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EDITORIAL

Biopolitics and science education

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We have great pleasure in bringing you this special issue of *Cultural Studies of Science Education* on biopolitics and science education. Highly regarded cultural studies theorist and sociologist Scott Lash, has described the shift in cultural studies from first generation early preoccupations with culture and power in diverse ethnic, class, gender, youth and other sub-cultures, to a second generation focus on biopolitics, digital media, technics and the questions of the posthuman and new materialism (Serafini and Lash 2016). Lash's comments make biopolitics then, an important topic of consideration for the pages of this journal.

The origins of this volume really date back to the CSSE Forum held prior to the NARST Annual Meeting in Puerto Rico in 2012. The three editors were part of a working group on science education and neoliberalism, and we continued our conservation throughout NARST in a nearby cabaña that we felt free to 'occupy' coming so soon after *Occupy Wall*

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St. Returning to our respective cities across the globe, over time, *Occupy Cabaña* as we called ourselves, evolved into a discussion and reading group via Google + that sought to grapple with the complex intellectual terrain of contemporaneity. On the journey, we came across many stimulating cultural scholars like Maurizio Lazzararo with whom we were previously unfamiliar, reacquainted ourselves with the latest from the likes of Stuart Hall, Bruno Latour and Stephen Ball, and was introduced to Clayton Pierce initially by way of his 2013 book *Education in the age of biocapitalism: Optimizing educational life for a flat world*. Clayton's thought-provoking read sent us scurrying into some of the biopolitics and biopower scholarship prominent in critical thought. We looked for a biopolitics intersection with science education, and with exception of work from Jesse Bazzul, we found very little. That paucity suggested to us the need for a special issue of CSSE on biopolitics and science education.

Our call for papers was broadcast as follows:

Many social theorists have noted that there are changes in the way that government has been organized, power exercised, and the public arena managed since the 1970s.

- An increased focus on the way that human populations are identified, managed, and neglected as part of the economic counter-revolution known as neoliberalism (the free market ideology which has achieved worldwide dominance);
- concurrently, the importance of genomics, proteonomics, and other emergent fields of the technosciences in establishing the quality and nature of living, from genetically modified organisms to pharmaceutical controls over social being (e.g. in ADHD and cancer and heart attack risk management medications), from ecological controls to prosthetics and cyborg embodiments,
- emerging identities, subjectivities and performativities (i.e. ways of acting in public), such as the perpetual entrepreneurialism and life-long learning demanded by these new systems of institutional and societal management.

> Together these changes are often labelled biopolitics, because life, especially its quality, management, and definition, is so central to these changes. We are seeking contributions from scholars interested in these shifts, including (but not limited to) examinations of how biopolitics is shaping science education; how science education more broadly is responding or resisting biopolitics, and how science education curricula are coming to mirror biopolitical priorities.

Amplifying our invitation, biopolitics in Robert Sinnerbrink's view has come to mean a "synthesis of processes such as the technological manipulation of our biological existence, the management of biological life as a resource, and the administration of human populations as the objects of social and political power relations" (2005, p. 240). It is a convergence between biological existence, technology, and the socio-political where power compels life to be administered, regulated, optimised and controlled. Or phased succinctly by Timothy Campbell when discussing his 2014 edited book *Biopolitics: A Reader,* it is where biological life encounters and is enmeshed with political life. Campbell goes on to suggest that biopolitics views politics today as "about the life of human beings judged and evaluated according to their health or potential for health" (Dewey-Hagborg 2015, p. 3). Similarly, Thomas Lemke articulates biopolitics as "the specific art of governing human beings" that is closely linked to the emergence of (neo)liberal forms of

government (2011, p. 45). Joshua Newman and Michael Giardina elaborate the latter point by arguing that perceived freedoms resulting from democratisation and marketisation assumes a self-constitution which can only occur within sanctioned limits and forms. In other words then, biopolitics is a "dominant form of governmentality" (2014, p. 420).

