



Education from a Biological Point of View

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Abstract There appears to be an irresolvable disagreement between “progressives” and “conservatives” regarding the ultimate aims of education. This paper argues that the dispute is irresolvable as it currently stands because the traditional progressive/conservative dichotomies are false and based on distorted half-truths. The current impasse is due to the fact that educationalists and philosophers alike have hitherto misunderstood the fundamental purpose of educational activities. The central claim of this paper is that a *biological* perspective on education allows one to see past the traditional dichotomies and affords a coherent rationale for a set of curricular priorities by providing the framework necessary to draw principled distinctions between education, training, indoctrination, and enculturation, all without having to draw on contentious politico-ideological commitments.

Keywords Aims of education · Philosophy of the curriculum · “Progressive/conservative” dichotomies · Biology · Developmental policy

“...the Confederation of Kitchwa Peoples of Ecuador... is campaigning with a picture which shows a bulldozer coming to erase a village to make way for a mining project. The man in the bulldozer says to a farmer: ‘You are poor. Sell me your land and water so that you will get money’, to which the farmer responds: ‘When the money will be gone, I shall have no water and no land.’ To which the man in the bulldozer replies: ‘Uneducated!’”¹

¹ Found in Deneulin (2014, 14).

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Introduction

What is it to be educated? Assuming that education has something to do with knowledge and skills, what does one need to know, or be able to do, in order to be educated? And how does being educated differ from being trained, or indoctrinated, or socialised, or otherwise inculcated with the values, mores and culture of one's social group? These first-order questions naturally lead to a second-order question: Are the propositions expressing putative answers to these first-order questions truth-apt? It is certainly not obvious to everyone that they are. It might very well be that there is no qualitative difference between being educated and being trained or indoctrinated, and that the term is simply a way of marking our approval, perhaps for ideological reasons, of a particular schooling program. Another way of expressing this point is to say that the ultimate aims of education might be entirely a matter of subjective value judgement, or a "social construct", there being no way to assess objectively the merits of any educational programme. A less cynical thought is that "being educated", despite being a real quality, might be context dependent. If this were the case, then what it is to be educated would not be the same across the board, there being no single right answer to our first-order questions.

Now the literature is replete with many plausible, often incompatible, claims about the ultimate aim(s) of education. Some maintain that the ultimate purpose of education is the socialisation of the individual with a view to the preservation (or imposition) of civic harmony. Others emphasise individual emancipation and 'soul making'. Artistic creativity has its champions, as does the promotion of scientific progress. Empowering individuals to choose wisely is a particularly popular aim in modern democracies. And there are always defenders of the idea that education is primarily about preparing citizens for the workplace.² These differing assessments of the basic aim(s) of education lead to significantly different curricular priorities and to significantly different views of what it is to be educated. And so it is perhaps not surprising that—beyond the oft repeated and obviously correct insistence on the importance of literacy and numeracy³—the literature betrays no consensus on what one needs to know, or be able to do, in order to be educated. Rather "conservatives" and "progressives" continue to argue over whether education is primarily about the transmission of knowledge or about the fostering of personal autonomy; about preparing students for the workplace and citizenship or about their personal development and transformation; about the maintenance of class structures or promoting social change.⁴

² See Rorty's (1998) for discussion of the various stances taken by philosophers on education.

³ Although it is perhaps worth noting that it was not ever thus. In his remarks about what should be taught and learned the enormously influential Islamic thinker, al-Ghazali, wrote the following about mathematics: "One should restrain anyone who would immerse himself in these mathematical sciences. For even though they do not pertain to the domain of religion, yet, since they are among the foundations of the philosopher's science, the student will be infected with the evil and corruption of the philosophers. There are few, therefore, who immerse themselves in mathematics without being stripped of their religion and having the bridle of godly fear removed from their heads." (*The Faith and Practice of Al-Ghazali*, trans. W. M. Watt. London: Allen and Unwin 1953, p. 34. Found in *Continuity and Innovation in Medieval and Modern Philosophy*, Marenbon (2013, 105). One can imagine similar remarks being made today about any western foundational discipline.

