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**To cite this article:** Koen R. Wessels, Cok Bakker, Arjen E.J. Wals & George Lengkeek (2024) Rethinking pedagogy in the face of complex societal challenges: helpful perspectives for teaching the entangled student, *Pedagogy, Culture & Society*, 32:3, 759-776, DOI: [10.1080/14681366.2022.2108125](https://doi.org/10.1080/14681366.2022.2108125)

**To link to this article:** <https://doi.org/10.1080/14681366.2022.2108125>



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Published online: 16 Aug 2022.



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# Rethinking pedagogy in the face of complex societal challenges: helpful perspectives for teaching the entangled student

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## ABSTRACT

Confronted by myriad interconnected societal challenges, this paper asks: what kind of pedagogy does justice to the experience and challenge of living in a complex world? Departing from a critical reading of a preparative-logic to education, this paper emphasises students' entangledness: more-or-less consciously, students are uniquely shaped-by and shapers-of complex societal challenges in a here-and-now sense. Utilising this premise, the paper develops a set of pedagogical perspectives that might inspire and help teachers to design their own responses to particular complex societal challenges in their unique teaching contexts. Drawing on emerging outcomes from a narrative diffractive inquiry with 12 teachers as co-researchers and engaging with complexity thinking, six perspectives are presented and discussed: entanglement-orientedness, entanglement-awareness, hopeful action, inquiry within complex societal challenges, practicing perceptiveness, and practicing integrity. Together, these perspectives offer a heuristic for embracing complexity in education.

## KEYWORDS

Entanglement; pedagogy; complexity; hope; integrity

## Introduction

As a teacher and/or educational researcher in contemporary society, one soon encounters complex societal challenges, such as the ecological crisis (e.g., Besley and Peters 2019), fake news and post-truth politics (e.g., Zembylas 2020), the increasingly multicultural, globalised, and digital outlook of societies (e.g., Bond et al. 2018; Tatham-Fashanu 2021), the rise of burnout among students (e.g., Walburg 2014), the impact of the COVID-19 pandemic (e.g., Heikkilä and Mankki 2021), and, indeed the reality or looming threat of war (e.g., Hajir and Kester 2020). We believe that in these confrontations, important pedagogical tasks await, and herein lies the focus of our work. In this paper, we approach this matter in a rather generic manner. As the complex societal challenges confronting us are myriad and interweave, rather than zooming in on one particular challenge we ask: what kind of pedagogy does justice to the experience and challenge of living in a complex world?

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We emphasise that, contrary to what much of educational discourse and policy has recently suggested, education is itself a complex process (Biesta 2010, 2016). This demands nuancing ‘what works’ into – as Akkerman, Bakker, and Penuel (2021, 421) put it, ‘what once worked for whom, when, where, how and for what purpose and with what kind of expansive possibilities’. For this reason, our aim is to develop a set of helpful pedagogical perspectives as *hermeneutic lenses* (Lengkeek 2016; Smedslund 2009): ways of seeing which can inspire and help teachers to design their own responses to particular complex societal challenges in their unique teaching contexts. We therefore build on Philippe Meirieu’s pedagogical model (Meirieu 2016) that suggests that a pedagogical response ought to be developed along the three interrelated dimensions of axiology (i.e., the purposes that provide a pedagogy its focus and orientation), praxeology (i.e., the educational settings, methods, teaching styles, and other practical arrangements that are utilised to shape the educational process), and theory (i.e., the way both axiology and praxeology are grounded in premises, arguments, data, knowledge about the world). In the dimension of theory, the work we present here is an exercise in *complexity thinking* which we now briefly introduce and position within an educational context to provide a base for our subsequent inquiry into the dimensions of axiology and praxeology.

### ***Complexity thinking***

Complexity thinking refers to ‘a way of thinking and acting’ that is ‘concerned with the philosophical and pragmatic implications of assuming a complex universe’ (Davis and Sumara 2006, 18). This idea of a ‘complex universe’ was initially triggered by a growing difficulty in understanding and predicting newly discovered natural phenomena using the available laws of physics and mathematics. Complexity thinking emerged, consequently, as an approach dominated by natural scientists when various strands of so-called ‘complexity science’ (e.g., cybernetics, systems theory, chaos theory) gained traction around the 1950s and 1960s (Alhadeff-Jones 2008; Davis and Sumara 2006). Today, however, complexity thinking has spread throughout academic disciplines. One of the key publications enabling this spreading is Rittel and Webber’s paper on wicked problems (Rittel and Webber 1973), in which they explained how problems of social policy are of such a complex nature that ‘the professionalized cognitive and occupational styles that were refined in the first half of this century, based in Newtonian mechanistic physics, are not readily adapted to contemporary conceptions of interacting open systems’ (156; n.b. ‘this century’ refers to the 20th century). By now, the accumulation of complexity research gives rise to a long list of ways in which the world we live in is complex rather than simple. Without claiming to be exhaustive we would like, here, to highlight three perspectives on complexity that we believe open up promising ways to think about education and pedagogy, and that formed the point of departure for our inquiry. To do so, we focus on the challenge of the ecological crisis for the sake of exemplarity.

