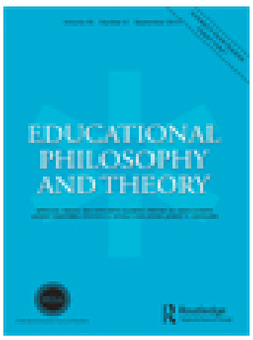

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Heidegger's critique of the technology and the educational ecological imperative

Rauno Huttunen[a] and Leena Kakkori[b]

[a]Department of Education, University of Turku, Turku, Finland; [b]Philosophical Faculty, University of Eastern Finland, Joensuu, Finland

ABSTRACT

It is clear that we have to do something in our time concerning global warming yet before we can actually change the world, we must first understand our world. According to Heidegger, technology itself is not good or bad, but the problem is, that technological thinking (calculative thinking) has become the only form of thinking. Heidegger saw that the essence of technology nowadays is enframing – Ge-stell, which means that everything in nature is 'standing-reserve' (Bestand). Enframing (as apparatus) is one way of uncovering, which for Heidegger meant truth. Truth can appear in many ways and the danger is that this truth of representational-calculative thinking becomes the only truth. We claim that the calculative way of thinking must be changed and we posit that Gelassenheit (slow thinking, releasement, letting-go) is the remedy. It does not mean some kind of mysticism or irrationality. The notion of Gelassenheit includes the idea of to let learn. We as teachers and educators have to learn how to think outside of the technological 'Ge-stell' and start thinking and acting in radically new ways. Like Arne Naes and Michael Zimmerman we connect the overcoming of technological 'Ge-stell' with so called deep ecology. We have to 'learn to think' and act within the deep ecology. We call for an educational ecological imperative. Every teacher and educationalist has to think what they can do (not as private person but as professionals) in order to prevent the coming eco-catastrophe.

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Introduction

It is now entirely clear that we must do something about the global warming and climate crises. Yet before we can change our situation, we must first understand our situation. According to Heidegger, and also in line with Deep Ecology, our understanding of technology plays a central role in fighting the climate crisis. Technology itself is not good or bad. The problem is that technological thinking (calculative thinking) has become the only form of thinking. One reason for this is our failure to understand the essence of technology in modern times. In Antique Aristotelian thought, *Techne* (the bringing forth of something) was the essence of technology. Heidegger saw the essence of technology in modern times as *Ge-stell* (frame, framing, enframing, construct, exposition, universal imposition). *Beherrschbarkeit* (controllability) and *Machenschaft*

CONTACT Rauno Huttunen rauno.huttunen@utu.fi Department of Education, University of Turku, Assistentinkatu 5, 20500 Turku, Finland.

(machination) can be seen as predecessors to *Ge-stell*. *Ge-stell* is a kind of thinking that conceives both nature and humans as a 'standing-reserve' (*Bestand*). *Ge-stell* reduces the whole world to a manageable reserve, which can be put to use with the help of calculative thinking. A river is a reserve for a power station; a forest is a reserve for a paper factory.

The aim of this paper is to reflect on how or to what extent – if any – teachers and educational scientists could step outside of this technological *Ge-stell*. First, the calculative way of thinking must be changed, and we posit that *Gelassenheit* (slow thinking, releasement, letting go) is the remedy. *Gelassenheit* is thinking that lets things 'be in their being', letting the world to be. *Gelassenheit* is the opposite of *Ge-stell* and is an active way to be in the world. It does not imply some kind of mysticism or irrationality. The notion of *Gelassenheit* includes the idea of to let learn. This letting learn is more difficult than learning itself, because the task of letting learn involves learning to think. (Heidegger, 2004, pp. 15–17).

We, as teachers and educators, must learn how to think outside of the technological *Ge-stell* and start thinking and acting in radically new ways. We have to 'learn to think' and act within Deep Ecology as an educational ecological imperative. Every teacher and educationalist has to consider what they can do (not as a private person but as a professional) to prevent an upcoming ecocatastrophe.[1]

Yes and no to calculative thinking – *Gelassenheit*

The essence of technology is nothing technological, but rather something quite different. Heidegger repeats, in different texts,[2] that the essence of technology is *Ge-stell* (Heidegger, 2012, pp. 38, 51; 1977, pp. 23, 31). *Ge-stell* has been translated in different ways; for example, as 'enframing', 'framing', 'positionality', and 'universal imposition'. In our text, we leave it untranslated (see Ma & van Brakel, 2014, pp. 527–562). For Heidegger, *Ge-stell* means standing-reserve (*Bestand*), danger, and the domination of calculative thinking. This critique concerns only the essence of modern technology, yet said essence is understood through the development and history of technology.

