint to education-oriented models is evident in studies that conceptualize youth as political subjects. In the context of Fridays for Future, education appears as a collective articulation process, in which digital media function not merely as tools but as structural spaces of possibility. This gives rise to an educational figure centered on representation, publicity, and digital-world relations.

These studies reconstruct ambivalent subject figures oscillating between internalized responsibility and structural powerlessness. Buchegger and Summereder (2020), for example, show that while young people are encouraged to act morally, they simultaneously report a lack of efficacy in individual practices. This constellation points to a paradoxical mode of subjectivation, in which moral responsibilization is not accompanied by political agency.

Holland et al. (2021) illustrate this tension through the concept of symbolic participation: although youth are included in consultative processes, they are largely excluded from institutional decision-making structures. Education, from this perspective, becomes a space for engaging with the preconditions of political agency — particularly in relation to the infrastructural conditions of visibility, influence, and participation.

The collective body of research reveals a dynamic spectrum of educational figures: from behavior-oriented, normatively guided concepts to reflexive, aesthetically coded self-relations, and finally to collective-political forms of articulation in digital publics. Subjectivation is thus not conceived as a linear process but as a contested negotiation situated in the tension field of discipline, self-expression, and collective positioning — each mediated by media, social, and ecological contexts.

When contrasted with previously developed theoretical educational figures, both, continuities and disruptions become apparent: while pedagogizing discourses draw upon modern, functional models of the subject, other empirical findings indicate shifts toward poststructuralist and postdigital modes of subjectivation, in which subjectivity is relational, situated, and media-mediated. References to exclusions along axes of global inequality, in turn, update postcolonial critique — education is thus not conceived as a neutral space of possibility, but as a contested site of societal representation and power relations.

Taken together, these findings yield a complex, non-coherent image of education in the Anthropocene — as a relational, mediatized, and power-sensitive practice, in which historical trajectories intersect with new forms of digital and ecological self- and world-relations.

Against this backdrop, our own empirical studies begin: we examine how young people position themselves in relation to nature and the climate crisis — and which implicit educational concepts, subject models, and youth images emerge in the process. Our aim is to challenge educational discourse by reconceptualizing education not as normative influence, but as a process of situated, media-mediated subjectivation in the Anthropocene.

2 Empirical Studies on Nature and Youth

2.1 Project Context

In our empirical research project, we explore how adolescents and young adults articulate experiences, images, and imaginations of nature and the future — and how these articulations relate to planetary crisis constellations. Our interest lies not only in explicit content but also in the implicit figurations, tacit knowledge structures, and habitual perspectives through which young people position themselves within ecological transformation. The underlying assumption is that these negotiation processes are embedded in media-technological and socio-economic contexts (Engel 2023): climate change is not perceived in isolation but processed as part of a complex configuration involving digital image communication, unequal global capacities for action, and media representation.

The research design reconstructs these complex entanglements across two interrelated settings with young people aged 16 to 22. In a first in-person meeting, a group discussion was conducted, during which participants brought in self-selected visual materials. These images served not only as prompts for discussion but were also considered carriers of figurative knowledge. In a second session, a chat-based conversation took place on a platform commonly used by the youth in their everyday media routines. This setting was supplemented with researcher-provided images, including AI-generated visuals based on the initial group discussions. This approach allows for deeper insights into postdigital spaces of articulation, extending beyond traditional interview or discussion formats.

The project centers on the media conditions of articulation: on one hand, technical infrastructures and interface designs enable or privilege certain forms of expression — such as visual short formats or reactive communication via emojis — while marginalizing or rendering others invisible. On the other hand, global power relations and ecological inequalities are echoed in the visual and discursive practices of the youth, such as when projects in the Global South emerge as potential future scenarios, or when the topic of consumption reduction in the Global North is raised. As such, the project is not only a contribution to youth studies but also an inquiry into contemporary modes of subjectivation in the Anthropocene: adolescents and young adults primarily articulate themselves via digital platforms — particularly image-based platforms and messaging services — which may be conceptualized as central arenas of current subjectivation practices.