### ***Confronted with multiple perspectives and an open future***

Decades of research, political debate, and social movements illustrate that it is an immense struggle to, in the face of the ecological crisis, reach one clear, shared narrative encompassing a singular problem-definition, vision for the future, and path to get there. Rather, society is permeated by a plurality of voices and stakes (Coyne 2005; Rittel and Webber 1973). As Rittel and Webber observe (163), when we plan for social change ‘many

parties are equally equipped, interested, and/or entitled to judge the solutions, although none has the power to set formal decision rules to determine correctness'. Indeed, it is up for debate how best to arrive at an ecologically desirable human presence on Earth (e.g., which renewable energy source is most wise to use where and in what timescale?), and what exactly such a desirable presence entails (e.g., what are the ethical limits to domesticating animals for consumption?). In our collective efforts to make sense of our predicament, the future is open, and any attempt to plan the future is bound to be frustrated by contrasting voices and/or turns of events (see, also, Laloux 2014; Wahl 2016).

### *Confronted with movements in (nonlinear) motion*

These very ecological problems we are trying to resolve are, to complicate matters further, continuously in motion. Average temperatures are rising, numerous species are on the verge of extinction, natural hazards are becoming more frequent and intense, innovative technologies are developing, ecological awareness is growing, and so forth. All our efforts to contribute to positive change are situated within these motions are, to use a phrase borrowed from Akkerman, Bakker, and Penuel (2021), *movements in motion*. The effectiveness of local action (e.g., planting seeds to strengthen bio-diversity) depends a great deal on the motion of that ecosystem in response to changes in the yet larger systems it is a part of (e.g., global weather dynamics), and so emerges a nested structure of local and increasingly global dynamics that co-specify each other (see Davis and Sumara 2006; Laszlo 1996). It would, therefore, be extremely helpful if we could perfectly forecast all the movements we are situated in, yet the complex reality we live in has an impressive track record in escaping our efforts to do so. An important reason for this is that living systems demonstrate self-creativity (Laszlo 1996; Morrison 2008); they are able to change their internal structures in response to changing conditions. For instance, if the population of a particular species in a certain region drops by 15%, a so-called cascade effect might move the local ecosystem into a state of accelerated change in which interactions between species are redefined and a new natural order emerges. Notably, such emergent behaviour tends not to present itself as a gradual, linear process, but rather occurs nonlinearly as a sudden response to an accumulation of triggers (Crowell and Reid-Marr 2013; Davis and Sumara 2006).

### *Confronted with interconnectedness*

A consequence of the dynamic, nested nature of ecological processes is that once we focus our attention on local ecosystems they appear to us as ambiguously bounded; that is, 'open in the sense that they continuously exchange matter and energy with their surroundings (and so judgments about their edges may require certain arbitrary impositions and necessary ignorances)' (Davis and Sumara 2006, 5). Consequently, we are confronted with interconnectedness, an important aspect of complexity thinking (Crowell and Reid-Marr 2013; Morrison 2003; Wahl 2016). In this context, an ecosystem is an intricate web of relationality, in which myriad life forms co-constitute each other's existence. Yet, this interconnectedness and co-dependency present themselves, not only within one challenge but also between challenges, and in many ways wicked problems can be considered to be symptoms of other wicked problems (Rittel and Webber 1973; n.

b. the images of war and climate refugees are, perhaps, today's strongest and most confrontational examples of how challenges of ecology, inequality, multi-culturalism, and mental well-being are intertwined).

### *The entangled student*

In order to position complexity thinking in an educational context – a crucial step in working towards helpful perspectives for a pedagogical response to complex societal challenges – we now move on to a consideration of students' relationships to complex societal challenges. We propose understanding this relationship in terms of entanglement (Barad 2007; Ingold 2008, 2010), that is to say: more-or-less consciously, students are always already uniquely *shaped-by* and *shapers-of* complex societal challenges through their evolving biographies. Our argument for doing so encompasses a critical reading of a preparative logic to education and its tendency to dichotomise and/or simplify.

### *The readiness dichotomy*

A common and intuitive way to understand education is as a process of preparation (Biesta 2010, 2020). This logic fulfils a crucial role in guaranteeing quality in professional practices, in protecting the healthy development of children into adulthood, and in protecting the integrity of democratic processes. For the purposes of our inquiry, we would like to highlight Hannah Arendt's educational critique (Arendt 1961) as a particular example of a preparative logic to education. Central to Arendt's reasoning is the phenomenon of natality, expressed in the understanding that 'to preserve the world against the mortality of its creators and inhabitants it must be constantly set right anew' (192). The student, for Arendt, thus represents a new generation of citizens that will have to renew the world in ways beyond the (dying) control of older generations, and for her it is the teacher's task to prepare the student for this responsibility without dictating its shape. Underlying her argument – and in this sense Arendt's reasoning is exemplary for any other preparative approach – Arendt poses a separation between what she calls the educational realm (i.e., there where newcomers are introduced into the world) and the political realm (i.e., there where we, post-education, take on responsibility for the world). Preparative approaches to education, thus, can be differentiated across many contexts and ideologies, yet their commonality is that they all instal dichotomies in terms of 'readiness'. Dichotomies, between those who can, know, or have certain rights (i.e., the teacher, and those particular others the teacher represents), and those who are still unfit, lack knowledge, and are yet to deserve certain rights (i.e., students).

