Struggles for teacher education in the age of the anthropocene

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Abstract

Major shifts in the world 'order' – especially the urgency of climate change and biosphere destruction – pose challenges for education which require significant changes of practice in schools and universities, and thus to teacher education. This paper starts from a brief summary of issues at stake in the 'Anthropocene Age', arguing that the converging environmental crises have to be linked to the crises of capitalism. Pragmatist philosophy and the practice turn in the human sciences provide directions for rethinking the tasks which teacher education can contribute to an activist-oriented development of education in these difficult times for humans and the planet.

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Rose reminds of what is at stake in the age of the Anthropocene:

We are spectators in the unmaking of the world we have known; we are spectators in the mass death of other creatures and the misery of numerous and diverse forms of life, including humans; we may indeed become spectators of our own demise (2013/2014, p.211).

Introduction:
Learning to educate in the Anthropocene Age

In Cape Town, during the last week of August 2016, the international Anthropocene Working Party (AWP, 2016) presented its findings and recommendations to the 35th international Geological Conference. These recommendations, supported by a very significant majority of the AWP, still need to be endorsed by their parent body, the International Stratigraphic

Commission, for the Anthropocene to come into force as an official geological term. The Anthropocene, they argue, is an 'epoch'; it marks the enduring changes to the planet and their impact on the biosphere for thousands of years to come. If this terminology is adopted, it would mean that the Holocene has finished, but that we remain within the Quaternary Period and Cenozoic Era. However, whether or not the AWP's recommendations are accepted, the '*Anthropocene'* is a concept around which action has been mobilised, as well as hard thinking. There are, of course, significant debates in the physical sciences about what counts as a new 'epoch', and about when the human-caused changes started – joined by social scientists who point to the inextricable linkage between humans and 'environment' co-producing one another in a 'web of life' (Moore 2015). Most recognise that human presence has always altered nature, just as nature has made possible and constrained what humans can do; climate change (including the last ice age, for example) and major events such as earthquakes and volcanos have always been present. Wars lead to famine, as we can see in the northern countries of Africa at the moment, and colonialism exacerbated effects of droughts and floods (Davis 2000). Yet the acceleration of planetary changes, particularly since the end of WWII, emerging as a result of radiation from the atom bomb and the massive growth of use of fossil fuels, has constituted a major threat to species, including our own, and to eco-systems, to the future of the planet.

In this paper, I argue that it is imperative that we in education explore more systematically some of the multiple debates about the crises arising in the intertwining of the Anthropocene and Capitalism, crises that are difficult to face, to understand, to explain – let alone work out what to do. We put our heads in the sand; we peek like children at the scary world, and look away fast. We depress our knowledge of the significance of the converging crises and then act surprised when there are uprisings, demands, movements which try to address elements and consequences of these crises. Or we try to explain them away, as relatively self-contained issues rather than connected to major shifts in economics, politics, democracy, sociality, the planet – even modernity itself. In education we tend to relegate such issues to a brief topic coverage within Social Studies or to a single subject subject, Environmental Education, which is often not on either school or university syllabi (*pace the Talloires Declaration,* 1990). Or we say it belongs to another discipline area – to politics, to economics, not education. We do not follow up injunctions from Environmental Educators or Critical Pedagogy activists that what is needed is fundamental and radical: to reconstruct our curricula and pedagogies, and re-purpose our institutions.

It is, of course, much easier to say the planet is past its tipping point, that capitalism is unstoppable, and there's nothing we can do, to allow ourselves to become paralysed with uncertainty or despair. Environmental groups, including environmental educators, have been warning us to attend to these matters for a considerable time (Carson, 1961; Stevenson, Brody, Dillon & Wals, 2013), as have critical theorists (Apple, 1982; Freire, 1970; Ladson-Billings & Tate, 1995). It is too easy to be suspicious of these warnings as 'catastrophising' but we should not ignore the 'sudden and massive shift in earth history' (Semal, 2015, p.92): tipping points can lead to fast and unpredictable shifts, even in economics. There is indeed reason to fear – and, as Naomi Klein suggests, fear is "a survival response" (2014, p.28). Educators are invested in 'survival' of the human species so we need to take notice; however, educational institutions have not been good at dealing with emotions (Bozelak, Carolissen, Leibowitz & Boler, 2013 ; Zembylas, 2008), particularly the 'darker' ones (Zipin, 2009) such as fear.