The study thus focuses on how nature-society relations are conceived, imagined, and staged in the context of digital media practices and global inequalities. Drawing on concepts from the sociology of the future and environmental education, we analyze how climate futures are not only produced and negotiated individually, but collectively (cf. Facer/Pahl 2017; Leccardi 2021). Particular attention is paid to the role of imagery and metaphor in this process: images, visual references, and metaphorical language are considered key carriers of figurative knowledge (cf. Bohnsack et al. 2013; Bohnsack et al. 2022; Lamprecht 2012; Engel 2023; Haverkamp 2007), in which implicit social orientations, affects, and attitudes toward nature, the future, and global responsibility become manifest.

Subsequent analyses follow the structure of the research design: first, participants' selected images are examined in terms of their visual semantics, implicit dimensions of meaning, and contextual references. Second, selected excerpts from the group discussions are analyzed to identify implicit orientations and (self-)positionings of young people within the climate society — always in relation to the digital framing and global structures of ecological inequality. This approach enables us to analyze the triad of climate change, digitalization, and global-social differentiation not in isolation, but as an interwoven structure through which young subjects construct their worldviews and visions of the future.

2.2 Exemplary Study[2]

Legend:

Bm:	Student	1
Aw:	Student	2
Am:	Student	3

Bw: Student 4

Bm: (2) For me, it's much more about — less about youth and nature, and more about the future.
Aw: Yes.
Bm: Because that aspect somehow —
Aw: Well, both are about the future.
Bm: └was at the forefront for me.
Aw: Yes.
Bm: Compared to the other two terms. And I actually @indeed@ just typed »youth, future, nature« into Google, one after the other, and then switched to Google Images and simply looked to see if any image caught my attention. (1) And I noticed there were so many (.) so, so many greenwashing images from companies and so on. (.) You know, all this »future here, future there« — I found that really striking. It took a while to find something even remotely informal.
Aw: And how did you find that guy with the —
Bm: He just popped up in my feed.
All: @(.)@
Bm: I occasionally get stuff like that from various sources — for example, in (.) uh::m I think it was South Africa, where people are building houses from plastic waste. They heat the plastic and press it into bricks? (.) And since plastic is so versatile and easy to work with, it's super practical. Now, they can build houses more cheaply and reduce waste. Or there are people cleaning up rivers and saying, »We're not going to start with the oceans, because that's a never-ending task. Instead, uh:m we'll block the inflows to the seas«,
Aw: Mhm.
Bm: On the surface, and collect all the (.) trash — which I find pretty intense, because when you think about the fact that only ten percent of plastic floats on the surface —
Af: Mhm.
Bm: That's still a lot; they're really removing 100 tons of plastic in 24 hours. And somehow my feed is full of that stuff, which I actually find really uplifting. It always carries a positive note — showing that people can achieve something, (.) even if it's just on a small scale. Exactly. (.) There's even a channel that constantly shares positive news? (.) Like, for example, that deforestation in the Amazon is decreasing (.) simply because meat consumption is declining, and it's becoming more economically viable to grow soy and create more space for animals; Exactly. That kind of thing.
Aw: I've never seen anything like that — positive news.

[2] All empirical materials were collected in German and translated into English by the author for the purposes of this article.

Bm: Yeah, it popped up and I immediately subscribed.
Aw: Yeah.
Am: Uh, I don't know. On Instagram I mostly follow (.) like, information pages and stuff; There was one about sea temperatures in the Baltic Sea. That was crazy, because it —
Bw: └ Over 23 degrees.
Am: Yeah, especially because the graph didn't start in the 1900s or anything; it started in 2002. And I found that really striking because I was born in 2003? So that's a development I've actually lived through in my life, (1) so.
Bw: (3) I just don't get why (.) why it's @(.)@
Aw: Why it fluctuates so much.
Bw: Yeah.
Bm: Well, that's the average for August.
Am: I don't know, but —
Bm: It's just one month, and some are warmer than others.
Am: That's just how it is.
Bm: But you can definitely see the trend is getting warmer.
Bw: Yeah. No idea.
Am: And the other video was from vacation. That was awesome. I was out in nature.
Bw: Show me the other video.
Am: In Greece. It was really nice.

Reflective Interpretation:

The discussion illustrates how young people use digital media to position themselves within the tension between climate change, global inequality, and visions of the future in planetary societies. Bm centers a future-oriented perspective, subordinating the concepts of youth and nature to this focus. His Google search reveals a critical awareness of aestheticized, depoliticized greenwashing narratives and reflects a sensitivity to the political economy of digital representations in planetary crisis contexts. His reference to plastic-based construction projects in South Africa further demonstrates how knowledge of planetary challenges is algorithmically filtered, mediated, and globally unequally distributed. These examples connect ecological innovation with digital visibility and postcolonial critique — indicating the relational thought patterns young people develop to make sense of planetary societies.