If we apply a preparative logic to students' relationship to complex societal challenges, we arrive at the conclusion that they are in some phase of preparation for future participation in them. Of course, there is a truth to this in the obvious sense that a student of Environmental Sciences would most likely be unable to successfully fulfil the role of Environmental Minister. However, in light of the understanding that complex societal challenges are hard to define, multi-interpretable, open-ended, and dynamic, it is not hard to see that a strict readiness dichotomy is insufficient in two ways. First of all, a distinction in readiness between a student and a teacher is always relative rather than absolute; although teachers evidently embody valuable knowledge and experiences, they too find themselves in need of knowledge and experience in the face of complexity

(Crowell and Reid-Marr 2013). Secondly, readiness dichotomies tend to be reversible in particular ways. Perhaps the most familiar contemporary images here are those of a teenager teaching his/her (grand)parent how to use some piece of innovative technology and of global student climate strikes in which the young of our world inspire older generations. We agree with Freire (1972), therefore, that not only should we understand teachers as teacher-students, but it would also do justice to students to consider them student-teachers. It is therefore important to understand the relationship of students to complex societal challenges not merely as in-preparation-for-future-participation but also in terms of participation-here-and-now.

### *The space dichotomy*

Yet a preparative logic to education tends not only to instal dichotomies in terms of readiness but also in terms of space, between the student-in-school and society 'out there'. Physically, schools do indeed typically appear as enclosed spaces, in that they are buildings equipped with borders. These borders enclose what Arendt (1961) referred to as the educational realm, and enable teachers to think of their task as preparing students for the world 'out there'. According to social anthropologist Tim Ingold (2008), to think in terms of space-dichotomies is, in fact, typical for modern humanity as we tend to use a logic of inversion; we tend 'to turn the pathways along which life is lived into boundaries within which life is contained' (1–2). From this point of view, it is interesting to note that Biesta (2013) writes of Arendt's dichotomy between the educational and the political realm that 'it is not only irresponsible to try to keep political existence away from the school; it is also impossible to do so, because the lives of children and young people – inside and outside the school – are permeated by questions about togetherness-in-plurality' (Biesta 2013, 118). Following this logic we might observe, for instance, that whereas as a society we need to move towards a more sustainable lifestyle, so the school building, the materials we use in the educational process, and the lifestyles of students and teachers are more or less sustainable. In other words, the complex challenges out there in the world are also in here in school and weave through the nested structures that organise our lives, and students are personally entangled with these challenges through their unique, evolving biographies. To live, as Ingold summarises it, is 'to join in the processes of formation' (Ingold 2010, 5–6).

The premise of entanglement emphasises how our being in the world is relationally mediated (i.e., we fundamentally exist and develop through relationships), and thus implies a relational ontology. To explicate this point further we turn, briefly, to Karen Barad. Resonating with Ingold's analysis of the logic of inversion, Barad (2007) argues that as human beings we excel in performing so-called agential cuts: we consider different entities and their agency in isolation yet in doing so analytically cut the relational threads that our existence depends on. She proposes that the primary ontological units 'are not "things" but phenomena – dynamic topological reconfigurings/ entanglements/ relationalities/ (re)articulations of the world' (141). To be sure, this is not to say that identities, both individual and collective, are unimportant or illusionary, but rather that the very experiences of self and other emerge in relationality (Barad 2007; Ceder 2019). It follows that the two fundamental experiences of being an entangled self are: (1) to be a whole with a hand in shaping the world's becoming and (2) to be a part shaped in the world's

becoming (see, also, Laszlo 1996). It is this here-and-now simultaneity of being whole and part and of being, shaper and shaped, that constitutes students' fundamental entanglement with complex societal challenges.

### Narrative diffractive inquiry with teachers as co-researchers

The question for us as teachers now is: with what purpose (i.e., axiology) and in what way (i.e., praxeology) are we to respond to students' entangledness in contemporary societal challenges? To formulate a set of perspectives that might help us to engage with this question, we draw on an empirical, narrative diffractive inquiry conducted with teachers as co-researchers between February 2019 and February 2021.

Using a selective sampling strategy (Palinkas et al. 2015), we approached a group of 14 teachers who had previously participated in a pilot programme at the Dutch experimental educational institute called The Bildung Academy to become our co-researchers. This pilot programme aimed at creating an open space for exploring new ways to focus education on students' personal development and societal engagement (n.b. the first author was a co-initiator of The Bildung Academy). Twelve teachers responded positively to our invitation and two opted out of participation for health reasons. We considered collaborating with this specific group of teachers interesting for two reasons: (1) their sensitivity to and experience with the scope of our research created a common ground which was crucial for a collaborative research process, and (2) their diverse backgrounds in terms of school type and educational discipline constituted an equally important degree of heterogeneity (see Table 1).