⁴ A sympathetic commentator has written the following about the standard conservative educationalist: For conservatives "the main mission of schools is to indoctrinate the young in the moral values of the great tradition. One rarely encounters a conservative educator who believes in providing students with opportunities for change and innovation. Since they disregard issues such as plurality, individual creativity, critical citizenry, these educators... cannot contribute much to the current debate on democratic education" (Mordechai 2005, 161). A clear expression of the progressive tendency, perhaps taken to its extreme, can be

To complicate matters, some insist that we should not be forced to choose, and that we should adopt an “all of the above” approach to education.⁵ But whatever the merits of these answers, they are inevitably linked, at least in the eyes of their detractors, to competing political or social ideologies. The temptation to cynicism and anti-realism in the philosophy of education follows quickly on the realisation that educational priorities are “interested”.⁶ It is easy to see why some have determined that these debates are irresolvable, riven as they are by deep ideological differences based on differing subjective value judgments.^{7,8}

Now philosophers in general are quite comfortable with the fact that there is rarely anything approaching a consensus on the answers to first and second-order philosophical questions. This sanguine attitude is usually entirely appropriate, it being difficult to say exactly what of practical significance hangs on the outcome of debates regarding the nature of reference, say, or one’s preferred theory of individuation. But educational matters are not confined to *recherché* debates of academics. Answers to educational questions have a real and lasting impact on the development of every individual put through a state run educational system, as well as on the development of a nation’s economic standing. It is this close connection with development, personal and national, which gives educational matters an obvious moral seriousness that many philosophical questions lack. A sanguine attitude to a lack of consensus in this context can look a lot like complacency.

That education is vital to development is not news. It is a commonplace amongst economic historians,⁹ developmental economists,¹⁰ development ethicists,¹¹ and

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found in Gareth Mathews who maintains that “the central mission of the school should be to create spaces in which children can articulate and explore their own interpretations of the world and bring these into dialogue with others. Critical thinking means not so much instrumental problem-solving as the capacity and the disposition to fantasise and to wonder, to entertain profound ideas about the world and to confront problems concerning individual well-being” (Vansieleghem and Kennedy 2011, 175–6).

⁵ See David Carr (2010) as a case in point. This inclusive attitude to the aims of education is also evident in The EU Lisbon Memorandum on Life-Long Learning 2000, which lists amongst its goals the promotion of active citizenship, vocational skills, self-development and easy access to ‘good quality information’.

⁶ This is a well-worn line of thought going back to at least Plato’s *Thracymachus*. More recent versions of this conflict theory of education are to be found in Marx, Bourdieu, Gramsci, Derrida, Foucault, who all emphasise the idea that educational policy is a means of social control.

⁷ Wilfred Carr advances this view in his (2006).

⁸ Of course it is very easy to become cynical about this very cynicism, for reasons outlined in Boghossian’s (2007) *Fear of Knowledge*.

⁹ Ever since Friedrich List’s (1841) *The National System of Political Economy*, the standard model of development has included mass education as a key ingredient, along with building transportation infrastructure and a unified national market; imposition of tariffs on imported goods to protect national industries; and chartering of banks to stabilize currencies and finance investment. These policies, adopted by the British in the 19th century, and then copied by the Americans and Germans, and subsequently adapted to different circumstances in Japan post WWII, lead to vastly improved standards of living.

¹⁰ Dasgupta is just one of many examples. He writes: “Throughout this book I have emphasized the productive value of expenditure in infrastructure, primary and secondary education, the production and spread of information, health care and potable water, and food and employment security. They are desirable in themselves, but in addition they add to the productivity of labour, and so have a derived value as well” (1993, 538). Similarly the Copenhagen Consensus Project 2012 (Lomborg 2014), which prioritizes developmental aid proposals, found “16 investments worthy of investment”, 3 of which, including the most important, being a set of “Bundled interventions to reduce undernutrition in pre-schoolers.

¹¹ Gaspar (2004, 139) is typical of development ethicists in ranking education behind only security and health (and alongside food, potable water, housing and access to health care) in his discussion of basic needs. Gaspar (2004) *The Ethics of Development*. Edinburgh: Edinburgh University Press.

educationalists themselves. And there has been a concerted effort amongst development theorists of various disciplines to promote education as part of national development programmes, to promote access to education for all at both primary and secondary levels, and to encourage investment in teacher training and educational facilities.¹² All of this is to be warmly welcomed. But a familiar worry resurfaces when one delves into the developmental literature. What is it that an individual needs to know, or to be able to do, in order to develop optimally? What does a society need to teach its members in order for that society to develop in a desirable fashion? Even if we assume, as seems reasonable, that “development” at the level of the individual should be cashed out in terms of “capability expansion”, as suggested by, among others, Amartya Sen and Martha Nussbaum, what do teachers need to teach and what do students need to learn in order to expand their (relevant) capabilities? And how would one justify one’s claims in this domain? Given the importance of education to development, one might reasonably expect development theorists to have some rather specific ideas regarding curricular priorities. But one would be wrong. Beyond the familiar consensus on the importance of literacy and numeracy, the development literature is surprisingly mute on curricular questions.¹³