What happens when the prevailing stories no longer make sense of the world? The serious, interwoven challenges of the crises of capitalism with ecological and climate change pose key questions that are unable to be addressed within the frames of the dominant stories of our day, requiring significant new analyses and even structures of knowledge. This has major implications for the work of education, in all its sectors – building new knowledge and knowledge structures in conjunction with new practices that are necessary to produce these knowledges.

Schools are responsible, usually with families/communities, for passing on the 'grand narratives' of the society, the frameworks for thinking and being – those practices which produce ways of organising thinking, saying and doing (Schatzki, 2002; Kemmis, 2009). However, education is not only about passing on past knowledges and practices but importantly about entrusting the future to the next generations, equipping them with capacities to survive, to organise, to think and plan and act. It has long been debated how we balance these two dimensions of education; the current dominant curriculum policy trend focusses mostly on passing on past knowledges. We are thus ill-equipped to deal with disruptions, to work with young people on the present and future, to connect knowledge and action.

To do our job responsibly in education, we need to come to grips with a complex reading of the world, as global citizens and members of multiple communities, including those of world-wide education workers in the 21st

century. We cannot afford to be illiterate about the changing world and this means becoming much more familiar with a wider range of physical and social science findings and with local spaces/places. In particular, we need to see ourselves as part of 'nature', avoiding treating humans and nature as a binary – the same binary that underpins the development of capitalism and colonialism and that continues to underpin many assumptions of human lives. Importantly, we have to ask how changing our narratives of the world might also challenge curriculum, pedagogy, assessment, the purposes of schooling, training, higher education – and the work of teachers, academics, and our students. Learning to educate in these times means paying attention both to our own learning and that of our students. Our imaginations cannot afford to be stuck in forms of stupid optimism, nor paralysed nihilism.

The needed stories and actions will be diverse and situation-specific. I am situated in Melbourne, Australia. My ponderings come out of continuing histories of British colonialism, genocidal relations with Indigenous peoples, immigration policies that aim for assimilation into an 'Australian' imaginary of the dominant Anglo-establishment, heavy reliance on international capital, and systematic skewing of access to the 'goods' of education away from students who are Indigenous, poor, rural and with disabilities, in favour of those from already privileged backgrounds. This is not identical to the South African experience; and the differences between our countries matter in terms of analysis of the present and in what it is possible to imagine and act upon.

In this paper, I first outline the two dominant stories of the day, those that underpin most of the world's practices of life: the 'grand' stories of capitalism and of ecological change, drawing on Jason Moore's analysis of 'capitalism in the web of life' (2015). My stories here can only be at a '101' level, trying to bring together for non-specialists issues drawn from environmental, capitalist, political, philosophical and change theories as starters for sharpening our educational analysis. I do not claim expertise in all these sciences, but write as an educator who urges the importance, for educational work, of appreciating the complexity of the issues and what is at stake, and the need to keep learning, sharing ideas and moving towards action. This overview suggests not only domains where our own and local schools and universities might need to concentrate attention but also provides directions for exploring links between local and global which might be fruitful for inter-disciplinary work across physical and social sciences. I am not naïve enough to suggest that we already have pedagogical strategies ready to address the learning that is needed to navigate our way as a species in concert with nature. Nor do I

believe it is possible to grasp the full complexity of things. We can only work towards narratives that make fuller and better sense in the urgency of working on issue/s. I thus move towards a framework for connecting knowledge-work with action, drawing on Stengers' critical pragmatist philosophical arguments (2015; Pignarre & Stengers 2011) about the need to act on events in the world, as a means to produce new knowledges about events. The challenge is how we might proceed with teacher education that does not attempt to 'save the world', yet does further educational thinking and acting that contributes towards local-global pro-action. The final sections of the paper give some indications of directions for such work.

The 'Anthropocene' and capitalism: Co-produced crises

'Anthropocene' is a contested term in part because it suggests that all humans were equally responsible for the massive acceleration in the effects of human-nature relations and their mutually constitutive effects, rather than sub-sets of humans, particularly in the advanced capitalist world. The term does not recognise that the planet has set up conditions for human possibility as well, treating the world as a separate 'object' to be *acted upon*. Nevertheless, 'Anthropocene' has good international recognition and does acknowledge that human interactions with the planet have altered the planet irreversibly. I use the term here as a political marker of the importance of the debates, signalling the need for human beings to come to terms with what has occurred on planet earth and the ways in which we, and planet, are intertwined.