In our collaboration with these teachers, we built on a narrative approach (Squire, Andrews, and Tamboukou 2013) recognising people as 'storytelling organisms who, individually and socially, lead storied lives' (Connelly and Clandinin 1990, 2). We emphasise that narratives are to be understood as we-realities (Rosenthal and Fisher-Rosenthal 2004); it is through interaction in specific research contexts that they take form. For this reason, communicative validation (Polkinghorne 2007) – ensuring that all involved in the narration process agree on narrative texts produced throughout it – is crucial in narrative research. In line with our purpose of articulating helpful pedagogical perspectives as hermeneutic lenses, our narrative approach involved two steps of narration: (1) identifying and narrating personal teaching experiences (after Kelchtermans 1993), and (2) collaboratively engaging with these narratives in the attempt to interpret and articulate hermeneutic lenses. To shape the second step of narration, we build on a *diffractive approach* (after Barad 2007; Bozalek and Zembylas 2017; Haraway 1997), recognising that together with co-researchers we are entangled in the phenomenon of our interest and are therefore more likely to articulate rich, helpful perspectives if we challenge and transform biographical narratives through an ongoing process of creative obstruction than if we take them for granted and try to reflect insights articulated in them. In shaping such a strategy, we were particularly inspired by the diffractive methodology of Van de Putte et al. (2020), whose work provides a powerful example of approaching co-researchers' initial narratives as 'diffractive scripts' (i.e., lively narrations that transform and gain meaning through the collaborative engagement of the researchers).

For a complete description of the process and outcomes of our collaboration with teachers as co-researchers, we would like to refer to Wessels (Forthcoming). For our purposes here, we limit ourselves to providing a brief summary of the research

**Table 1.** The general diversity profile of the 12 co-researchers at the start of participation.

Gender		Age			School type		
Male	Female	25–40	41–50	51–65	High School	Applied University	Primary School
5	7	2	4	6	7	4	1
Location School (Province) <sup>a</sup>					Subject type <sup>b</sup>		
North Holland	Utrecht	Groningen <sup>c</sup>	Social Sciences	Humanities	Science	Art	Other <sup>d</sup>
5	3	3	3	4	2	3	1

<sup>a</sup>One participant is not listed here and came from the province of Gelderland.

<sup>b</sup>The sum of subject types is 13 instead of 12 as one teacher taught in both Art and Social Sciences at a high school. Notably, during the research process this teacher switched jobs and started working as a teacher educator at an Applied University.

<sup>c</sup>One of these teachers (female, age-group 51–65, high school, humanities) left the inquiry after phase 1 for personal circumstances.

<sup>d</sup>Other subject type refers to the primary school teacher.

process, followed by an illustration of outcomes around one out of three generated diffractive scripts in Table 2. All in all, the inquiry with co-researchers comprised the following three phases:

- (1) A semi-structured narrative biographical interview with each co-researcher, exploring teacher biography and exemplary teaching experiences in which students actively participated in complex societal challenges. Subsequently, these interviews were processed into narrative synthesis texts utilising audio recordings and co-researchers’ summary notes and fed back to co-researchers for communicative validation.
- (2) Two inquiry sessions per randomly created subgroup of 3 or 4 co-researchers, engaging in the following challenges: First, they read each other’s narratives and highlighted so-called hotspots (i.e., parts that particularly attracted their attention). Secondly, they were asked to collaboratively think of a challenging yet realistic educational situation in which students’ entangledness in complex societal challenges could be brought to the fore and to develop several scenes describing how this situation could turn into a meaningful educational process. This resulted in the development of three diffractive scripts, titled ‘The Multicultural Classroom’, ‘The Sustainable School’, and ‘Mock and Prejudice’. Finally, each group engaged in a contemplative dialogue to gather and summarise, in a mind-map structure, insights that emerged through this creative challenge regarding the question of how to work meaningfully with students’ entangledness.
- (3) A one-on-one inquiry-session with each co-researcher aimed at enriching the diffractive scripts, exploring creative tensions in them, and expanding the insights harvested in phase 2. In the first part of each session, co-researchers engaged with the following challenges: (1) reread the scripts and notice what attracts your attention, (2) improve your group’s script as you see fit, (3) improve the script of another group as you see fit, (4) looking at what attracts you and the kind of changes you suggest, describe a pedagogical tension or dilemma that you recognise, (5) describe a recent exemplary experience of your own in which this tension also surfaces. Subsequently, in a contemplative dialogue each co-researcher articulated insights around the two questions: (1) what do you now realise about what it takes to work with the



pedagogical tension you explored? and (2) how would you now summarise your pedagogical aim in the diffractive script you co-created with your group?

After completing this process with all co-researchers, the first author made and shared one summary of insights in the form of a recorded PowerPoint presentation, in which six helpful perspectives emerging across the inquiry sessions were highlighted. Namely, the three axiological perspectives of *entanglement-orientedness*, *entanglement-awareness*, and *hopeful action*, and the three praxiological perspectives of *inquiry within complex societal challenges*, *practicing perceptiveness*, and *practicing integrity* (see Table 2). On request, we received and processed a few points of feedback on how to improve the summary so that all co-researchers felt fully represented by the outcomes.

**Table 2.** Illustrations of how the six perspectives emerged in co-researchers' processes of co-creating the diffractive script, 'The Sustainable School'.

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**Diffractive Script 'The Sustainable School' opening scene**

Two students in a secondary school in the Netherlands send a message to their physics teacher stating that they want to start a sustainability committee at the school. The students decided to seek the help of this particular teacher as they are known to be very interested in sustainability.

