Going Beyond STS: Towards a Curriculum for Sociopolitical Action

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Abstract

This article asserts that STS-oriented curricula, while of value in presenting a more authentic view of scientific practice and its cultural context, are too timid in their approach towards the political interests and social values that underpin scientific and technological developments. A case is made for politicizing students through an issues-based, technology-oriented curriculum aimed at social critique, values clarification, and preparation for sociopolitical action. (This paper is a summary of Hodson, 2003)

Introduction

Regrettably, science is often regarded as a body of knowledge that can be transmitted by teachers, memorized by students, and reproduced on demand in examinations. Regrettably, too, science is often portrayed as the de-personalized and disinterested pursuit of objective truth, independent of the society in which it is practised and untouched by ordinary human emotions, values, and conventions. Although the science-technology-society movement (STS education) has done much to shift the emphasis of science education in some educational jurisdictions towards a more authentic representation of scientific knowledge and scientific practice (Kumar & Chubin, 2000; Solomon & Aikenhead, 1994; Yager, 1996), the reforms do not go nearly far enough. Although some curricula draw on elements of the history, philosophy, and sociology of science to show students how scientific inquiry is influenced by the sociocultural context in which it is located, this insight is not used to politicize students. Too often, teachers avoid confronting the political interests and social values underlying the scientific and technological practices they teach about, and seek to avoid making judgements about them or influencing students' views. Two points are worth making. First, curriculum cannot be value-free. Values are promoted as much by what is omitted as by what is included. Second, the so-called “value-free” approach diverts attention away from what I consider to be the major purpose of science education: preparation for responsible citizenship.

It almost goes without saying that science education should lay the foundation for further study and for a potential career as a scientist, engineer, or technician, but it should also be concerned with enabling young citizens to look critically at the society we have, and the values that sustain it, and to ask what can and should be changed in order to achieve a more socially just democracy and to ensure more environmentally

sustainable lifestyles. This view of science education is overtly and unashamedly political. It takes the Advisory Group on Education for Citizenship and the Teaching of Democracy in Schools (Qualifications and Curriculum Authority [QCA], 1998) at its word--not just education about citizenship, but education for citizenship: "Citizenship education is education *for* citizenship, *behaving and acting as a citizen*, therefore it is not just knowledge of citizenship and civic society; it also implies developing values, skills and understanding" (p. 13, emphasis added).

Politicizing the Curriculum

My view is that politicization of science education is best approached via an issues-based and technology-oriented curriculum. In the modern world, technology pervades everything we do; its social and environmental impact is clear; its disconcerting social implications and disturbing moral-ethical dilemmas are made apparent in the media almost every day. Consequently, it is much easier to see how technology is determined by the sociocultural context in which it is located than to see how science is driven by such factors, and it is much easier to see the environmental and societal impact of technology than science. This is not an argument against teaching science; rather, it is an argument for using technology as a means of contextualizing science in a way that makes it more accessible to students.

In Hodson (2003), I outline my proposal for a curriculum focused on seven areas of concern: human health; food and agriculture; land, water, and mineral resources; energy resources and consumption; industry (including manufacturing industry, the leisure and service industries, biotechnology, and so on); information transfer and transportation; freedom and control in science and technology (ethics and social responsibility). Within such a curriculum, a judicious mix of local, regional, national, and global concerns can be addressed in terms of four levels of sophistication.

- *Level 1*: Appreciating the societal impact of scientific and technological change, and recognizing that science and technology are, to some extent, culturally determined.
- *Level 2*: Recognizing that decisions about scientific and technological development are taken in pursuit of particular interests, and that benefits accruing to some may be at the expense of others. Recognizing that scientific and technological developments are inextricably linked with the distribution of wealth and power.
- *Level 3*: Developing one's own views and establishing one's own underlying value positions.
- *Level 4*: Preparing for, and taking, action.