There is a misunderstanding of the essence of technology and, due to this misunderstanding, we are in grave danger. This danger is our imminent ecological catastrophe, from which Heidegger said 'only a God can save us' (*Nur noch ein Gott kann uns retten*) (Heidegger, 2000b 16, 671). Heidegger's use of the word 'essence' has different meanings at different times. 'Essence' is usually a translation of the German noun *Wesen*. Yet for Heidegger, 'essence' (*Wesen*) is more like a verb, meaning something that endures through time. Heidegger writes, in *Introduction to Metaphysics*: 'The substantive *Wesen* does not originally mean what-ness (*Was-sein*), *quidditas*, but rather enduring as present (*Gegenwart*), pre-sencing and ab-sencing' (Heidegger, 2000a, p. 76).

Ge-stell as essence is not the whatness of technology, nor some constant and unhistorical essence. There are many definitions of *Ge-stell*; one major definition comes from *The Question Concerning Technology*:

'Ge-stell means the gathering together of that setting-upon which sets upon man, i.e. challenges him forth, to reveal the real, in the mode of ordering, as standing reserve. Ge-stell means that way of revealing which holds sway in the essence of modern technology and which is itself nothing technological' (Heidegger, 1977, p. 20).

Ge-stell means that everything that is has been ordered under technological calculative thinking. *Ge-stell* does not mean any type of composition of objects, or any individual object such as a bookcase or water well. It is not something in constant reserve that we can use when needed. Instead, *Ge-stell* means universal ordering as a standing reserve (*Bestand*). Everything present, everything that is, becomes a standing reserve. *Ge-stell* is more like aappening than a noun[3] (Heidegger, 2012, pp. 30–31; Heidegger 2005, pp. 32–34, see also Ruin, 2014).

When *Ge-stell* reveals and orders, every being becomes a standing-reserve. In this happening, even God degenerates to a level where God is only a causa and is bound to causality (Heidegger, 1977, 26). Human beings become a labour force reserve, the Rhein River becomes a power reserve, and forests become a reserve of raw material for the paper industry. In Finland, there is a great debate as to whether a forest is first and foremost a reserve for material or a carbon sink. A carbon sink is a forest, ocean, or other natural environment viewed in terms of its ability to absorb carbon dioxide from the atmosphere. In this debate, both parties view the forest through calculative thinking, as a standing-reserve.

Heidegger's basic critique and argument of modern technology is that we have not yet understood technology's essence. Because of this lack of understanding, we are in a dangerous situation that may lead to disaster (Heidegger, 1977, pp. 3, 26). Our lack of understanding is related to a lack of thinking; Heidegger expressed this by writing that man today is in '*flight from thinking*'. Even when a man is thoughtless, it does not mean that all thinking ends. There are two kinds of thinking: calculative thinking and meditative thinking. Calculative thinking is related to technology and meditative thinking to *Gelassenheit*. Both kinds of thinking are necessary; problems arise when either way of thinking takes on a superior power position. Andrew Feenberg criticises Heidegger's notion of technology claiming that Heidegger is 'technophobic', 'technological essentialist', supercritical to technology and fatalistic (Feenberg, 2000). Iain Thomson[4] (2000, 2005), Mark Wrathall (2019) present very convincing counter-arguments to Feenberg's claims. Heidegger doesn't want to turn the clock back and abandon modern technology. What is needed is so-called *Verwindung* of calculative thinking. We elaborate on this point later in the article.

According to Heidegger calculative thinking computes, while meditative thinking contemplates the meaning that reigns over all that is (Heidegger, 1969, p. 46). Both types of thinking require great effort, time, and practice. Calculative-technological thinking has become the dominant way of thinking and, through it, everything has come to be perceived as measurable and calculative. The answer to the dominance of technological thinking is to say 'yes' and 'no' to technology at the same time. Saying both 'yes' and 'no' implies letting things be as they are, or *Gelassenheit* (Heidegger, 1969, p. 54).

History of modern technology and Ge-stell

The emergence of *Ge-stell* coincides with the appearance of modern technology. According to Heidegger, there was no *Ge-stell* in Ancient Greek. Technology (*techne*), in Ancient Greek, was a different phenomenon than modern technology. Modern technology reveals (*aletheia*) beings in a different way than did *poiesis* and *techne* in the pre-modern world.