**Axiology (the teacher's purposes, as articulated by teachers as co-researchers)**

Entanglement-orientedness	To grow into more sustainable perspectives together with other students and teachers in the school, with respect and openness for diverse points of view yet without losing the capacity to critically question their grounds
Entanglement-awareness	To trigger awareness of the importance and complexity of sustainability, societal dynamics related to sustainability, and our personal thoughts and actions concerning sustainability
Hopeful action	To invite students to express their opinions with sound arguments, to practice respect and openness to others, and to transform their interests and growing awareness into actions that help move towards sustainability collaboratively

**Praxeology (the pedagogical process, as designed by teachers as co-researchers)**

The process of inquiry	
Opening	Encouraged by the teacher's outspoken commitment to sustainability, the students approach him/her with their plan
Organising	The teacher and two students enthusiastically share ideas and the teacher offers his/her support based on three intentions: (1) to connect with other students, viewpoints, and the curriculum, (2) to try to get the school management on board, and (3) to start with small concrete steps to get the ball rolling.
Consolidating	Three months later, after first experiences of success and frustration, the teacher initiates a meeting for interested students and teachers. In this meeting, there is an open stage for sharing and performances, and the two students and teacher challenge each other to share in a creative way what they have experienced and learned thus far.
Practicing perceptiveness	In his/her first meeting with the two students, the teacher feels s/he gets carried away with enthusiasm, yet later at home when considering how to follow up s/he becomes aware of the risks of (1) going too fast/ambitious so that other students, teachers, and the school management do not feel inclined to join and (2) being close-minded towards adversary voices.
Practicing integrity	Based on these concerns, the teacher decides to have a conversation with the students leading to the articulation of and commitment to the three intentions that organise the inquiry (see above).

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## Helpful pedagogical perspectives

We now move on to a theoretical reading of the six helpful perspectives for teaching in the face of complex societal challenges that emerged in the inquiry with co-researchers (see Figure 1 for a summary). In doing so, we draw on a selection of complexity thinking, with a focus on pedagogical theory and relational ontology and ethics. Our focus on the

particular scholars whose work we refer to (below) came about through a pragmatic approach to literature selection that resembles what is commonly known as snowball sampling (Noy 2008). We have depended, in particular, on occasions in which initial writings or presentations triggered specific literature suggestions (e.g., during conference visits), and on discussions among ourselves around initial writings of the first author, in which the other authors were encouraged to bring new material into the conversation.

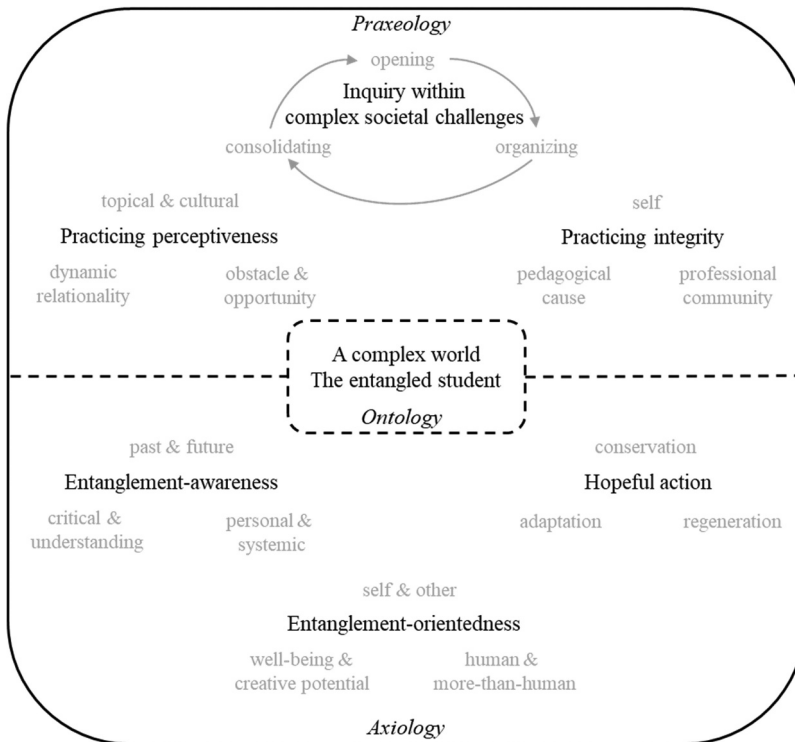


Figure 1. Helpful perspectives for teaching the entangled student.

### Three axiological perspectives

The perspective of *entanglement-orientedness* offers something of a meta-narrative in the dimension of axiology, and is rooted in the move from an ontology of individualism – ‘the belief that the world is populated with individual things with their own independent sets of determinate properties’ (Barad 2007, 19) – to a relational ontology. Embracing this move we should, as is our suggestion here, likewise transform our pedagogical focus on individual flourishing and accomplishment into a more ambitious focus on entangled flourishing, that is: a strive towards ways of being in the world through which we co-constitute each other’s well-being and can realise our personal and collective creative potentials.