Since only a minority of teacher educators come from physical sciences background, I here summarise some of the physical science discussion of environmental changes. The Intergovernmental Panel on Climate Change (IPCC), in their 5th major report – the 6th is due in 2022 – summarised evidence to date of human-induced shifts in climate. The level of agreement about humans' impact on the planet across many areas of physical sciences has only gained strength since the IPCC's first assessment report in 1990. Their most recent online summary for policy-makers puts it strongly:

> Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems. (IPCC 2014-PM)

The IPPC report points to the warming of the global climate system, including both atmosphere and ocean, with diminished amounts of snow and ice, and rising sea levels. As a result, extreme weather and climate events are more common and more devastating. Into the future, climate change, the report argues, will amplify existing risks and create new risks for natural (including human) systems; but risks are unevenly distributed, having greater impacts on less advantaged communities and countries. Even a few findings which have medium to high confidence among scientists are enough to suggest the magnitude of the problems policy makers and ordinary people in every region are already facing. In the last two decades sea levels rose almost double the eight inches of the previous century. Ocean acidification, largely as a result of absorbing excess CO^2 levels in the atmosphere, has grown over 30% since the beginning of the industrial revolution, about half of that amount in the past 40 years.

The panel notes the resultant mass extinction of many species, accompanied by food insecurity and need for migration of humans and many other species. They conclude that:

> Many aspects of climate change and associated impacts will continue for centuries, even if anthropogenic emissions of greenhouse gases are stopped. The risks of abrupt or irreversible changes increase as the magnitude of the warming increases. (IPCC (PM), 2014).

The physical science evidence is clear: the planet is altering significantly through the interaction of the human species with other species and biosystems. The AWP nominates the start of the Anthropocene as 1945, pointing to the increasing impact of technologies in shaping what has become known as the 'great acceleration' since atom bombs in 1945 spread radiation around the atmosphere, followed by massive expansion of the use of fossil fuels and their emissions of carbon into the atmosphere in the second half of C20[th] and up to the present.

The 'date' of locating the Anthropocene's 'beginning' has been subject to dispute because interaction between humans and planet has always occurred. Early forms of agriculture, technological development and the spread of humans altered biospheres, which in turn framed possibilities for the spread of and activities of humankind. Good overviews of the debates on the Anthropocene, including starting dates and terminology, can be found in an edited collection edited by Hamilton, Bonneuille and Gemenne (2015). Such debates include arguments that point to the **role of machines,** particularly the

steam engine invented by Watt in 1784, and the ways technology developed for the industrial revolution and the interplay of old and new worlds in making possible the modern world and its emphasis on fossil fuels. Should this 'new' era perhaps be called the ***Technocene***? Others see the most recent periods of acceleration of consequences of human activity as continuing a logic of capitalist accumulation of wealth, and associated forms of colonialism, suggesting that the Anthropocene commenced around 500 years ago with capitalism's emergence into formation as a world system (Wallerstein, 1983). Indeed, some suggest that referring to this period as '***Capitalocene'*** would be more appropriate (Moore, 2016, see also Haraway, 2015). Such a term recognises the central capitalist ideology of 'cheap nature', as merely a resource to be used for the benefit of the concentration of powerful accumulators in geographic 'metropoles', typically through exploitation and expropriation of resources from colonies or trade agreements. Indeed, Moore suggests that capitalism itself is a world ecological regime, a "way of organizing nature" by the "co-production of earth-moving, idea-making, and power-creating across the geographical layers of human experience" (2015, p. 2, 3).

These debates point up the need for more comprehensive inter- or trans-disciplinary explanations. We have to be able to understand how human action was involved and how the world acts back on such action. Yet many activists around poverty and inequality have signally failed to address environmental issues whilst many environmental activists have stopped short of including the role of capitalism in their analyses and suggestions for action. For humans to alter course on planet earth, we have to understand how capitalism is inextricably bound up with changes to climate, ecosystems, bio-diversity, atmosphere and associated living systems. Yet, as Jameson (2003) so rightly quipped, it is easier to imagine the end of the world than the end of capitalism.

Capitalism is a system that is not only economic but also social and environmental, a roughly 500-year-old world system (Wallerstein, 1983). Its underlying logic is accumulation, which requires continual growth and expansion – a capitalism that can sustain itself, most economists agree, works on at least a 3% compound growth of profit annually. If such growth slows or stops, then accumulated profits decline or are destroyed (Harvey, 2011), so capitalising entities are always in search of new innovations to expand reach and capacity to profit in competition with others. Capitalism has to evolve in order to continue to expand. As Wallerstein's history of capitalism argues, the

dominant forms have altered, from agrarian enclosure capitalism, to mercantilism, to industrialisation, through to the contemporary forms of globalisation and financialisation (see Braudel, 1979; Harvey, 2011). European colonialism has been an essential means of spreading capitalist practices, expanding geographic space, and giving access to resources and new labour frontiers, such that capitalism had spread across the globe, as a networked 'world system' with a power to limit alternatives to its logic, by the late C19th (Wallerstein, 1983).