Most biopolitics scholars credit Michel Foucault with introducing the idea in the middle of the 1970s in his book *The History of Sexuality* to argue that the economic and political regulation of the population in addition to disciplining the body, is crucial to power relations within the modern nation state. Though seeking to develop an understanding of biopolitics in his now famous 1978–1979 Collège de France lectures collectively known as *The Birth of Biopolitics* (available in English only from 2008), Foucault ultimately focused the lectures on birth of liberal and neoliberal forms of governmentality. Foucault presciently saw biopolitics as the political economisation of human life that would ultimately culminate in the neoliberal hegemon under which we all labour today.

Biopolitics these days is a confusing, complex and hotly contested terrain about which Campbell and his co-editor Adam Sitze struggled to find a reasonable definition that could cover the nuances and various applications of the term. In Campbell's words, "biopolitics is truly plastic: it morphs just as soon as you think you've got hold of it" (Dewey-Hagborg 2015, p. 2). This is in part due to Foucault's lack of elaboration given the primacy of his focus on neoliberalism in his essays and lectures. Over the intervening decades, biopolitcs has provided a fertile intellectual opportunity for scholars like Giorgio Agamben, Roberto Esposito, Michael Hardt and Antonio Negri, Thomas Lemke, Nikolas Rose and Melinda Cooper amongst others to tweak, critique, alter, expand, deconstruct or devise their own particular standpoints. Agamben is principally known for a theorisation of biopolitics in his 1998 book *Homo Sacer. Sovereign Power and Bare Life,* that proffered life as 'bare life' or a 'state of exception' where life is stripped of any of its rights. Such normalisation of exception allows us to accept the questionable treatment of refugees the most recent example being the plight Syrians in Europe, those subject to contemporary rendition, spaces like Guantanamo Bay and all forms of marginalisation. Michael Hardt and Antonio Negri on the other hand, privileged the relationship between biopolitics and the economy through an autonomist Marxist lens. They regard the proliferation of power over life as a consequence of contemporary capitalism. According to Negri (2015), the globalized economy ensures that a 'living force' has superseded the 'labour-force,' such that value which once resided in substance and individual labour has been replaced by a mobile arrangement of multilateral and immaterial sets of activities and services which are immediately cooperative and productive.

This persistent perturbation in theorisations of biopolitics has also spawned, as Kean Birch critically points out in the final paper of this issue, a raft of bio-concepts where the affixing of the prefix *bio* somehow makes for comprehensible constructs able to suit a range of purposes. These portmanteaus include biopower, biocapital, biometrics, bioeconomy, biovalue, bioart, biodemocracy, biosubject and so on. At least with biopower and biopolitics there is some solace in noting that Foucault conflates the terms seeing them as interchangeable. In the first volume of *The History of Sexuality*, *The Will to Knowledge (La Volonté de Savoir),* Lars Thorup Larsen (2007) observes that Foucault uses both terms but in subsequent texts, uses only biopolitics. Larsen (2007) believes that Foucault reconsiders the vocabulary and then sticks with biopolitics. Not all agree though and in Jesse Bazzul's essay, he describes varying ideas on biopolitics and biopower from Hardt and Negri and Lazzarato.

Clearly, those interested in reading in the biopolitical area have much terrain to negotiate. Alexander Carnera (2012) has tried to place some conceptual clarity when he

suggests that perhaps there are two major identifiable streams of research. The first he believes, promotes more abstract philosophical discussions around problems of politics, social values and aesthetic practices. Key questions become the attachment of life to politics and how biopolitics becomes a new critical perspective on economy and capitalism. His second stream tackles studies of science and technology (STS), bioeconomy, medical research, health-care and the like. "Questions of 'health', 'eating habits', welfare, the policy for use of medical products, evaluation programmes in schools, and new scientific programmes for converting living organisms into artificial beings of technological innovation, are some of the issues being addressed in these approaches" (Carnera 2012, p. 69). We also refer readers to the useful Lemke (2011) book *Biopolitics: An advanced introduction*.