Against the background of the focus on flourishing as a relational quality, we emphasise that, when we focus on a particular entanglement we are part of, we can typically discern both enabling/freeing and constraining/entrapping effects (Hodder

2014; e.g., high mobility tends to go hand in hand with high expense and an increased carbon footprint). What hangs in the balance pedagogically, is how we respond to such effects, and with Rosa (2017) we recognise that our responses might both move towards experiences of alienation – i.e., types of relationality marked by the absence of ‘a true, vibrant exchange’ (499), such as indifference or hostility – and experiences of resonance: a progressive and vibrant relationality characterised by bi-directional openness and expression. We suggest that an important pedagogical task is to invite the latter.

Seen from the perspective of relational ontology, we would make four additional remarks. Firstly, as the premise of entanglement gives rise to the relational ontological interpretation, that relationality precedes individual identity (Barad 2007; Ceder 2019), entanglement-orientedness is not to be understood as an attitude that seeks to compromise between the desires of fixed, separate individuals. Rather, we propose it as a far more dynamic and ambitious aim to embrace the fundamental *dependency* that characterises our lives and to recognise the task of fostering communal relationships as part of the flourishing, not only of ourselves, but also those with whom we share our existence on Earth in our hearts. In other words, the emphasis is on striving towards ‘a collective sense of us [. . .] in which individualities are engendered’ (Elwick 2020, 149). Secondly, given that we are entangled with, and thus dependent on, not only other human beings but also the microbes in our stomachs, the air-regulating trees in the forest, the biodiversity in the ocean, and so forth, entanglement-orientedness ought to be understood in post-anthropocentric and even post-human terms. Such a plea for including the more-than-human into our conception of the common good is, indeed, gaining traction, and is, for example, clearly observable in the research areas of holistic education (e.g., Hart 2014), common world pedagogy (e.g., Taylor and Pacini-Ketchabaw 2015), critical animal pedagogy (Pedersen, Håkansson, and Wals 2019) and education for sustainable development (e.g., Lotz-Sisitka 2017). Thirdly, entanglement-orientedness can both be explained as an ethical logic – i.e., as we depend on each other, we should care for each other (see especially, MacIntyre 1999) – and experienced as an intuitive ethical desire to contribute to a world of joy, peace, and mutual flourishing, or as Barad poetically puts it: ‘a delicate tissue of ethicality runs through the marrow of being’ (Barad 2007, 396). Fourthly, following the logic of relationality, entanglement-orientedness is not something a student can acquire and possess on his own and once and for all (see, on this point, Ceder 2019), but it is rather, what Biesta (2020) refers to as ‘a never-resolved existential challenge’ that has to be collaboratively practiced over and over again.

To translate the perspective of entanglement-orientedness into a more practical orientation for teaching students in the face of complex societal challenges, the two axiological perspectives of entanglement-awareness and hopeful action might offer help. The combined proposition of these two perspectives is to let our actions as teachers be driven by the hope that students demonstrate awareness of the dynamic human and more-than-human relations they are part of (i.e., entanglement-awareness) and that they manifest such awareness in actions that provide them with the experience that they can help protect and create a world in which entangled flourishing is increasingly possible (i.e., hopeful action).

Focusing, first, on entanglement-awareness, we emphasise that, in light of Barad’s critique on representationalism (Barad 2007), such awareness cannot be seen as a matter of ‘pure’ or ‘absolute’ awareness and should rather be understood as a matter of

dynamically increasing situated awareness. Notably, this awareness is not achieved passively by representing from the outside, but actively by intra-acting within entangled phenomena. We therefore agree wholeheartedly with Freire (1972) that humility is crucial for true dialogue, and echo his conclusion that ‘at the point of encounter there are neither utter ignoramus nor perfect sages; there are only people who are attempting, together, to learn more than they now know’ (63). In supporting students’ increase of entanglement-awareness, we suggest focusing on the integration of:

- (1) The personal and the systemic, so that we simultaneously become aware of the particular events, choices, and commitments that make our lives uniquely ours (Kroger and Marcia 2011) and learn to see how our lives are part of a bigger ‘meshwork of interwoven lines of growth and movement’ (Ingold 2010, 3).
- (2) The past and the future, so that we simultaneously increase our understanding of the events and processes through which our entangledness in the world took form and of the possible futures we might collaboratively create. We can, if we pay close attention to experiments around us (e.g., ecological housing projects), even recognise what Wahl calls ‘pockets of the future in the present’ (Wahl 2016, 54).
- (3) Criticism and understanding, so that we simultaneously become aware of entrapping relationalities that we might feel inclined to transgress (Wals and Peters 2017) – much as in Freire’s pedagogy of the oppressed – and grow the understanding that these are the result of a relationally produced history (Barad 2007) and thus there for a reason and never simply one person’s fault.