The recent crises of capitalism (e.g. the Global Financial Crisis of 2008) have not led to widespread reform of neoliberal capitalism, and its emphasis on financialisation rather than production as the 'engine' of expansion. Rather, those crises have largely been subsumed in the old stories: the banks are now 'safer', we are told; emphases on increased productivity – perhaps in the global south – will strengthen the global economy; austerity measures will bring back fiscal responsibility; and new technologies will resolve the problems experienced by the planet, including humans. Of course, there are still many groups of people for whom these stories can no longer be taken seriously, but few people, seeing the crises of their governments, really believe there is anything they can do. Larger-scale demonstrations – Seattle, the Occupy movement, the middle eastern countries' search for democratic governance – have been contained in their effects; and capitalism appears to have prevailed (but precariously so), muting address to environmental challenges, which get put on backburner while capitalism is returned to 'business-as-usual'.

Historically, capitalism has exploited periods of cyclical crises by evolving its mechanisms, while also accelerating the effects of contradictions that inhere in its logic of continually expansive accumulation growth, including impacts of social and environmental shift. Yet the effects of contradictions *are* accelerating; and it is highly questionable whether ongoing growth through a capitalising logic can continue sustainably. Moore (2015, p.17) argues that capitalist expansion has relied on what he calls the "four cheaps: labor-power, food, energy, and raw materials". Now we are at the end of sustainability of these 'cheaps'. There are few new 'frontiers' for capitalism to exploit and colonise to continue expanding. Moore argues that capitalism and environment co-produce one another through what he calls a 'double internality', so capitalism is *in* nature. Like Wallerstein, he points to the continuity of capitalism in the past 500 or so years, and the interaction of humans with other parts of nature over this time, as constituting "new

conditions for successive eras of capitalist restructuring across the *longue durée*" (p. 176). During this period, argues Moore, there have been three main 'revolutions': *landscape* (e.g. the medieval enclosures, C17th colonial clearing of forests in Brazil or the Vistula Basin); *labour productivity* (e.g. the crisis of feudalism after the Black Death in Europe, the African Slave Trade and sugar-slave nexus); and the *techniques of global appropriation*, especially of 'natural' resources.

A number of major macro-historians/sociologists of capitalism recently explored the question: "Does Capitalism have a Future?" (Wallerstein, Collins, Mann, Derlugian & Calhoun, 2013), presenting divergent and convergent perspectives. They agree that the 'Western Great recession' of 2007–8 has shifted the global economy and its instantiation in nation states, marking the end of the 'old left' currents: the liberal reformism of the first world states, the communist revolutionary dictatorships of the industrialising 'second world', and the national populist movements of the 'third world'. Accumulation, and un-equal redistribution of wealth to the benefit of those 'above', continue apace, creating greater stratification within and across nations; and power seems to have shifted from the Euro-American axis towards Asia. Wallerstein and Collins each suggest that capitalism is now reaching a structural limit-point: a dangerous juncture with major exacerbation of internal contradictions, profit squeeze, and, Collins adds, the replacement of much middle class work by automation, making consumption levels necessary for at least 3% growth in profit-accumulation impossible to sustain. Mann and Calhoun both suggest that capitalism remains flexibly adaptive, and so *may* persevere – however, with major alterations necessary, and facing precarities due to crises that capitalism is significant in creating. Mann sees environmental disasters, possible use of nuclear weapons, and weakly responsive political mobilisation, as major threats which capitalism in its current form is unlikely to tame; while Calhoun argues that the institutions which neoliberalism has eroded would need (perhaps impossible) rejuvenations if capitalism is to have any chance of continuing.

It has only been through social movements, points out Naomi Klein, that governments are forced to pay attention to major threats. She notes that climate change "has never received the crisis treatment from our leaders [compared to terrorism or bailing out banks], despite the fact that it carries the risk of destroying lives on a vastly greater scale than collapsed banks or collapsed buildings" (2014, p. 6). Governments started negotiating on action to alter carbon emissions in 1990; yet by 2013, carbon dioxide emissions had

increased by 61% on 1990 levels. Perhaps the Paris agreement in 2015 might have more chance of both recognition and action, but the precedent of governments' previous avoidances of keeping to agreements do not hold out much hope – despite ever more severe scientific warnings about the level of warming and irreversibility of current effects on the planet.