'The earth now reveals itself as a coal mining district, the soil as a mineral deposit. The field that the peasant formerly cultivated and set in order appears differently than it did when to set in order still meant to take care of and maintain. The work of the peasant does not challenge the soil of the field. In the sowing of the grain it places the seed in the keeping of the forces of growth and watches over its increase. But meanwhile even the cultivation of the field has come under the grip of another kind of setting-in-order, which sets upon (stellt) nature. Agriculture is now a mechanised food industry' (Heidegger, 1977, pp. 14–15).

The history of modern technology can be thought of as a series of industrial revolutions, from the 18th century to the present. The First Industrial Revolution began with the invention of the steam engine. It started in the UK, in the late 18th and early 19th centuries. Max Horkheimer and Theodor Adorno (2002) call this the Enlightenment, where humankind conquered nature and the triumph of natural scientific reason (instrumental reason) began. The rationality of action and science were now measured by their ability to harness the forces of nature. The First Industrial Revolution caused the rise of the mechanised factory system (mass production), which

replaced the former manufacturing production and transformed work into wage labour. The First Industrial Revolution also meant the rise of logic standardisation and calculative reason. Everything began to be standardised and measured in numbers.

The Second Industrial Revolution is normally dated between 1870 and 1914, but it extended beyond 1914. The Second Industrial Revolution was characterised by the mass production of steel, cost-effective railroads, electrification, the petroleum industry and internal combustion engines, cars, planes, modern warfare, paper machines and the rise of newspaper media, rubber and pneumatic tyres, the use of fertilisers and the modernisation of agriculture, telecommunications, modern business and labour management, the rise of the worldwide stock market, etc.

When Heidegger writes about technology, modern technology, and machine technology (Heidegger, 2012, p. 32; Ihde 2010), he mainly refers to the technology of the Second Industrial Revolution. When he addresses the dangers of nuclear power and gene technology (Heidegger, 1977, pp. 51–53), these phenomena belong to the era that we could call the Third Industrial Revolution (see Rifkin, 2015). The Third Industrial Revolution began in the late 20th century, with the rise of microelectronics and microcomputers (Söderberg, 2013). It continues nowadays with globalisation, robotisation, digitalisation, the Internet, gene technology, hybrid warfare, immaterialisation of the production process, nanotechnology, quantum computers, and cognitive capitalism. Following the lead of Klaus Schwab (2016), we could call this newly emerging era the Fourth Industrial Revolution. Within the Fourth Industrial Revolution, human behaviour integrates with digital equipment and becomes part of the global Internet of things (Schwab, 2016). Each human transforms into a cyborg-type being that becomes one with a digital smart device. These devices are already integrated with human thinking and action. Thus, the interface between humans and digital smart devices is blurring (Heikkinen & Huttunen, 2017). This, at present, is where *Ge-stell* has brought us.

Nevertheless, modern technology is also revealing. Without this, there would be no hope. *Ge-stell* is one way of uncovering and this means truth for Heidegger. Yet here Heidegger also sees a great danger. Truth can appear in many ways, and it would be dangerous for the 'truth' of representational-calculative thinking to become the 'only truth'. We can understand *Ge-stell* as the final appearance of metaphysics, where all things are conceived as beings in the technological world. Heidegger (1974, pp. 32–33; 1972, pp. 6–7) sees *Verwindung* as a possible way out of the supremacy of technology. Heidegger (2012, p. 65; Heidegger 2005, p. 69) claims:

'Technology is not humanly overcome (*überwunden*); much to the contrary the essence of technology is converted (*verwunden*) into its still-concealed truth. This conversion (*Verwinden*) is similar to what occurs when, in human realism, a pain is converted. Yet the conversion of the dispensation of being, here and now the conversion of positionality (*Verwindung des Ge-stells*), every time takes place through the arrival of another dispensation, which can be neither logically-historically predicted nor metaphysically constructed as the result of the process of history'.

We cannot just abandon technological languages and thinking (*Ge-stell*) as a whole. Yet it is a very difficult task to heal from the disease of domination of technological thinking (*Ge-stell*), while maintaining a healthy portion of technological thinking. To heal and to maintain – that it is what *Verwindung* means.

Deep ecology, the natural contract, and the educational ecological imperative

In 1972, philosopher Arne Naess participated in the 3rd World Future Research Conference in Bucharest and presented a paper called 'The Shallow and the Deep Ecology Movement'. The following year, an article summarising the conference paper (Naess, 1973) was published in *Inquiry*. According to Naess, 'Shallow Ecology' attempts to fight pollution and resource depletion by following this central objective: 'the health and affluence of people in the developed countries' (Naess, 1973, p. 95). Shallow Ecology is a 'standard view of conservationists'. It is an

anthropocentric, individualistic, and Western movement, the focus of which is narrow. Yet this movement isn't altogether unethical (Antolick, 2003, p. 28).