What then of the intersection between biopolitics and science education? We need a reading of biopolitics that deepens our understanding of science education and investigates actual relations of power. In arguing that some constructions of biopolitics are more useful than others to analyse the concrete mechanisms of biopolitical regulation, Maarten Simons suggests that ideas of governmentality have merit since "the qualification of human life as a kind of capital and as a resource turns it into a governmental concern." (2006, p. 531). Thus, if biopolitics is about governing life in terms of securing normality and the order of the polis, central control mechanisms like schools, official curricula, certification, standards and associated apparatus seek an optimal educational environment that promotes stability, diminishes risk and expedites prosperity. Schooling of which science education is a part, is consequently, a biopolitical system that (re)produces and regulates the economic subject. This view of biopolitics is apparent in the human capital argument promoting STEM education (science, technology, engineering and mathematics). For example, Mark Engberg and Gregory Wolniak argue that as

> concerns mount about the shortage of students entering science, technology, engineering, and math (STEM) careers, policy makers throughout the United States are contemplating strategies to maintain and enhance our nation's economic vitality and international competitiveness. … The prevailing concern is that a failure to meet workforce demands will ultimately impede America's ability to compete in an increasingly global and technologically advanced economy. (2013, p. 1).

The conflation of science and science education with a nation's global economic competiveness compels life (students) to be produced, administered, regulated, optimised and controlled in the service of contemporary capitalism and is thus a biopolitcs. Since educational institutions frame and employ these knowledges for the purposes of producing a particular kind of scientifically literate citizen, they therefore have a role in exercising biopower. It is in the practices of biopower at both the level of education policy, and classroom pedagogies, with which educators can engage.

With these thoughts in mind, we turn now to introduce the various papers within this special edition. Our first paper is from Noel Gough who in 'Specifying a curriculum for biopolitical literacy in science teacher education' takes on the challenge of exploring the question of biopolitics as a pedagogical project in teacher education. His approach is deeply pragmatic, proposing a flow of readings from the foundational texts and critiques (many cited in the references to this editorial) through fictions (both text and audio-visual) that engage with the world Foucault and others have tried to describe. This curriculum both engages with the biopolitical and the form of education within the biopolitical in embodied ways.

Next we hear from Ajay Sharma writing particularly in the context of the United States, where he explores social justice concerns regarding educational accountability measures using econometric techniques to control teachers, teaching and learning; and, ultimately, populations. Sharma claims that neoliberal capitalists influence education in ways that prioritize "strong [positivist] and substantivist [prioritizing actants over relations] ontology of work [e.g. teaching]." Such ontologies seem to him to align well with neoliberal capitalists' desires for conceiving citizens as primary economic beings (i.e. *Homo economicus*). He suggests, instead, we need to place much more priority on relational ontologies and, more specifically, on acknowledging the complexity of teaching and individuals' rights to self-determination. Accordingly, he recommends we focus on 'quality of teaching' (unpredictable and situated phenomena) rather than some pre-specified 'teacher quality.'

Still in the United States, and with the *Next Generation Science Standards (NGSS)* providing a great deal of fodder for a biopolitical analyses, Matthew Weinstein considers the ways that the NGSS both embody the logics and ethos of neoliberalism and simultaneously resist those same logics. The source of this ambivalence is traced back to the ways that neoliberal policy has simultaneously reached out to science in the form of STEM and at the same time undermined the very principles of science, as regards the replacement of empiricism with market valuation. These tensions become a nexus upon which to think about resistance to biopower as well as to understand its operations.