Several possible explanations for this lacuna in the development literature suggest themselves. Development theorists might have decided, not unreasonably, that the initial focus of their efforts has to be on making the case for universal education as a governmental priority, the actual content of that education (beyond basic literacy and numeracy) being of secondary importance. Or perhaps the core of the curriculum is taken for granted. It might be assumed, for example, that basic literacy and numeracy are propaedeutic to studies in the sciences and engineering, the latter forming the core of the advanced curriculum. Or perhaps development theorists are not committed to anything more than literacy and numeracy, and feel that the rest of the curriculum is best left to educationalists. But it is also possible that development theorists avoid being more specific about the curriculum because they are fully aware of the sensitivities involved, and that what it is to be educated is highly contested.¹⁴ And no doubt matters are complicated by the fact that

¹² Happily it would appear that these efforts have been largely successful. Banerjee and Duflo write: “Most national governments seem to have bought into this idea. In India, 98 % of children now have a school within a half mile or so. Several African countries ... have made primary education free, and children have flooded the schools. ... In our eighteen-country data set, even among the extremely poor (those who live on less than 99 cents a day), enrolment rates are now above 80 % in at least half the countries for which we have data (*Poor Economics*, p. 73–4).”

¹³ It is always difficult to establish a negative. It will have to suffice to point to important documents in the development literature and note the absence of discussion of curricular matters. Dasgupta (1993) for example, we find the following: “...I am thinking of education in a very specific way, as acquiring knowledge of other places, people, opportunities, and the natural world, and of reading and writing, and numerical skills and so forth. More generally, I am thinking of the acquiring of a certain attitude towards others and the world, one that imparts a distinct form of self-confidence, and encourages a judicious mix of conscious and trained reflection and experimentation to improve ways of doing things, and of understanding things” (*An Inquiry into Well-Being and Destitution*. Oxford: OUP, p. 98). The bulk of Dasgupta’s discussion is devoted to the empirical evidence regarding the benefits of education, with no more said about the curriculum itself. In another more recent example, the 2006 UNESCO report entitled “Higher Education in South-East Asia”, produced by the Asia Pacific Programme of Educational Innovation for Development, covers a vast array of topics without touching on curricular issues at all. (Topics covered are: Higher Education reforms; Access to Higher Education; Diversity in Higher Education; University governance and management; Restructuring of faculties and academic progress; Developing research capabilities; Changes to the academic profession; Roles and function of private Higher Education; Internationalisation of Higher Education; Accreditation and quality assurance; Challenges and future developments).

¹⁴ As the campaign picture referred to above makes abundantly clear. The point is precisely that the Confederation of Kichwa Peoples of Ecuador would have us reject the educational assumptions of the man

education, particularly Western education, is frequently seen as a threat to traditional ways of life, and positively resisted.¹⁵ One might hazard a guess that many development theorists prefer to avoid controversy and focus instead on those aspects of the curriculum which enjoy widespread support. But whatever the explanation, given the importance of education to development, at some point development theorists will need a philosophy of the curriculum that can be defended in a multicultural and global context.

This position paper presents such a philosophy of the curriculum. It sets out to defend an unusual answer to the fundamental question of what it is to be educated, and does so without relying on contentious political or social ideology, or subjective value judgments. The crucial first step, I suggest, is to consider approaching our first-order questions from a different perspective with a view to casting well-worn terrain in a new and hopefully revealing light. The central claim of this paper is that a *biological* perspective generates a distinct picture of education which suggests: (1) contra widespread opinion, that the purpose or function of education is neither a subjective matter or “socially constructed”; and (2) that progressive and conservative educationalists and philosophers alike have hitherto failed to correctly characterise the fundamental purpose of educational activities. This means one can reject the familiar but false progressive/conservative dichotomies, and qualify the half-truths on which they are based. This biologically based picture also affords an objective rationale for a set of curricular priorities, and provides the framework necessary to draw principled distinctions between education, training, indoctrination, and enculturation.