James (2013/14, p. 2) suggests that the "constant deferral of fundamental action on basic questions has slipped between the modern dialectical struts of hope and despair". It takes "real effort", he suggests, to go along with the idea of business as usual: that "life on our planet can go on much as before, so long as it is supported by a 'digital revolution' and enhanced technological platforms" (ibid). It is indeed hard for many of those in advanced capitalist countries even to imagine how their 'lifestyles' are supported by exploitation of other humans, species and biosystems. In the same volume, Hinkson (2013–2014) points to massive development of techno-sciences since World War II through global markets, such that "Western culture has become locked into technological solutions as a deep form of cultural response to complex change" (p.60). Such faith in the techno-sciences as our saviour induces us to

> defer the need to rethink fundamentally the form of the hyper-mobile, consumption-heavy and growth-based social freedom that presents itself as the raison d'etre of "sustainable development" (James, 2013–2014, p.2–3).

Continued capitalist investment in climate change denial, through think tanks and research sponsorships, has warded off attention to groups who raise environmental issues. It is in capital's interest to promote accommodation with 'green lite': simplistic techno-'fixes' to environmental problems that suggest individual responsibility, rather than structural change, as what is needed. Beck noted that global risk is produced largely by wealthy decision-makers (including those hired or co-opted to serve them), whose lives are not as directly harmed by consequences of their decisions:

> Those who are taking the decisions are not accountable from the perspective of those who are affected by the risks, and those who are affected have no real way of participating in the decision-making process. This is what I call organized irresponsibility. (2014, p.76).

Such irresponsibility on the part of capital, with nation-states in thrall, helps to create conditions of fear without much capacity to imagine what to do about the situation, as we transition from one era to the next.

If we consider only physical science definitions of the problem, then we are more likely to restrict ourselves to technical and market-oriented answers – a tendency to concentrate on 'nature' but not how social assumptions structure our relations within it (Hinkson, 2013–2014). And while environmental movements have fostered some inter-disciplinary work, the continuing separation of social-only and physical-sciences-only explanations leads to 'science as usual' (Stengers, 2015), rather than reinventing sciences appropriate to the complexity of the issues under investigation. Moreover, there may not be effective physical science 'solutions' since good explanations of the problem do not necessarily translate to good 'answers' or recommendations for action – especially if the 'solution' required that action be taken before the current degree of crisis was reached. Capitalist expansion since World War II, reliant on fossil fuels and growth of consumerism, accompanied by movement of the majority of the world's population into cities, has left unmistakeable signals in geological strata (AWP, 2016). Other sciences, including human sciences, provide more indication on the outcomes for humans and other living species and the planet overall. It is now most likely that we will have to learn to live within conditions that are less than optimal for human survival and flourishing. I note here the IPCC's assertion that the consequences of global warming, climate change and destruction of species and habitats have most impact on those who are poorest and most marginal in the world capitalist system.

Learning how to focus on reinventing practice in crisis-ridden times

What might these crises mean for education as a field and teacher education in particular? I argue that there are huge implications for those of us in education, at a time when – internationally – education is being pushed backwards by narrowing curriculum, standardised testing and competition, and lack of adequate investment in high quality public education for all. All modern institutions are under strain from the converging and interwoven crises of capitalism and the environment. In Australia, for example, a group schools in a poor rural region where I have done research were, within a four-year period, thrice affected by serious floods which had ramifications for the lives of students' and their families, some living in large groups in shared housing and garages two and three years later. School staff also lost housing, not to mention loss of library stock in schools, and shift in school functions

when they served as emergency shelters. As researchers we had to cancel visits, and to alter our plans, including our data instruments. But the floods did make us rethink our curriculum work with schools and their communities, and what educators' 'accountability' might mean in such contexts.

Pragmatist approaches to knowledge in action seem most appropriate here. Isabelle Stengers, an activist philosopher of science, reminds us that pragmatism is the 'care of the possible' (Stengers, 2015; Stengers & Bordeleau, 2011), rather than working out a replacement macro vision. Pragmatism gives ethical emphasises to uses of knowledge in connection with pro-action in the world – to forms of praxis – which has been elaborated in a range of educational traditions. As Reckwitz (2002, p. 259) proposes, practice theory decentres "mind, texts and conversation" while "[s]imultaneously, it shifts bodily movements, things, practical knowledge and routine to the centre of its vocabulary" – paying attention, adds Schatzki (2002, p. 12), to practices as "embodied, materially interwoven". Such attention to educational practices may enable us to build on strengths in ways that exceed the institutions within which those practices have been developed, creating new configurations of practice: of 'doings, sayings and relatings' (Kemmis, 2009). Practices and knowledge develop in association, emerging through concrete action by social beings in particular places and times. We cannot wait for 'full evidence' to come before acting: life on this planet is too precarious for that. Part of the problem of 'evidence-based' approaches is that the cited 'evidence' is from what is past, while present and future continue to emerge in changing contexts that may require attention to what was not 'evident' before. What is applicable can only be tested in action, which in turn changes what emerges.

