SCHOOL SCIENCE, EQUALITY AND FAIRNESS

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Throughout the world science and technology, or STEM as it has come to be known, are seen as crucial instruments in ensuring national prosperity. At the same time there is a consciousness that the products of science and technology should be directed towards the public good, hence the policy coda of Responsible Research & Innovation (RRI) which underpins funding of S&T research and education in the European Union. This linking of social issues to science - socio-scientific issues in educational terms - has always faced epistemological problems. These problems include the focus on the Mertonian norms of science as objective and disinterested, the prevalence of empiricist and positivistic methods in science practise, and the ideological sway of Hume's naturalistic fallacy or the 'is-ought' dichotomy. Indeed some educationalists have argued effectively that science as a discipline has a distinctive space in the school curriculum with a unique set of concepts and principles (Hirst & Peters, 2011)

I shall argue that interpretations of Enlightenment rationality have hampered the development of socio-scientific issues and the gearing of science education to social justice. Rather than argue for a bolt-on connection between science and society, underpinning so-called Vision I and Vision II approaches (Roberts & Bybee, 2014) I claim that the practise of science can only flourish through an understanding of social justice at its core. Prevalent neoliberal formulations of science and society mean that S&T research and development skims over deep and structural injustices.

There are two theoretical positions I shall draw on, with examples, to argue that science practise and learning cannot be decoupled from questions of social justice. Critical Realist metatheory (Collier, 1994; Levinson, 2018a) has the reality of human emancipation at its core. Taking the world as ontologically real (the intransitive dimension) and epistemologically relativist (the transitive dimension) – what is is not the same as what is known - Critical Realism considers natural phenomena as open systems to be investigated. It finds an approach to science practise between naïve realism and empiricism, buttressed by an appeal to judgemental rationality. Theories about the nature of reality can be judged according to valid criteria of truth. At the same time stratification and emergence can generate explanations through causal mechanisms in diverse disciplines from the physico-chemical to the socio-economic. The explanation of events is thus inter-disciplinary.

Secondly Levinas's ethics of the refusal of subjectivity allows us to recognise difference and diversity, that Nature can be studied from a different perspective from the dominant subjective 'I', a hangover from

Enlightenment rationality. From this perspective I create a picture of the non-presumptive and knowledgeable science teacher (Levinson, 2018b). If social justice is intrinsic to science education then it must also be at the heart of pedagogy. Finally I draw on the 'story' demonstrating how the personal and political are interwoven in understanding scientific ideas through interlocking narratives (Levinson, 2009). My conclusion is that science teaching should focus on explaining events in an interdisciplinary manner which not only couples science to the social but also deepens understanding of core scientific concepts.

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