Naess calls instead for a movement towards Deep Ecology, which includes the following principles, among others (Naess, 1973, pp. 95–98):

- Rejection of the man-in-environment image in favour of the relational, total-field image.
- Principles of diversity and symbiosis; 'Live and let live' is a more powerful ecological principle than 'Either you or me'.
- Fight against pollution and resource depletion.
- Complexity, not complication; The theory of ecosystems contains an important distinction between what is complicated without any Gestalt or unifying principles – we may think of finding our way through a chaotic city – and what is complex.
- The complexity-not-complication principle favours the division of labour, not the fragmentation of labour. It favours integrated actions in which the whole person is active, not mere reactions.
- Principles of local autonomy and decentralisation; The vulnerability of a form of life is roughly proportional to the weight of influences from afar, from outside the local region in which that form has obtained an ecological equilibrium.
- The Deep Ecology movement is not derived from ecology by logic or induction. Ecological knowledge and the lifestyle of the ecological field-worker have suggested, inspired, and fortified the perspectives of the Deep Ecology movement'.

In 1984, Naess reformulated Deep Ecology, presenting eight points based on Buddhist, Taoist, and Christian religious views as well as on Spinoza's, Whitehead's, and Heidegger's philosophies (Naess, 2005, p. 68):

1. The flourishing of human and non-human life on Earth has inherent value. The value of non-human life-forms is independent of the usefulness of the non-human world for human purposes.
2. Richness and diversity of life forms are also values in themselves and contribute to the flourishing of human and non-human life on Earth.
3. Humans have no right to reduce this richness and diversity except to satisfy vital needs.
4. The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of non-human life requires such a decrease.
5. Present human interference with the non-human world is excessive, and the situation is rapidly worsening.
6. Because of the foregoing points, policies must be changed. The changes in policies affect basic economic, technological, and ideological structures. The resulting state of affairs will be deeply different from the present and make possible a more joyful experience of the connectedness of all things.
7. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent value) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great.
8. Those who subscribe to the foregoing points have an obligation directly or indirectly to participate in the attempt to implement the necessary changes.

Michael Zimmerman supports Naess's Deep Ecology, yet Zimmerman (1993, 2003) aims to connect ecophilosophy[5] more closely with Heidegger's philosophy and especially with Heidegger's later philosophy.[6] In 1983, Zimmerman claimed that the environmental reform movement would be unable to stop the destruction of the biosphere due to its reliance on

anthropocentric humanism. This anthropocentric humanism is guilty, in part, for the ecological crisis of today (Zimmerman, 2003, p. 99).

The Heidegger concepts of 'dwelling' and 'fourfold', as raised by Zimmerman, describe the role of *Gelassenheit* (letting-be) in the conversion (Verwindung) of technological thinking. Zimmerman sees that Heidegger provides a basis for radical environmentalism, insofar as he calls on us to remain open to a creative renewal of the Western wisdom tradition that offers a more appropriate understanding of Being (Zimmerman, 2003, p. 128). This new ethos includes concepts like 'dwelling', 'fourfold', and 'happening of the world', along with a nonanthropocentric conception of humanity. Heidegger uses 'fourfold' and 'dwelling' in his later writings; they belong most of all to his poetic vocabulary. In this article, we are not using the notions of 'dwelling' and 'fourfold', which are amongst the many ways that Heidegger tries to overcome metaphysics. This is a very complex and extensive endeavour that is not, in our view, useful for ecophilosophy. Our strategy is to use the Heideggerian notions of *Ge-stell* (frame), *Gelassenheit* (letting-be), and *Verwindung* (to heal and to maintain) without Heidegger's poetical vocabulary of 'dwelling' and 'fourfold', pp. 217–265).

Zimmerman's deep ecological interpretation of Heidegger adheres closely to Michel Serres' notion of the Natural Contract (*Le Contrat Naturel*, Serres 1995). We are on the verge of ecocatastrophe, yet the debate still focuses on small environmental reforms. According to Serres, we are on a collision course with nature:

'To be sure, we can slow down the processes already under way, legislate reductions in fossil-fuel consumption, massively replant the devastated forests … all fine initiatives, but together they amount to the image of a ship sailing at twenty-five knots towards a rocky bar on which it will inevitably be smashed to pieces, and on whose bridge the officer of the watch advises the engine room to reduce speed by a tenth without changing direction' (Serres, 1995, p. 29).

