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Heideggerian Notes on Science Education

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The article discusses issues, trends and possibilities in current education in Heideggerian terms. It follows a previous article that introduced the relevancy of Heideggerian philosophy for the topic of education. The approach of formal indication and the issues of deworlding and Being-in-the-world were explored. The reader may have been left with the question whether this approach to teaching and learning is only relevant to humanities and akin fields or to sciences as well. Hence the exploration in this second part continues with respect to the relevancy of an 'other' relation to language (logos) because currently education, like current sciences, supervenes on a Being-forgetful notion of ratio, whereas 'reworlding' and 'reontologizing' have to do with other possibilities.

Keywords: Being-in-the-world, education, science education, Heidegger, logos

INTRODUCTION

In the previous article (Stasiulis 2025), we, at first, introduced Heidegger's method of formal indication which also served as an outline of a 'method' for education. Its formality consists in the (in essence, Platonic) one-over-many principle – one is not single but both simple and multiple. Such 'paradoxical' nature of formality is an indication of its transcending the structure of formal-logic (the order of higher and lower classes, or genera and species). Also, this kind of formality involves situationality and temporality: its multiplicity unfolds in a dynamic, temporal and situational manner while always being retained in the unity. This 'unity' is not the highest of the classes or genera, but Being which is different from entities, 'escapes' formal-logic and gathers while remaining latent or concealed.

Accordingly, the way of teaching (as well as learning), based on the above-mentioned notions, focuses on the ability to relate to the unsaid, the beyond-discursive, to hint at the potential of insight in the learner as opposed to stamping propositional knowledge upon her or him. Such attitude also involves a kind of openness on the part of teacher who should be better than his students, more importantly, not in knowledge or having information but in the ability to learn and be close to Being which is overly rich in its ever temporalising.

This kind of teaching and learning is not based on a routine but rather on a repeated conscious resolution and action (of striving at unconcealment of Being). Such learning or teaching substitutes for the notion of student's static essentiality a notion of student's authentic temporality. The student should be ever conscious of the risk of inauthenticity and be directed

by the possibility of authenticity. As present, teaching institutions are embedded in opposite notions (and, ultimately, the forgetfulness of Being), the very setting of learning should also be called into question.

The previous article concluded that education should be brought back to Being-in-the-world as opposed to being structured by 'Gestell'. And this led to the question whether this approach of letting Being appear and presence is applicable only to the humanities or to 'hard' sciences as well? Since 'Gestell' is so nearly-identical with the calculative approach and modern technosciences, does the alternative approach to learning and teaching hold in the field of sciences as well? The answer was also hinted at: Heideggerian uncovering of Being undermines the very clear-cut distinction between humanities and sciences. It presupposes reconsidering the very fundamental notion of *ratio* and is linked to other ways of uttering sameness and Being, and this makes sciences open to Heideggerian ways of teaching/learning. This article will expand of this line of thought.

The linking of Heideggerian philosophy and education as well as science has been discussed by Duarte, Rocha, Thomson, Mika, Ehrmantraut, Biesta (all in the same issue, 2016), Riley (2011), Bagni (2010), Donnelly (1999), Standish (1997), Mertel (2020), Kakkori, Huttunen (2012), Gibbs (2010), Neufeld (2012), Irwin (2025), Shaw (2013) and Stasiulis (2021; 2023; 2023 a; 2024; 2025). Education from other perspectives was discussed, among others, by Asakavičiūtė et al. (2023), Valantinaitė et al. (2020), Grincevičienė et al. (2019), Valatka (2013) and Šniras (2016). A university of technology and Heideggerian notions also come into contact in the monograph by Kačerauskas, Vėželis (2016). A number of lecturers in the Lithuanian system of education have discussed Heideggerian notions, including in the collection of articles edited by Andrijauskas (2019).

PRESENCING AND SOLID SCIENCES

Mathematics and Temporality

One could argue that such attitude might be possible in humanities but is it relevant to education in technical, mathematical or exact sciences?