Large-scale dynamics of environment, capitalism and their interwoven crises are experienced by us in our locals as 'glitches' in the infrastructure of our lives, as Lauren Berlant (2016, p.393) observes:

> . . . at some crisis times like this one, politics is defined by a collectively held sense that a glitch has appeared in the reproduction of life. A glitch is an interruption within a transition, a troubled transmission. A glitch is also the revelation of an infrastructural failure…. Infrastructure is not identical to system or structure, as we currently see them, because infrastructure is defined by the movement or patterning of social form. It is the living mediation of what organizes life: the lifeworld of structure. Roads, bridges, schools, food chains, finance systems, prisons, families, districts, norms all the systems that link ongoing proximity to being in a world-sustaining relation.

Glitches tend to be site-specific, place-based, and so to be understood not only as generalisable effects of widespread structural phenomena, but also as expressing particular histories and conditions in the local. In this sense, the 'glocal' is a helpful term pointing to the inter-relationships of people and places, institutions and biosystems. Glitches in the local – always relational to other locales, i.e. to 'the global' – are phenomena that offer sites to start investigating possibilities for new educational praxis, with a view to collective pro-actions – including the diverse range of actors who are affected in the situation – that can generate situated knowledge. I suggest that pursuing action around glitches in our regions offers us a focus for reinventing education and teacher education.

Struggling to reinvent teacher education

Teacher education has been tied to global policy shifts, with particular effects in different countries. As Green, Reid and Brennan (2017, p.39) have recently argued, this creates a "churn" of reform that keeps attention away from our own practice and focussed on policy and compliance with its speedy shifts:

> The ongoing and escalating struggle for control of teacher education in countries around the world reflects the difficult and contested position of teacher education within what is experienced as a chaotic churn of reform … government has sought to constrain and 'improve' teacher education in the interests of competitive (inter)national struggles for economic power. Within the terms of this struggle between teacher education and the global state, we argue here that there is an urgent need for attention to the everyday work of teacher educators, their students and the school systems they serve – the practice of teacher education, which is to say, the 'soul' or animus that makes teacher education what it is.

Stengers' version of pragmatism provides an important corrective here. She asks to think from where we are, and act on the issues which are problematic in that site, rather than focussing on policy. We do have resources on which to build, despite being caught up and implicated in 'business-as-usual', to address glitches in the infrastructure of our lives and the reinvention of our educational institutions. For a start, much of our work is invested in inter-generational activity. Whilst some of this is far too bound up with modernist ideas of 'progress', working with the next generation brings particular responsibilities in helping them navigate their ways in changing conditions. This is not to replace silly forms of optimism that ignore the current crises but rather to keep 'grounded' in renewal of practice thereby avoiding the paralysis of despair and cynicism. Working alongside our students (and in

turn their students), we can help to problematise the old grand narratives with stronger analysis of why those dominant narratives may have come into being, and why they are inaccurate. New generations can be part of building new and multiple narratives that are connected to place, and linked to other places. These narratives can help rebuild some new discourses, that draw on multiple disciplines and on local expertise, weaving together the 'web of life' that Jason Moore points out, seeing the human endeavour as part of the 'natural' world, working against capitalist appropriations and assumptions, and towards a renewed connection among humans and with the planet and its biosystems. In building new narratives, we have to work with the local/regional glitches, bringing together old and emerging knowledges and practices to understand more of how the local is linked to other locals. This is necessary to build new complex narratives that specify the big issues challenging local lives and open up spaces of action.

Teacher education is fortunately placed for such work. Many countries' teacher education programmes share a number of features, although realised in different historical circumstances. They generally work within government policies, operate within universities, with a few remnant 'teachers' colleges', and are usually linked to regional or national school authorities, which specify school curriculum to be addressed and/or employment requirements for teachers. Programs often include broad education studies (such as educational history, sociology, philosophy, psychology), subject teaching methods, specialist disciplinary study and some form of placement. Countries differ in whether pre-service teachers come in as graduates or as undergraduates, opportunities for placement and levels of specialisation, in whether education-specific studies are included and in the kinds of relationships with schools.