Another narrative that Serres uses in this context is that of a war or a war-like situation. Our relation to nature is violent ('violence objective'). It is not a war ('subjective war') because war is a contract between two fighting parties. Our relationship with nature is worse than a war; it is one of unilateral violence towards nature. Just as a Social Contract should end violent and uncivilised relationships amongst humans, the Natural Contact should end our violent relationship with nature. At a minimum, our relationship with nature could take the form of a limited war. At best, it could be true peace:

'This is the state, the balanced account, of our relations with the world, at the beginning of a time when the old social contract ought to be joined by a natural contract. In a situation of objective violence, there is no way out but to sign it. At the very least, war; ideally, peace' (Serres, 1995, p. 20).

Serres demands an end to the current situation, in which nature has no legal rights. He believes that we should treat nature as a legal person and respect its rights. Serres calls for humans to stop their parasitic relationship with nature and to instead initiate a symbiotic relationship, where humans respect 'natural objects' (animals, plants, plaque, bacteria, etc.). The Natural Contract is nevertheless different from a social contract. A social contract is always local. The Natural Contract is global. In the Natural Contract, humankind is neither the master of nature nor a parasite of nature. In the Natural Contract, instead, the relationship is symbiotic and reciprocal. A symbiotic relationship with nature is easy to understand. Yet how can this relationship be reciprocal if the other party is silent? Serre claims that the other party (nature) is not silent at all (Serres, 1995, p. 39):

'In fact, the Earth speaks to us in terms of forces, bonds, and interactions, and that's enough to make a contract. Each of the partners in symbiosis thus owes, by rights, life to the other, on pain of death'.

The Natural Contract includes the rights of symbiosis, which are based on reciprocity. We must give back to nature in equal measure with what we receive from nature (Serres, 1995, p. 38). Serres considers nature to be a legal subject. This also requires that we consider nature as

an end-in-itself (Kant, 2002, p. 45) in the Kantian sense. We should view nature as an equal member of the moral community, so that nature cannot be treated as a mere means to an end. This was of course not Immanuel Kant's original intention. For Kant, nature and animals are not members of the moral community (see Muraca, 2011, p. 376). Kant claims, further, that one can have moral duties only to persons or rational beings. This is why Kant is normally left out when discussing environmental ethics (Cannon, 2012, p. 151). As such, Kant's practical philosophy has very little to contribute to environmental ethics. Nevertheless, we can make postmetaphysical – Heideggerian *Verwindung* – and deep ecological interpretations of Kant's practical philosophy. Here we leave out Kant's transcendental idealism and interpret his categorical imperative as a relational and socially constructive moral principle. The postmetaphysical categorical imperative is not a Kantian 'fact of reason' but a socially and communicatively (dialogically) constructed contextual ethical principle.

Kant's main formulation of the categorical imperative is (Kant, 2002, pp. 46–47): 'Act so that you use humanity, as much in your own person as in the person of every other, always at the same time as end and never merely as means'. We suggest the following postmetaphysical and deep ecological formulation as a basis for discussion[7]:

> *We should act so that we use nature, including nature within ourselves (our bodies) and outer nature (the natural physical nature and its non-human inhabitants), always at the same time as end and never merely as means.*[8]

This is what Serres' Natural Contract truly demands of us. This means, too, that we cannot understand nature nor other humans merely as standing-reserves. If we simply add ecology to Kantian practical philosophy, we end up with Shallow Ecology, which sees nature mainly as a means for human survival. If we remain stuck on Kant's original formulation of a categorical imperative when constructing environmental ethics, we remain in Shallow Ecology with presuppositions of anthropocentrism and man-in-environment images.

If we accept this postmetaphysical reformulation of main formulation of the categorical imperative, then Kant's universal law formulation of the categorical imperative will work as such (Kant, 2002, p. 37 [Ak 4:421]): 'Act only in accordance with that maxim through which you can at the same time will that it become a universal law'. We need to act in an environmentally sustainable way. In Europe, we need to work and consume in a manner that would allow every citizen in China and India to sustainably work and consume in the same manner – that is, with the same carbon footprint. As teachers and educational scientists, we need to work in such a way that every teacher and educational scientists in China and India could effectively work in the same manner – and vice versa.