Focusing, secondly, on hopeful action, we emphasise that if a particular action advocates or works against entangled flourishing, it is highly situational and up for interpretation. We do recognise, however, at least three types of acts from which hope for and commitment to entangled flourishing speaks, and that our pedagogies might therefore seek to invite and support:

- (1) Whereas critical pedagogical accounts, such as those of Freire (1972) and Wahl (2016), often tend to focus on change and transformation of the undesired into the desirable, environmental education researcher Chet Bowers (2003) provides a welcome plea for what he calls ‘mindful conservatism’; we ought, he argues, to ask ourselves not only the question of what we want to change, but also what we want to conserve, and then take responsibility for this very conservation. *Acts of conservation*, thus, strengthen and nurture existing relational patterns from which mutual flourishing emerges (e.g., in line with the diffractive script ‘The Sustainable School’, here one might think of students supporting the local vegetation and wildlife around the school’s perimeters).
- (2) To refer to Arendt’s educational critique (Arendt 1961) once more: ‘to preserve the world against the mortality of its creators and inhabitants it must be constantly set right anew’ (192), and therefore, next to acts of conservation, we also need acts of adaptation and acts of regeneration. *Acts of adaptation* are the milder of the two;

- they are attempts at tweaking existing relational dynamics to reach greater harmony among different stakes involved (e.g., continuing the 'The sustainable School' example, here we might imagine the student-initiated sustainability committee exploring and vouching for ways to improve the school building's isolation quality).
- (3) *Acts of regeneration*, lastly, go a step further and work towards replacing or transforming destructive relational patterns with/into relational patterns that enable entangled flourishing (e.g., in contrast with improving the school building's isolation, this would rather involve the sustainability committee lobbying for a transition towards sustainable energy sources).

### *Three praxeological perspectives*

The praxeological perspective of *inquiry within complex societal challenges* departs from the following pattern of insight that emerged in our collaboration with teachers as co-researchers: myriad different teacher moves can trigger entanglement awareness and hopeful action, yet only if enacted in the right way at the right time. We propose that a pedagogical response to complex societal challenges ought to be, therefore, process-centred, and we refer to this process as *inquiry within complex societal challenges*. Our choice of the word 'within', in this formulation, is intentional; building on our critical analysis of space dichotomies, grounded in the relational ontologies of Barad (2007) and Ingold (2008, 2010), we consider inquiry not as a process of representation – i.e., of trying to learn from some sort of outside position – but rather as a diffractive process of intra-acting within the phenomenon of interest. The teacher's task, then, is to orchestrate and enrich such inquiry, and in doing so to purposefully invite and facilitate the intra-action of a plurality of voices.

We wish to make four additional remarks regarding the process of inquiry. Firstly, in alignment with Crowell and Reid-Marr's work on emergent teaching (Crowell and Reid-Marr 2013), together with our co-researchers we have come to understand the process of inquiry as a cyclical process of opening, organising, and consolidating. We see an opening as an event that brings to our shared attention a certain theme, challenge, or question that permeates our lives in the world and triggers an experience of opportunity, energy, perhaps even urgency, to engage. Following an opening, inquiry can be organised; we can collaboratively share, seek, and contemplate different perspectives and experiences and experiment with our active involvement within the phenomenon of interest. As we do so, the need for consolidation arises: the need to harvest and organise entanglement-awareness, (re)shape our commitments and actions, and perhaps articulate new questions or challenges so that the process of inquiry can carry on. Secondly, the opening, organisation, and consolidation of inquiry might be better understood as relational phenomena than as actions of singular individuals (Barad 2007). We consider it 'a certain gathering together of threads of life' (Ingold 2010, 4) that gives rise to an opening and enables the emergence and ordering of insights. Consequently, as a teacher, you 'can influence but not control what is happening' (Crowell and Reid-Marr 2013, 1). Thirdly, to embark on the path of inquiry may require a teacher to break free from an imposed structure (e.g., to deviate from a schedule as an opening emerges), yet the moment they do so, the need to structure tends to re-emerge; for the inquiry to reach its

potential it needs to be organised around shared questions, methods, time and space (Crowell and Reid-Marr 2013; Palmer 2017). As such, inquiry (as we consider it here) is both enabled and frustrated by structure, and it helps if there is sufficient space within curricula to improvise and to take initiative. Fourthly, understanding inquiry as a process within complex societal challenges, we suggest – in line with Kuntz (2020), – that good inquiry embodies both the qualities of realism and resistance. Through inquiry we can become increasingly aware of what is currently within the realm of the possible. Yet entangled as we are, we are not only shaped by the world but also shapers of it, and therefore good inquiry also ought to support students to ‘eschew the possible in favour of a challenging potential’ (28).

The two praxeological perspectives of *practicing perceptiveness* and *practicing integrity* emerged in the research process with co-researchers in response to the following pattern of insight: as we try to orchestrate and enrich inquiry within complex societal challenges, even as we become increasingly experienced we are nevertheless repeatedly confronted with the challenge to shape a response that is effective given the particularities of the here and now. Meeting this challenge – the aim of these combined perspectives – entails (1) trying to be aware of here-and-now opportunities or obstructions for collaborative inquiry in the dynamic relationality of students-teacher-school-society (i.e., practicing perceptiveness), and (2) trying to respond to what we perceive in a way that contributes to the process of inquiry (i.e., practicing integrity).

Concerning practicing perceptiveness, we recall that teachers are themselves to be considered as part of inquiry within complex societal challenges (i.e., teachers as teacher-students: Crowell and Reid-Marr 2013; Freire 1972). There are two consequences that flow from this and are important to highlight. Firstly, it is unrealistic to expect ourselves – as teachers – to be fully aware of everything going on in the process of inquiry. Rather than holding all the answers, it is much more important to notice opportunities or obstructions, which may be both topical (e.g., a sudden opening to inquire within the theme of sustainability) and cultural (e.g., a classroom culture of fearfulness that inhibits open inquiry). Secondly, inevitably, the situated interpretations we make as teachers are sometimes wrong. It is therefore crucial to allow our interpretations to be challenged and if necessary transformed by the responses we receive; practicing perceptiveness is, truly, a perpetual process of being curious, present, and open to learning.