In fact, Heidegger's reconsidering the underlying assumptions of Cartesian thought needs concern the mathematical aspect of knowlege (indeed, Heidegger reminds us that etymology of *mathematics* itself refers to *knowledge*) and does away with the distinction of 'objective' and 'subjective' which is presupposed by the afore-mentioned doubt. The great philosopher of mathematics and Heidegger's master Husserl already talked about the naivete of holding the opinion that 'objectivity' of science is possible without the 'subjective' experiencing scientist who livingly constructs the objective knowledge and performs real achievements (Bagni 2010: 80–81). Just like propositional knowledge, mathematical knowledge presupposes the worlding world. Knowledge is gained by human beings who are involved in the world. A mathematical statement does not just objectively mean something but is also used by someone in a specific situation, hence, interpretation can be recognised as being more central to mathematical knowledge than the 'naive' view would assume (see Bagni 2010: 81). The historical-sociological investigation in the philosophy of science would also apply to mathematics, which would be seen as situated human activity (as a subset of social activity) (see ibid.). Bagni is in agreement with Radford that learning is not 'an uncritical appropriation of existing knowledge' but rather an open-minded activity with a transformative power

where, in the absence of distinction between an object and a subject, 'in the course of knowing and learning, the subject is itself transformed' (Radford, cited from Bagni 2009: 82). As mathematical objects are uncovered by mathematicians in the course of history, they naturally have social, ethical and political dimensions or significance. The way they are now made available to students in the classroom should be sensitive to these dimensions and they must be pointed out clearly to allow students to grow fully and consciously (Bagni 2009: 82).

One of the key messages of Heidegger about mathematics is that its significance in modern science does not stem from itself but from (Cartesian, and eventually Greek) the ontology of presence. It is only because Being was uncovered as stable (and, in an important sense, atemporal) presence – something which remains constant, the same, in the flow of changes or time – that mathematics became especially relevant because it is very fit for capturing and describing the constant, the same (Heidegger 2006: 95–96). But as presence is presencing to Dasein, that is, it emerges in the relation between Being and Man, each scientific activity is also human activity as practice of discovering (see Heidegger 2006: 358).

For similar reasons, Bagni suggests a more dynamic approach to learning mathematics and places importance on the fact that students can make sense of how knowledge is generated historically and that they are aware of how it comes to be meaningfully understood and creatively employed (Bagni 2009: 81, 83). The basis for this view is Heidegger's explanation about the absence of the distinction between an object and a subject.

Rocha emphasises that education cannot restrict itself to merely superficial things: the slogan of phenomenology 'To the things themselves!' means that the fullness of all phenomena should be taken into account (2016: 813–814). Heidegger notices how allegedly scientific ('materialist') investigation reduces the description of the world to the most shallow or easily describable things but leaves the essence of phenomena unattended. For example, a scientific explanation of colour in terms of the frequency and length of a moving light-wave can leave the phenomenal givenness of colour unattended (Heidegger 1984: 212). As phenomena are phenomena (showings) of Being, knowledge of them is never 'exhausted' because Being remains 'mysterious' and inexhaustible (Rocha 2016: 814). According to Rocha, even Heidegger himself does not discuss education as a phenomenon in itself but only as part of a university system (Rocha 2016: 817). Yet, he argues, education does not equal schooling but is a broader notion: history of education is history of consciousness (or the like) rather than of schooling (ibid: 818). Relating education to the situation in the world and the question (as well as the mystery) of Being could bring back enchantment into education (ibid: 820–821 and further).

On the other hand, Rocha's view risks being two abstract: the formality of thinking Being or Dasein is a potentiality for a new content of being and knowing and, in-exhaustive as Being is, this potentiality should give rise to contentful thinking rather than just throw us into the embrace of the 'irrational' (cf. Heidegger 1979: 388).

Proper Understanding of Language

Standish, like others, notes that education has become worldless (deworlded) – very similarly to how in Descartes' philosophy abstract space is prioritised over the everyday world with its bodily and concrete locations (cf. Stasiulis 2021: 8–9). Social relations also take place in this 'Cartesian' kind of space (Stasiulis 2023 a: 275–276). Community of teachers and students should be brought back 'to be-in-the-world' again, and Standish believes that strengthening the community and 'restoring responsibility to those who teach' could foster the good practices that could subvert the deworlded trends in the educational system (Standish 1997: 458).