We must also draw an educational conclusion – an educational ecological imperative – from these two ecological imperatives. Here we take Theodor Adorno's educational imperative as the starting point (Adorno, 2019, p. 1): 'Every debate about the ideals of education is trivial and inconsequential compared to this single ideal: never again Auschwitz'. Unfortunately, Adorno's educational imperative is still relevant today (and educational means, in fact, played a major role in the Holocaust). Yet in a world that is facing ecocatastrophe, we don't just need Adorno's educational imperative. We need an ecological educational imperative – one that accounts for the dire situation facing our planet, and all its inhabitants, today. Thus, we propose the following educational ecological imperative as a basis for discussion:

> *We, as teachers and educational scientists – not only as private citizens or individual people – must do everything in our power to prevent an upcoming ecocatastrophe!*

Here, we leave open what this imperative may mean concretely, in practice. In the next chapter, we will discuss *Gelassenheit*-education as one – amongst many – educational means that follow the educational ecological imperative, as it aims to overcome *Ge-stell* through *Gelassenheit*.

Gelassenheit, education, and letting-learn

Both Iain Thomson (2011) and Mark Wrathall (2019) see the importance of education and learning in following Heidegger's critique of technology. They share Heidegger's demand for learning to think, and they see this as a remedy to our ecological situation. Thomson understands Heidegger's ontotheology as belonging together with technology, as *Ge-stell*. In Heidegger's view, ontotheology means that everything is based on one thing, and when we discover what this one thing is, we can resolve all problems. The one thing can be God or some undefinable 'it', idea, unmoved mover, or some other type of being. In this thinking, the 'Being' (*Sein*) has been forgotten completely and everything has become 'beings' (*Seiende).* In technology, this means that everything – every being – has now become a standing-reserve. Thomson argues that environmental devastation and the increasing reduction of higher education to empty optimisation imperatives are 'symptoms of the underlying ontotheology enframing (*Ge-stell*) our sense of reality' (Thomson, 2011, p. 116). The correct approach to this, and to our ecological crisis, is to embark on an educational mission to learn to think differently. Wrathall describes this 'remedy', approving Heidegger's idea that there are different ways to think and that we must, first, learn to think differently. After we have learned to think differently, we can understand technology and overcome technology through *Gelassenheit*. Wrathall stresses that overcoming technology does not mean that we can, nor that we should, abandon technology completely (Wrathall, 2019, p. 22). This is consistent with Heidegger's interpretation of the *Verwindung* ('conversion').

We can understand *Ge-stell* as the final appearance of metaphysics, where everything is conceived as beings in the technological world. Heidegger (1974, pp. 32–33; 1972, pp. 6–7) sees that the *conversion* is a possible way out of the supremacy of the technology. Heidegger (2012, p. 65; Heidegger 2005, 69) claims that this kind of conversion is similar to human pain that is converted. Gianni Vattimo uses Heidegger's *Verwindung* (conversion) when describing the end of modernity governed by *Ge-stell*. According to Vattimo, using the German term *Verwindung*, we should think of 'surmounting', 'turning to new purposes', 'surpassing', 'twisting', or 'resigning'. Conversion is neither overcoming of something nor Hegelian dialectical *Aufhebung*. There is no complete *Verwingung* of metaphysics and there are always traces of metaphysics. *Verwindung* is like traces of illness or a kind of a pain to which we are leaving behind. Vattimo suggests that Heideggerian complex term *Verwindung* can be translated with a much more familiar term as 'secularization' (Vattimo, 1988, pp. 166, 171–177). Vattimo claims that what is needed nowadays is 'a *Verwindung* of the scientific and technological languages that tend to dominate our society. Of course it is easy not to see what verwinded recollection of the 'message' of science and technology would be' (Vattimo, 1988, p. 178). It is clear that we cannot just abandon the technological languages and thinking (*Ge-stell*) as a whole. It is a very difficult task to heal from the disease of domination of technological thinking and maintain a healthy part of technological thinking. To heal and to maintain – that it is what conversion means. Same way we cannot just abandon our way of teaching and education. Instead education needs healing and maintaining that is conversion.

All educational thinking starts from our understanding of a human being and secondly how we understand learning and education. Heidegger's understanding of a human being is found in *Zollikon Seminars* (2001). According to Heidegger, a human being is always already in the world, 'being-in-the-world'. He is ever only an object, he is openness to the world and the world opens up in a certain historical time and place. One of the most important aspects of this being-in-the-world is to be-with-others. A human being manifests itself in authentic and in unauthentic life at the same time. And because of this the goal of education is not authenticity. Here we follow the thinking of Ilan Gur-Ze'ev, who besides authenticity also talks about danger in the context of education. This danger is that we can never know the outcome of education. The world opens up to us as something, and with-somebody, because our basic mode of being is to understand

the world and to be open. This understanding is language – and it reveals the world and everything that is in the world (Heidegger, 2001, pp. 3–4, 85; Ilan Gur-Ze'ev, 2002, pp. 65 – 80).