Level 1 is about the complex interactions among science, technology, society, and environment. Technology is not shaped by scientific knowledge alone; rather, it is the

product of particular sociopolitical, cultural, and economic circumstances. In turn, technologies such as the printing press and the computer, or the steam engine and the internal combustion engine, shape the lives of people and impact on both the natural and built environments in quite dramatic ways. Level One awareness includes recognition that the benefits of scientific and technological innovations are often accompanied by problems: hazards to human health, challenging and sometimes disconcerting social changes, environmental degradation, and major moral-ethical dilemmas.

Although there are STS-oriented curricula that identify problematic features of scientific and technological development, many regard decision-making in science and technology as a relatively simple matter of reaching consensus or effecting a compromise. In contrast, the intention at Level Two is to assist students in recognizing that decisions are usually taken in pursuit of particular interests, justified by particular values, and sometimes implemented by those with sufficient economic or political power to override the needs and interests of others. In consequence, the advantages and disadvantages of scientific and technological developments often impact differentially on society. In other words, science and technology may serve the rich and the powerful in ways that are prejudicial to the interests and well-being of the poor and powerless, sometimes giving rise to further inequalities and injustices. In many ways, the material benefits of the industrialized world are achieved at the expense of those living in the Developing World. The intention of Level 2 is twofold. First, students recognize that critical consideration of scientific and technological development is inextricably linked with questions about the distribution of wealth and power. Second, they begin to see that problems of environmental degradation are rooted in societal practices and in the values and interests that sustain and legitimate them.

Level Three is concerned primarily with supporting students in formulating their own opinions on important issues. Its focus is values clarification, developing strong feelings about issues, and actively thinking about what it means to act wisely, justly, and honourably in particular social, political, and environmental contexts. Like global education (Selby, 1995), with which it has much in common, it begins with the fostering of self-esteem and personal well-being, and extends to respect for the rights of others, mutual trust, the pursuit of justice, cooperative decision-making, and creative resolution of conflict between individuals, within and between communities, and throughout the world. It is driven by commitment to the principle that alternative voices can and should be heard in order that decisions in science and technology reflect wisdom and justice, rather than powerful sectional interests (Maxwell, 1992).

The fourth level of sophistication is where the radical character of this curriculum is principally located: helping students to prepare for, and to take, responsible action. Socially and environmentally responsible behaviour will not necessarily follow from knowledge of key concepts or even from the possession of the “right attitudes.” Almost

every one of us has personal experience illustrating that it is much easier to proclaim that one cares about an issue than to do something about it. What translates knowledge into action is ownership and empowerment. Those who act are those who have a deep personal understanding of the issues (especially their human and environmental implications) and feel a personal investment in addressing and solving the problems. Those who act are those who feel personally empowered to effect change, who feel that they can make a difference and, crucially, know how to do so. Thus, a prerequisite for action is a clear understanding of how decisions are made within local, regional, and national government, and within industry, commerce, and the military. Without knowledge of where, and with whom, power of decision-making is located, and awareness of the mechanisms by which decisions are reached, intervention is not possible. In other words, the kind of scientific and technological literacy that this curriculum proposal is designed to achieve is inextricably linked with education for political literacy. The likelihood that students will deploy their knowledge of political structures and mechanisms in significant sociopolitical action in adult life will be much greater if they are given opportunities to take action as part of the curriculum experience. Examples of such action include conducting surveys of dump sites, public footpaths, and environmentally sensitive areas, generating data for community groups such as birdwatchers and ramblers, making public statements and writing letters, organizing petitions and consumer boycotts of environmentally unsafe products, publishing newsletters, lobbying local government officials, working on environmental clean-up projects, creating nature trails, assuming responsibility for environmental enhancement of the school grounds, monitoring the school's consumption of energy and material resources in order to formulate more appropriate practices, and so on. It is not enough for students to learn that science and technology are influenced by social, political, and economic forces. They need to learn how to participate, and they need to experience participation. It is not enough for students to be armchair critics! As Kyle (1996) put it: "Education must be transformed from the passive, technical, and apolitical orientation that is reflective of most students' school-based experiences to an active, critical, and politicized life-long endeavour that transcends the boundaries of classrooms and schools" (p. 1).