In addition, Am describes a data-driven mode of self-location through climate information encountered on social media, which synchronizes personal biography, ecological change, and media infrastructures. The collective reflection on climatic uncertainties shows that digital media serve not only as informational platforms but also as resonance spaces for affective and discursive negotiations concerning planetary futures. These dynamics give rise to subjectivizing world relations in which lived experience, digital representation, and global interpretive frameworks intertwine.

In summary, the conversation reveals that the young participants articulate complex and implicit — i.e. action-guiding — modes of imagination and reflection concerning the interplay between climate change, digitalization, and global inequality. They emerge not only as consumers of media content on planetary crises but also as critical observers of how such information is digitally generated, transmitted, and politically framed. Their engagement with greenwashing, the reception and evaluation of innovative global projects, and their discursive processing of uncertainty highlight how digital media produce new symbolic orders of planetary entanglement. Moreover, these media enable novel forms of aesthetic-affective orientation within ecological-technological transformation processes — approaches which, in this case, are relational, global, postcolonial, affect-based, and critical.

3 Conclusion and Outlook on Planetary Education in Postdigital Climate Societies

This contribution has analyzed educational figures within the context of planetary crises and demonstrated the epistemological insights they offer for current questions concerning planetary constellations of crisis. The theoretical reconstruction of historical educational figures reveals that education cannot be conceived independently of socio-cultural power relations. While classical models such as Neo-Humanism articulated a knowledge-oriented relationship to nature centered primarily on the self, postmodern, poststructuralist, and postcolonial perspectives illustrate the extent to which educational and nature relations are discursively and structurally shaped by social inequalities and technological framings. The postdigital subject figure, in this regard, draws attention to the interrelations between media, affect, and ecology.

The discursively differentiated educational concepts were juxtaposed with empirical research findings. Here, diverse modes of subjectivation emerge — ranging from responsibilizing, moralizing approaches to collective, politically articulated practices. It is striking that digital technologies, on the one hand, enable new forms of expression, connection, and knowledge practices, while on the other, they reproduce mechanisms of selection, regimes of visibility, and representational asymmetries. This gives rise to a largely overlooked area of tension: the attempt to understand, communicate, and shape climate change through digital technologies is itself part of the infrastructural dynamics that exacerbate climate change — a paradox of epistemological and educational relevance that has thus far received little attention.

The analysis thus underscores that discursive and practical engagements with climate change and digitalization are deeply embedded in structures of social inequality. In her study on education for sustainable development in intercultural contexts, Barbara Pusch (2023) shows, for instance, that individuals in precarious economic circumstances often exhibit a high level of awareness regarding climate justice, yet perceive themselves as structurally powerless. In contrast, middle-class milieus tend to frame climate protection as a matter of individual moral responsibility, while societal elites portray themselves as pioneers — regardless of their disproportionate contribution to emissions. Particularly stark is the symbolic marginalization of people with migration backgrounds: in public discourse, they primarily appear as those affected rather than as actively shaping subjects. These dual exclusions — along lines of social status and ethnic affiliation — highlight the entanglement of ecological and social exclusion mechanisms. Educational research has thus far scarcely explored these intersectional interconnections in a systematic manner. Yet it is precisely here that significant epistemological entry points emerge for a critically reflexive theory of planetary education — one that regards social justice not as secondary, but as constitutive of ecological transformation.

From this, several epistemically guiding perspectives for future research can be derived. First, it is essential to more closely examine the ambivalent role of digital technologies — both as enablers of participatory educational processes and as amplifiers of ecological and social burdens. Second, new research questions emerge at the intersection of education and inequality studies: Who is addressed as a subject of planetary responsibility? Educational science can make a vital contribution here — through the analysis of subjectivation processes, the reflection on implicit educational norms, and the reconstruction of collective negotiation processes in both digital and institutional spaces. In planetary societies, education is not exhausted in transmitting knowledge; rather, it becomes an epistemic mode of relating to the world under conditions of planetary transformation.

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