In his book *What is Called Thinking* (2004) Heidegger introduces expression 'to let learn' (*lernen-lassen*). This 'letting learn' is the same as 'letting learn to think', and is the most difficult task for the teacher. Education does not start by defining objects or the world, but by learning to think and by 'letting learn'. To 'let learn' means allowing students to leap into thinking, while the teachers' task is to give 'food for thought' (Heidegger, 2004, p. 22).

Our intention is not to establish any new pedagogy, especially in the field of environmental education. There is no need for this, as there are good alternatives for different needs in existing and diverse pedagogies. The lack of pedagogy innovations are not the reason that environmental education has failed to some extent. We do not mean that no further development work is needed on pedagogies.[9] Our efforts are deeper. Mere knowledge sharing is not enough, we need a change of thinking in relation to teaching, learning and our relationship with nature. Without a change in our hinking, the goals of Naess's eight deep theses of deep ecology cannot be achieved. There are a lot of differences between Heidegger and Naess, but there are also similarities. Naess uses Heideggerian *Being in the World* when talking about our relation to the world. He understands self as a process, not as a static essence and sees education the most important role when talking about saving our future and ecology (Naess, 1987, 2000).

Here are five statements that outline *Gelassenheit* as principles of education, which can offer a way to change our thinking and education.

1. Everybody can wonder, can have natural curiosity, and can have the ability to ask questions. There is no dichotomy between nature and culture. All learning begins with wondering and questioning.
2. Language is the world. There is no one proper language, which supersedes all others.
3. Education and learning are occurrences in and of themselves, and they belong to everyone. There is no distinction between the educator and the educated, nor between teacher and learner.
4. Freedom consists of those possibilities that we encounter in our own being-in-the-world with others. This freedom makes it possible to conversate *Ge-stell* and calculative thinking. They are not dismissed but they are let to be what they are. *Gelassenheit* and 'letting learn' (*lernen-lassen*) belong to this freedom.
5. Truth is an occurrence and a historical event. No one can claim that she has exclusive access to the truth. Neither teachers nor students alone have access to the

These five statements are just an outline of *Gelassenheit* principles (see Kakkori, 2017). Learning and thinking are very important for Heidegger and he sees learning and thinking as belonging together in a profound way. It is not easy to learn to think and Heidegger sees three serious obstacles and these obstacles can be generalised to all learning. The first obstacle is that we have too little face-to-face discussion, dialogue. Another problem he sees are radio and television – today we could add social media and the internet. We use them every day all the time without understanding how they work. Today, partly because of the covid-19, they have also replaced the immediate face-to-face encounter and discussion. The third obstacle is the rigidity of the educational systems and institutes of culture, which are unable to meet the demands of the times in the development of teaching and education. However, despite the obstacles outlined above one should not be discouraged. Obstacles can be overcome, and it is possible for everyone to learn to think new way. (Heidegger, 2000b)

Learning and thinking form a hermeneutical circle: we know what thinking is, once we are ready to learn how to do it; and we learn to think while we are thinking. Heidegger (2004, p. 4; 1984, p. 1) poses the question of what learning is and answers: 'Man learns when he disposes everything, he does so that it answers to whatever essentials are addressed to him at any given

moment.' We must remember that teaching is even more difficult than learning, because real teaching is to let learn, and the teacher must learn to let her students learn, *das-Lernen-lassen* (Heidegger, 2004, p. 15; Heidegger, 1954, p. 50). This means that the teacher is less sure of her actions than are those who are learning. There is no room for the authority of the 'know-it-all' in the relationship between teacher and learners; between the educator and those who are educated.

Conclusion

Something has to be done. We cannot continue business as usual. There must be a decisive change in our thinking and actions. First, we have to understand how *Ge-stell* is dominating the western worldview and reducing nature and humans to a 'standing-reserve' (*Bestand*). Heidegger's philosophy of technology helps us understand our situation. Before we can act – in order to prevent an upcoming ecocatastrophe – our thinking must change (see Heidegger, 1998, p. 338). We must conceive both nature and humanity differently. Heideggerian eco-philosophy (Naess and Zimmerman) helps us in this task. Michel Serres' notion of a Natural Contract gives us guidelines on how to listen the nature and recognise its legal rights.

Second, we need to move from eco-philosophy to eco-practice. As educational scientists, we must do more than just write academic articles and make presentations at conferences. We need that 'changing praxis' (*umwälzende Praxis*) that Karl Marx and Friedrich Engels (Marx 1888) are demanding.