Together with our co-researchers, and in alignment with Palmer’s work on what he calls the inner landscape of a teacher’s life (Palmer 2017), we have come to frame the challenge of enacting a fitting response as a practice of integrity. The term ‘integrity’ particularly appealed to us as it refers both to the quality of being true to moral principles and to the state of being whole and undivided (Palmer 2017). To integrate is notably the act of bringing together in harmony without losing individuality, and as such is also the orientation of the axiological perspective of entanglement-orientedness. This makes integrity a particularly interesting concept for our purposes. From our inquiry with teachers as co-researchers (i.e., phase 3), and building especially on Kelchtermans (2009), MacIntyre (1999), and Palmer (2017), we have come to see integrity as a rich, multi-interpretable concept that asks a teacher to be simultaneously true to a pedagogical cause; his/her own strengths, limits, and sense of self; and the community of professionals s/he is part of. We would like to close this section, therefore, by sharing six interpretations of the practice of integrity, formulated as questions to live by (Wahl 2016). We encourage

using these questions as a diffractive tool, that is to say: as a set of questions that help to imagine alternative scenarios for past, present, and/or future situations and elicit experimentation. We address these questions here to a teacher who is able to pause in the midst of a challenging educational situation. This luxury does, of course, not exist in reality, yet by making these questions explicit and engaging with them individually and collaboratively we might train our ability to shape our pedagogical responses in a particular moment.

In a particular pedagogical situation:

- (1) Integrity as the practice of commitment to a pedagogical cause: What is your pedagogical purpose and what does it ask you to do?
- (2) Integrity as the practice of an authentic style: How can you utilise your personal passions and strengths?
- (3) Integrity as the practice of professional realism: How can you respect your current emotional/physical limits and the lack of full control on your behalf, whilst simultaneously embracing your responsibilities and influence as a teacher?
- (4) Integrity as the practice of constructive self-awareness: How is your sense of self touched or challenged and how might you utilise this experience to enrich collaborative inquiry?
- (5) Integrity as the practice of collegial support: How do your professional peers judge this situation and what does this teach you?
- (6) Integrity as the practice of professional independence: To what extent do you succeed in making and enacting your own situated judgement, and what do you need to increase/nurture the courage to this?

## Conclusion

In the hyperconnected, dynamic and indeed troubled world we live in, permeated as it is by profound challenges and transformations, the awareness of complexity is unequivocally on the rise. In order to assist and inspire humanity to navigate complexity with increasing sensitivity and wisdom, it is high time that our educational institutions and pedagogical approaches come to embody this growing awareness. Doing so is necessary, for if there is one thing that recent history teaches us, it is that the tendency and attempt to simplify, separate, control, and indeed exploit has – as the dark side of the advancements of modern life – brought us growing ecological and humanitarian crises. The pedagogical perspectives developed throughout this article can help teachers in the quest to embrace complexity in education, as they contribute to a narrative about *why* – i.e., to invite and practice entanglement-orientedness, as manifested through entanglement-awareness and hopeful action, and *how* – i.e., through the iterative opening, organising, and consolidation of collaborative inquiry within complex societal

challenges, and through the ongoing practice of perceptiveness and integrity in this process – to do so. To support this cause in moving forward, we would like to end with two remarks.

Firstly, although we have engaged with myriad exemplary teacher experiences through our work with teachers as co-researchers, we have purposefully limited ourselves to a rather generic articulating of helpful perspectives. These perspectives, in fact, only become meaningful if they are engaged with creatively by teachers in their specific teaching contexts. Such a lively engagement is notably likely to result in two types of new insight: (1) the insight of the engaged teacher concerning how to improve their teaching, and (2) insight concerning the ways in which the helpful perspectives could be further improved or expanded. Similarly, our pragmatic approach to literature selection leaves considerable space for engagement with yet other scholars. We consider, therefore, the helpful perspectives we have articulated here as unfinished and incomplete and would like to encourage educational researchers and teachers (and indeed ourselves) to live the questions of complexity in an educational context.

Secondly, from our core focus on pedagogical perspectives that can help teachers in specific teaching situations, a wide range of other questions ranging beyond the immediate student-teacher relationship emerge. For example: (1) how might teacher education help to revitalise the teaching profession to emphasise its situatedness in contemporary societal challenges? (2) what kinds of professional community (in schools, between schools, between schools and inspection/policymakers) are needed to invite and support teachers to orchestrate inquiry within complex societal challenges and to practice perceptiveness and integrity? (3) what organizational/curricular challenges emerge if we try to utilise the perspective of inquiry within complex societal challenges as a model for curriculum design, and how can we respond to these? And (4) how might we (re)design the spaces of education to disrupt our understanding of schools as spaces separate from society? By posing these questions (and more could be added), we wish to emphasise that a thorough educational response to complexity should be developed holistically and include all the dimensions of a school (see, for instance, Bosevska and Kriewaldt 2020) as well as its situatedness in the larger educational system (i.e., as a whole school and whole educational system approach).

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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