Yet, even though these 'good practices' are welcome, what Heidegger spoke about was a more fundamental project of an epochal change. Thomson, who published his article 19 years after Standish's article and even much longer time after Heidegger provided his description of the essence of technology, notices how enframing permeats education (for example, in teaching to test according to pre-existing plans rather than disclose students' capacities) as well as the understanding of entities in all or many academic disciplines (biology, psychology, history, study of literature): hence, 'Heidegger's *later* goal for education in general and the university in particular becomes to teach the other disciplines to *think ontologically* in order to help them uncover other, non-nihilistic ways of understanding being at the frontiers of their own research' (Thomson 2016: 855). It would help us see that learning is first and foremost not about acquiring information but about 'freeing vision': a freedom which equals the task or call to exist as the shepherd of Being (ibid.). Here we can recall that the Greek word for truth, *alētheia*, can be translated not only as unconcealment or unconcealing (the usual translation for Heidegger) but also as unforgetting or unforgetfulness: truth is what cannot be forgotten once it has been seen (cf. Šliogeris 2013: min. 2:38–3:20), eventhough it is not restricted to propositional informations. This 'truth' stays with those who engage with Heideggerian thinking of Being even if they depart from Heidegger as, perhaps, all are 'compelled' to do at some stage (Mika 2016: 1 and further).

What is needed is education in thinking because fundamental ontology is not a closed system of axioms but a rather fluid and open-ended project (Mertel 2020: 475, 473). In the present situation, students themselves feel increasing levels of anxiety because of effectively becoming enframed resources but as the character of education is deworlded, this social pathology is redirected to responsibility of individual students and contributes to their mental burnouts (ibid: 477, 481). What is needed is not a retreat into the irrational but fostering the proper character of 'ratio', that is, language, and safeguarding it from the aggression of 'technical language' what amounts to safeguarding the proper essence of man (see ibid: 484).

Neufeld aptly notices that this Heideggerian style of critique will always remain suspicious and strange because it seems to go against the very deeply-entrenched notion of what it means to be 'educated' (Neufeld 2011: 69) which in turn has to do with what it means to be 'rational' and, in the end, how, at bottom, language presences. 'Education' is supposed to deanimalise us (ibid.; cf. Stasiulis 2024: 114–115). Yet, Heidegger, in his analysis of what thinking is or how it presences, pays attention to the fact that the beginning of Western philosophy and rationality (Parmenides) cannot be understood if construed syntactically (our syntax just expresses the ontology of substance) but should be read or listened to paratactically (Neufeld 2011: 70–71). It is another kind of language and a different understanding of sameness, other than that on which Western metaphysics has dwelt. This different ontological uncovering is necessary for us to stop being estranged from ourselves by our own ways of speaking. This is why the (very) formal indication of Heidegger's earlier thought later gave way to search for ways of expressing and thinking Being outside of the language of 'traditional' metaphysics.

The word 'school' comes from *skholē* (ease, leisure, that in which leisure is employed). Eventhough unconcealing of truth and the so-translated authenticity has nothing to do with de-worlding or de-bodying, still, in a vulgar everydayness things can be too commonplace and fail to appear in their presence as phenomena of Being. Unconcealment, or authenticity, requires a certain distance or repose (cf. Heidegger 1993: 33). Likewise, we may need a kind of distance or repose from language to let it (re)appear in its presence.

'Nature's Own Science'

Some authors (cf. Shaw 2013) see implications of 'hermeneutic' philosophy of science for science education as profound and, accordingly, suggests that some current practices of schooling be challenged. As paratactic thinking drops the structure of subject–object syntaxis, the 'manipulative' approach also drops and opens possibility of another kind. 'Science teacher [will] teach nature's own science' (Shaw 2013: 546) as opposed to interpreting its random processes based on some contrary-to-nature human manipulative inclinations.