The curriculum proposals outlined here are unashamedly intended to produce activists: people who will fight for what is right, good, and just; people who will work to re-fashion society along more socially-just lines; people who will work vigorously in the best interests of the biosphere. It is here that the curriculum deviates sharply from STS courses currently in use.

Changing Values and Changing Lifestyle

The gist of my argument is that science and technology education has the responsibility of showing students the complex but intimate relationships among the technological products we consume, the processes that produce them, the values that

underpin them, and the biosphere that sustains us. Within an issues-based curriculum oriented towards sociopolitical action, it is not acceptable to regard environmental problems as an inevitable consequence of technological development or to imply that science itself can solve the problems by simple technical means. Projecting such messages depoliticizes the issues, thereby removing them from the "realm of possibility" within which ordinary people see themselves as capable of intervention. As a consequence, dealing with environmental problems is left to experts and officials, and ordinary citizens are disempowered. Education for sociopolitical action entails recognizing that the environment is not just a "given," but a social construct. It is a social construct in the sense that we act upon and change the natural environment, and so construct and reconstruct it through our social actions. It is a social construct in the sense that we perceive it in a way that reflects the prevailing sociocultural framework. In consequence, environmental problems are not problems "out there" in our surroundings, but problems "in here" (in our heads), in the way we choose to make sense of the world. They are pre-eminently social problems--problems of people, their lifestyles, and their relations with the natural world.

By adopting this position, we can challenge the notion that environmental problems are inevitable. If environment is a social construct, environmental problems are social problems, caused by societal practices and structures, and justified by society's current values. It follows that solving environmental problems is a matter of addressing and changing the social conditions that give rise to them and the values that sustain them. It follows that science education for sociopolitical action is inescapably an exercise in values clarification and values change. Hence Level 3 in the scheme outlined above. Environmental problems will not just "go away," nor will they be solved by a quick "technical fix" while we blithely maintain our profligate lifestyle. We have to change the way we live; the planet can no longer sustain our present way of life.

It is a well-worn cliché to say that we live in a global village, and that what we do in our own backyard can impact quite significantly on people living elsewhere in the world. It is also the case that our actions now impact on the lives of future citizens. The ethics of previous generations have dealt almost exclusively with relations among people alive at the same time. In startling contrast, the impact of contemporary technology makes an urgent issue of relations with those as yet unborn. In recognizing this new reality, we would do well to heed the wisdom of the First Nations people of North America: "Treat the Earth well. It was not given to you by your parents; it was loaned to you by your children. We do not inherit the Earth from our ancestors, we borrow it from our children" (oral tradition). It is not too much of an exaggeration to say that the degree to which young citizens incorporate sustainable practices into their professional and personal lives will determine the quality of life for future generations. It is my contention that the science curriculum has a crucial role to play in teaching students how to exercise the enormous power of

technology responsibly, carefully, and compassionately, and in the interests of all living creatures.

The most fundamental element in this values shift is the rejection of anthropocentrism (and the objectification and exploitation of nature that follow from it) in favour of biocentrism: having respect for the intrinsic value of all livings things, cultivating a sense of compassion and caring towards both human and non-human species, having a concern for maintaining the existence of biological and cultural diversity, challenging and rejecting all forms of discrimination, and making choices that are designed to maintain an ecologically sound and humane lifestyle. Laszlo (2001) describes the inculcation of this clutch of values as developing a "planetary ethic"--an ethic which "respects the conditions under which all people in the world community can live in dignity and freedom, without destroying each other's chances of livelihood, culture, society and environment" (p. 78). He goes to some length to reassure readers that abiding by a planetary ethic does not necessarily entail major sacrifices or self-denying behaviour. Striving for excellence, beauty, personal growth, enjoyment, even comfort and luxury, is still possible, provided that we keep in mind the consequences of our actions on the life and activity of others by asking:

- Is the way I live compatible with the rights of others?
- Does it take basic resources from them?
- Does it impact adversely on the environment?

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