Placement, and the necessary relationships with schools in a region, which underpin successful learning through professional experience, opens up many opportunities for teacher educators and pre-service teachers to work with local communities to delineate the big issues challenging their lives. Through expanding relationships beyond the school into communities, teacher educators can also source local knowledge action workers who have the potential to contribute to examining, defining and acting upon issues, providing access to networks and joining local expertise with academic expertise to address those issues. Teacher education could thus act as a clearinghouse point to establish, sponsor or join transdisciplinary teams working on these key issues, with a particular brief to take an educative stance. This may require drawing on understanding the translation and

selection of content, suggesting communication and pedagogical strategies, and supporting students as researchers of these issues.

Teacher educators are helpfully placed in universities as sites of multiple disciplinary resources which can be brought to bear on key problematics experienced locally/regionally, and more widely. Among ourselves, we are less a 'discipline' than a field, already multi-disciplinary, so potentially better equipped to bring together multi-disciplinary teams to work on local 'big issues'. Teacher education could become a fulcrum point for linking university academics and knowledge workers (staff and students) to spheres of research and action, using the school as an entry point to local communities and their issues – a focus for inter-disciplinary research linked to action. The work of the Global Alliance for Community-based research (http://www.guninetwork.org/articles/knowledge-world-we-want-emergence-global-alliance-community-engaged-research-gacer) has a good track record in this regard. In the process of such engagement, schools, teacher education and university-based research are all reinvented.

As teacher educators we cannot be expert in all issues – nobody can. However, what we do have is a repertoire of 'signature pedagogies' (Hooley, 2017) and experience in pedagogising knowledge, 'delocating a discourse, for relocating it, for refocusing it' (Bernstein, 1996, p.47) for use in teaching. These strategies can be drawn upon for the reinvention of teacher education, curriculum and pedagogies. We can also draw on histories of critical pedagogy and praxis traditions, e.g. developing and sharing new knowledges and practices as a form of Freire's (1970) 'conscientisation' for/in/with the society. Among us, we also have environmental educators, citizenship educators, social educators and science educators with histories of problem-oriented project work. Despite being very much tied into national framings and policies, we also have significant international networks, which can be put into service for linking up our students and school students in constructing 'globalisation from below'. Supporting mobilisation around local problematics to help map and deepen their readings of issues, practices and relationships, teacher educators can also build linkages across local sites to build new knowledges and learning from one another's actions.

Pre-Service Teachers (PSTs) form a large cadre of potential knowledge workers who can be put to diverse uses in supporting students and teachers in schools, as well as bringing to bear their own knowledge and experiential backgrounds. Rather than being positioned only as incompetent novices to be

inducted into current practices, PSTs can assist schools in supporting students to become researchers, building their own capacities as researchers, as part of their work in becoming teachers, while learning to understand their students, and their communities and the place in which they are located. In the process, they too contribute to reinventing schools in a future-action-oriented way, through the collaborative invention of new practices that link schools, communities and action on big issues. It is an important part of their education as teachers to be oriented to community and to redefine teachers' work as including knowledge developed through action and research, the invention of new practices of and for school communities and teaching.

Researching big issues for/in/with communities is also a way for building new paradigms of research and reinventing research away from the capitalising logic of the 'knowledge economy'-driven university in the current times. It may well be that teacher educators can find ways of 'double dipping' in 'counting' and measuring community-oriented research in the climate of measurement, using 'impact' measures but this ought not drive such efforts wherever possible. Traditions of place-based curriculum (Gruenewald & Smith, 2003), funds of knowledge (Moll & Gonzalez, 1997) can be added to environmental education research (Stevenson et al., 2013) that position teacher education well to work on situated knowledge work on 'glitches'. Building such research as core to our practice (Green, 2009) has important spin-offs for developing agency for students, pre-service teachers, community and ourselves as teacher educators. We have to take ourselves seriously as co-producers of knowledge through new forms of action, including teaching, and helps to de-pathologise young people (both school and university students), giving them respect as co-agents in knowledge-in-action (Bottrell 2015; Brunila, 2014).

Working on big issues together may also help to address programmatic design in teacher education, often left as a collection of individual subject areas rather than coherent design. 'Web of life' principles and use-value rather than exchange-value orientations to teacher education can thus contribute to sustainability of humans with the planet in curriculum terms (Barab & Roth, 2006; Hicks, 2014; Paige, Lloyd & Smith, 2016). The curriculum of teacher education, and the curriculum of schooling seem to have become narrower and narrower in parallel over the neoliberal policy ascendancy. Opening beyond this set of constraints (Reddy & Schreuder, 2004) does require new kinds of politics for the field but can be developed through attention to building new practices that satisfy a wide range of practitioners and

communities who can support such politics. Unless programmatic design and relationships with school communities alter, then such projects will remain tethered to individual university classrooms, with little scope for changing the basic framing of universities or teacher education, as has too often been the case with activist innovations.