Notes

1. This article is based author's conference presentation in ECER 2019 (Huttunen & Kakkori, 2019).
2. This article draws from Heidegger's main texts: *Die frage nach der technik* 1953 (The Question Concerning Technology 1977); *Bremer und Freiburger Vorträge* 1994 (Bremen and Freiburg Lectures 2012, GA 79 Heidegger 2005); and *Gelassenheit* 1955 (Discourse on Thinking 1969). Heidegger lecture in Bremen 1949, named *Einblick in das was ist* (Insight into That Which 2012), includes four lectures: *Das Ding, Das Ge-stell, Die Gefahr und die Kehre* (The Thing, Positionality, The Danger, and The Turn). *The Question Concerning Technology* is based on Positionality but is an independent text. *Die Gefahr* is published only in *Bremen Vorträge* and is translated for the first time in the Bremen Lectures. Heidegger presented his speech *Gelassenheit* at the celebration of the 75th birthday of the composer Conradin Kreutzer in Messkirch.
3. Heidegger also uses the word *Gestellnis* (Heidegger, 2009, pp. 286, 290, 301, 312, 345). Ma and van Brakel note that it can be understood 'as naming the essence of the Ge-stell' (Ma & van Brakel 2014, pp. 527–562). Their interpretation states that 'the later Heidegger employs the term *Gestellnis* to accentuate the possibility of getting out of the *Ge-stell* from within the *Ge-stell*' (Ma and Brakel 2014, pp. 527-562). We see that the idea of 'getting out of the *Ge-stell* from within the *Gestell*'" is according to Heidegger's *Verwindung*.
4. Iain Thomson's Heideggerian interpretation of ontological education has been very significant for all research on Heideggerian education and technology (Thomson, 2005). However, our interpretation does not fully follow Thomson. In this article, we use Heidegger's critique of technology and *Gelassenheit*. The question, can calculative thinking and *Ge-stell* be seen as manifestations of ontotheology, we leave out from our article.
5. Zimmerman also applies ideas from radical environmentalism (Zimmerman, 1983), radical ecology (Zimmerman, 1994), and integral ecology (Esbjörn-Hargens & Zimmerman, 2009). In his book *Contesting Earth's Future: Radical Ecology and Postmodernity*, Zimmerman states that deep ecology, social ecology and ecofeminism are three major branches of radical ecology (Zimmerman, 1994, p. 1).
6. Arne Naess himself is quite skeptical towards Heidegger's later philosophy and considers 'the late works of Heidegger to belong rather to a new kind of poetry than to philosophy' (Naess, 1997, p. 6).
7. Our proposal is more radical than Barabara Muraca's (2011) environmental interpretation of Kant's notion of moral obligations (*A New Axiological Matrix for Environmental Ethics),* based on Heidegger's and Whitehead's philosophies. We don't just reinterpret Kant's categorical imperative. We overcome Kant's transcendental idealism and make a postmetaphysical formulation of categorical imperative.
8. This is not the first ecological reformulation of Kant's categorical imperative. In 1979 Heidegger's former pupil Hans Jonas made following reformulations of CI (Jonas, 1979/1984, p. 11): 'Act so that the effects of your action are compatible with the permanence of genuine human life on earth … Act so that the effects of your

action are not destructive of the possibility of such life … Do not compromise the conditions for an indefinite continuation of humanity on earth … In your present choices, include the future wholeness of Man among objects of your will'. We claim that these formulations preserve anthropocentric views and represent shallow ecology.

9. For example Pulkki et al. (2017) are presenting and developing contemplative pedagogy, and environmental education.

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Notes on contributors

Leena Kakkori is a philosopher (PhD) and diplomate in logotherapy VFI. Currently, she is an adjunct professor in philosophy of education at the University of Eastern Finland and working as a logotherapist in Jyväskylä. She is also an active member and lecturer of the Finnish Kriittinen korkeakoulu (Critical University in Finland). Kakkori has published a number of articles for example in the field of philosophy of education, philosophy of Heidegger, hermeneutics, and phenomenology.

Rauno Huttunen is a philosopher (PhD) and a sociologist of education (PhD). Currently he works as senior lecturer of education at the University of Turku (Finland). He is also an adjunct professor in philosophy of education at the University of Jyväskylä (Finland). Huttunen is the author of book Habermas, Honneth and Education (2009). Huttunen is a section editor of the Encyclopaedia of Educational Philosophy and Theory. Huttunen is a member of international research group called Pedagogy, Education and Praxis.

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GA is referring to Heidegger's Gesamstausgabe, Vittorio Klosterman.

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