Hoeg and Bencze follow on to present a critical discourse analysis on STEM policy also from the United States, as a basis to discuss biopolitics in science education, notions of citizenship in contemporary school education and science education, and citizenship and STEM education. Utilising examples such as the NGSS, Hoeg and Bencze argue that contemporary STEM policy in the USA appears to prioritise augmentation of STEM workforce numbers, with associated economic gains for corporate networks driving science reform, rather than developing democratically grounded citizenship. They frame such policy as that of a biopolitical technology meant to govern into existence priorities and values of corporations. They conclude that, because these priorities and values are openly acknowledged in current STEM policy in the USA, economic values and practices have come to define what citizenship means in contemporary, neoliberalism-derived, science education.

Jesse Bazzul is next up in arguing that science education is a site of biopolitical engagement. Drawing on the work of Foucault and Hardt and Negri to discuss the various complexions of biopolitics, Bazzul argues that it is in the microanalyses of everyday practices that one can come to see biopolitics enacted. In the context of science education, he explores how repetitive close-ended lab/assessment tasks and discourses surrounding careers in science can work to constitute students as depoliticized, self-investing subjects of human capital. As no discourses are totalising though, micropolitical approaches enable accessible critiques and encourage resistance.

Annette Gough shifts the gaze from the US to Australia and focuses on to environmental education as a bedfellow to science education. She traces the shifts in environmental education discourses from the 1972 UN Conference on the Human–Environment, to the 2012 UN Rio + 20 Conference on Sustainable Development, and beyond through a biopolitical lens. Gough analyzes the shifting biopolitical interfaces that have occurred between "natural environment" and "society"—from a goal of preserving the natural foundations of life to a focus on exploiting these foundations, modifying and transforming the environment through scientific and technological means—and the manifestations of this in Australian curriculum documents. As we engage with various planetary cries like

climate change, Gough wonders what posthumanism may bring to the table in a post-anthropocentric era.

Our final paper is an essay from Kean Birch of York University, Toronto, writing largely in terms of literature in Science and Technology Studies (STS). Birch provides detailed critiques of ways in which some STS scholars 'fetishize' a great range of bio-concepts that he believes significantly diverge from Foucault's initial conceptions of biopolitics—which he suggests prioritised relationships among capitalism, population and government. His critiques focus on such bio-concepts as: *biovalue*, *bioeconomics*, *bio-capital*, *biowealth* and *biocitizenship*—mainly through an inquiry into bio-concepts as presented in the book, *Clinical Labor* by Cooper and Waldby (2014). Regarding biopolitics, he suggests that this STS text "analytically fetishizes the biological to the detriment of theoretical engagement with the cultural, social, political and economic." In his analyses, he suggests that roots of capitalist relations discussed in the book are feudal; so, "it would be more analytically useful to consider how capitalist organizational forms (e.g. the firm and the corporation) are constituted by feudal socio-political hierarchies." Consequently, he tacitly suggests that "STS scholars theorizing the bio-economy [should more often] actually engage (rigorously) with literature from political economy, heterodox economics or orthodox economics."

In addition to these original papers, we have four forum papers from scholars across the globe. Chantal Pouliot from Quebec City Ralph Levinson from London Isabel Martins from Rio deJang and Lyn Carter from Melbourne.

We hope that the readers of CSSE find this volume just as thought-provoking to read as we have in putting it together. We also hope that this issue provides some impetus for future conversations about science education and biopolitics as we struggle with the immense and ongoing challenges of developing a more humane and fairer science education.

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Lyn Carter's work seeks new articulations of science education valuing cultural diversity, ecological sustainability and social justice in a globalised world. Her many published journal articles and book chapters emphasises consequences the for science education of globalisation and neoliberalism, and the ways in which postcolonialism and ecological sustainability can act as counter discourses.

Matthew Weinstein is a Professor of Science Education at the University of Washington—Tacoma. He is the author of the books *Robot World* and *Bodies out of Control*, the latter with Nidaa Makki and the TAMS Analyzer qualitative research tool. In addition, he has published many articles on social justice, social movements, and public cultures of science.

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