… some tentative steps towards further action

The ongoing struggles to change teacher education will make such suggested community-oriented, big-issue-oriented research and action quite difficult to achieve. Like school education – to which it is connected by origin, governmental policy, historical practice and shared concerns – teacher education has been inextricably bound up with the project of modernity and the formation of the nation state. The ideal-typical focus has been on universal provision of education on the premise that each individual will achieve academically according to 'merit' (supposed 'inborn ability' and hard work), learn to be good citizens, and gain appropriate credentials for further education and/or work. UNESCO on World Teachers' Day (October 5, 2016) suggested the world will need close to 69 million more teachers by 2030 – 17 million in sub-Saharan Africa alone – if the world is to reach the goal to provide universal primary and secondary schooling. So education academics are not likely to run out of work, presuming that universities continue to be funded and that states require teachers to have credentials. Still, education in various forms, including the non-institutional forms, will need resourcing for the ongoing survival of the human species. However, if we are to contribute to the survival of the next generation, then we need to change our game quite significantly.

In the contemporary global settlement around higher education, neoliberal assumptions predominate; as with other sub-sectors, there have been moves into standardisation, credentialism, and economism, through focus on entrepreneurship, performativity, vocationalism and knowledge for sale. This has been accompanied by a tendency to blame teacher education for the breakdown in the promise of credentialism leading to employment (Furlong, Cochran-Smith & Brennan, 2008). Thus there are political, social and intellectual challenges for teachers and teacher education – challenges that are both shared with other occupational groupings and specific to our field.

Specific to our field, we will have to unpack our modernist our concepts of education and their institutional practices, replete with binaries, including the mind/body dualism, the academic/manual split and the binary of the split between humans and nature – all being highly anthropo-centric. We will need to alter the balance of knowledge to value prospective/future orientations, as well as bringing the most appropriate past knowledge to address current and emerging issues. This requires knowledge to be recontextualised in the frame of local communities, reconnected to place, relationships and action. Our 'performance management' will need significant redefining in audit cultures that have been eviscerated of meaningful connection to students, communities and schools.

In this paper, I have tried to outline a positionality for teacher education and teachers without falling into the trap of nominating ourselves as responsible for 'hope' and 'salvation' of the world, or even education. In uncertain times without large-scale convincing narratives of problems or solutions, claims to have 'the' answer can easily fall into hubris, without actually acknowledging, humbly, that we cannot possibly have an answer. Education cannot 'save' society but we do need to contribute to more civility, more civic spaces, more informed dialogue – with teachers who see this as core to their work. We can contribute to focus on local action and to joining up local praxis – action with knowledge – to make it possible to DO otherwise and to produce knowledges through this further action. As I suggested, within the university and in our communities, we are well placed to link diverse resources, including pulling together diverse disciplinary expertise, to add to local knowledges of students and communities so the action on issues can be as informed as possible – and as future-oriented as possible.

Such an orientation relies on us to build our own capacities to 'read the world' and deal with uncertainty. The darkness of the views of the intertwined crises of capitalism and environmental changes challenges us all, whilst removing more traditional institutional responses. Imagining new options into existence is indeed a tough ask.

> We have a desperate need for other stories, not fairy tales in which everything is possible for the pure of heart, courageous souls, or the reuniting of goodwill, but stories recounting how situations can be transformed when thinking they can be, achieved together by those who undergo them. Not stories about morals but "technical" stories about this kind of achievement, about the kinds of traps that each had to escape, constraints the importance of which had to be recognized. In short, histories that bear on thinking together as a work to be done. And we need these histories to affirm their plurality, because it is not a matter of

> constructing a model but of a practical experiment. Because it is not a matter of converting us but of repopulating the devastated desert of our imaginations. (Stengers, 2015, p.132).

As teachers, as teacher educators and as researchers, the experiments we enter into here are not just narratives but narratives which need renewal through forms of action that can produce further emergent knowledges. As suggested earlier, the points for experimenting and working are likely to be most fruitful where 'glitches' in our lifeworld's infrastructure are experienced. Currently there are serious 'glitches' in the field of education in all its sectors. These make good starting points for us to develop, represent and further knowledge making, reinventing our field and the institutions which make up that field.

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