It is not only the insights given in reply to the question of what science is but, first of all, the very asking of the question is worthy. The lack of such questioning is especially typical of science education. On the other hand, there is an alternative constructivist view, applied in science education, which is subjectivist and dims notions of truth. Shaw pointedly stresses that the 'hermeneutic' approach is different from both as well as takes something from both as it notices the human role in the existence of science but also engages with truth (Shaw 2013: 548). For Shaw, it is critical that students of science experience truth discovered in science as *alētheia* and not merely as *adequatio*, that is, they must engage in the very act of discovery of knowledge that mimics the way the hidden aspect of nature first revealed itself to the original discoverer (Shaw 2013: 565). Without the event of truth, there is no *science*. Thus, truth – not mere utility – should be restored in science education. The activity of science has to be related to (asking) the question, what is science? As Heidegger has it, the level of science is determined by the extent to which it is capable of a crisis of its fundamental notions (cf. Heidegger 2006: 9). This sense could also be preserved in the course of science education.

The phenomenological notion of truth brings one back to 'things themselves' which exhibit ontological power and lawfulness that we should heed. Irwin relates the Heideggerian critique of modernity and education to our disregard of basic laws or pace of nature (Irwin 2025): our education is adapted to meet the needs of current economy which in turn is unnatural in that it neglects the sense of balance inherent in the world. Re-worlding education can also mean its relating to being in a bodily place (ibid.), and it has an ecological significance as well. Economy itself should move from *Gestell*-like linear rationality to respecting the pace and rythm of things.

Heidegger drew the famous distinction between the ontologic and the ontic. Western *logos* began in ontology in ancient Greece but the ancient Greeks did not draw a clear distinction between the ontologic and the ontic. The same shortcoming was passed over to the basis of modern science as expressed in Descartes' philosophy and, in particular, in his understanding of space. This geometrical space is an abstraction from spatiality in the worlding world. But the first act of measuring is, in the phenomenological sense, already an act of deworlding (cf. Stasiulis 2025 a). Hence, science education 'naturally' has a tendency to ignore the world into which it should be situated. Awareness of the phenomenological situation of its basis and its rootedness in the world could make an important difference.

CONCLUSION AND DISCUSSION

The ontologic is not unrelated to the ontic – quite the contrary, the former is expressed in or through the latter. If their difference is obscured, though, only the ontic remains. The ontologic system is dynamic and temporal, whereas the ontic side of phenomena appears first and foremost spatially – as spatial things. Hence, science, if it has undergone ontisation, only investigates relations between spatial objects. As these objects have been deontologised, this kind of science only investigates mechanical 'non-living' relations but nothing else, and tends

to falsely reinterpret the world as nothing else but a whole of such relations expressed numerically. Orientation from mere *adequatio* to *alētheia* opens room for a better understanding of the world that we exist in.

At the beginning of Greek ontology, the (Pythagorean) number played a crucial role in expressing and describing the *logos* of the world. But despite tendencies towards ontisation, it was embedded in the 'living' and ontological appearance of *logos* which expressed the unity of simplicity and multitude. This implies that thinking, in order to grasp it, could not have been reduced to ratiocination but was open to other ways of manifestation as well. Heideggerian work aimed at uninhibiting those possibilities. They can alter science education in accordance with the way it alters the stance of science and thinking/existing in general.

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NERIJUS STASIULIS

Haidegeriški pastebėjimai apie gamtos mokslų edukaciją

Santrauka

Straipsnyje, pasitelkiant haidegeriškas sampratas, aptariamos dabartinės edukacijos problemos, tendencijos ir galimybės. Jis pratęsia ankstesniame straipsnyje pradėtą haidegeriškos filosofijos relevantiškumo edukacijos temai aptarimą, kuriame nagrinėjama formalaus nurodymo prieiga ir išpasaulinimo bei būties-pasaulyje problemos. Skaitytojui galėjo kilti klausimas, ar tokia mokymo ir mokymosi prieiga yra tinkama tik humanitariniams ir jiems artimiems mokslams, ar ir tiksliesiems ar gamtos mokslams. Todėl, tęsiant tyrinėjimą, šioje antrojoje dalyje daugiausia dėmesio skiriama „kito" santykio su kalba (logos) svarbai, nes šiuolaikinis švietimas, kaip ir dabartiniai tikslieji ar gamtos mokslai, remiasi būtį užmirštančios racionalumo (ratio) samprata, o „pasauliškumo" sugrįžimas ir „reontologizavimas" atveria kitas galimybes.

Reikšminiai žodžiai: būtis-pasaulyje, edukacija, gamtos mokslų edukacija, Heideggeris, logos