The next section begins with a brief apology for adopting the biological point of view before going on to present a case for the claim that educational activities are a crucial phenotypic adaption of *Homo sapiens* keyed to the maintenance of homeostasis. This biological fact in view, I then go on in the following section to characterise the fundamental aim of education, specify what it is to be educated, and identify a set of curricular priorities. Here the key claim is that *Homo sapiens* maintains homeostasis by the intentional teaching and learning of behaviours that allow individuals to participate in the running and maintenance of the social order to which they happen to belong. The conclusion of this section is that one is able to participate in the running and maintenance of the social order when one is fully versed in the fundamentals of one’s social order, familiar with the relative merits of alternative social orders, and so in a position to make reasonable judgments about proposed changes to one’s social order with a view to the common good. This is what it is to be educated. In the final section I revisit the familiar progressive/conservative dichotomies, and briefly address some obvious objections to this biologically based picture of education.

Footnote 14 continued

in the bulldozer, assumptions they see as providing spurious justification of actions taken in the name of “development”.

¹⁵ It is important to realise that it is not just extremists like Boko Haram or the Taliban who feel this threat. Many groups in Nigeria, for instance, who are otherwise unsympathetic to Boko Haram, are uneasy about western education. See *The Economist*, “Education in northern Nigeria: Mixing the modern and the traditional”, July 26, 2014. Similar stories of unease and positive resistance are to be found in the histories of virtually every country which consciously attempted to “modernise”, Russia under the Tsars, and Turkey under Kemal Ataturk being instructive cases in point.

Education from a Biological Point of View

So far I have been at pains to suggest that a coherent philosophy of the curriculum with a warrant to widespread acceptance is to be highly welcomed. Such a philosophy of the curriculum is currently lacking. The remainder of this paper is an attempt to begin to address this lacuna.

The suggestion is to begin by adopting an unusual point of view.¹⁶ I suggest that one begin by asking why it is that *Homo sapiens* devotes so much time and energy to educational activities compared with other species. This biological orientation affords a distinct perspective on education that abstracts from the familiar ideological concerns. This turn to biology will strike many as counter-intuitive, so a few apologetic words are in order.

It is often a fruitful methodological procedure, particularly when engaging in a long-standing debate, to take a step back from the fray and consider the terrain from an entirely different point of view. Often both sides of a seemingly intractable dispute are prey to the same unexamined and mistaken assumption about the subject matter in question, and it is our failure to notice this shared mistake which prevents us from realising that both sides of the dispute are in error. I believe that something like this has happened in education. Progressives and conservatives alike share the common assumption that education is primarily a socio-cultural matter within the domain of value judgments. This is perhaps most clearly seen in the “culture wars” over whether education is primarily about indoctrinating the young in a society’s moral traditions with a view to preserving them or the fostering of a critical attitude to these same traditions with a view to social change. But education is more accurately seen as our species specific strategy for dealing with a challenge faced by all living creatures. If we adopt the comparative method of biology, and compare traits and behaviours across distinct species the better to understand them in each, it emerges that, at bottom, educational activities are—as a matter of fact, and not of value—our species’ solution to a biological problem. Failure to recognise the biological point or function of educational activities results in a distorted picture of the core purpose of education, and thus to distorted curricular priorities.¹⁷ A few biological reminders are essential to this approach to education. Those reminders in place, we can then proceed to consider the curriculum from a biological point of view.

The Biological Context

I take it as axiomatic that the issue regarding what should be prioritised in the curriculum cannot be addressed in a principled fashion until one has a settled opinion on the overarching aim of education.¹⁸ A corollary of this is obvious: If there is no objective core aim

¹⁶ The view to be defended here does have precursors. See section 1 of Chapter 1 of John Dewey’s (1966) *Democracy and Education*. William James also recommends the adoption of “the biological conception” in educational matters in “The Child as Behaving Organism” in his (2014) *Talks to Teachers on Psychology*.

¹⁷ No doubt some will insist that one cannot “read off” educational priorities from biological facts since this is to fall prey to the naturalistic fallacy. But this is to assume that one’s educational priorities are always a matter of subjective judgement, and this is to beg the question against my case. I am arguing that curricular priorities are *not* a matter of value but of fact, and so it remains to be seen if the facts of biology can speak to educational matters.

¹⁸ This is simply a specific instance of the general rule that the success or otherwise of any activity or practice is “measured” by reference to its point. This rule is unaffected by the claim that education is an end in itself (Peters 1973) a claim made by those wishing to ensure that education not be exclusively vocational.

of education then there is no objective set of curricular priorities. So the crucial question is: Why do we engage in educational activities? What is the purpose of this behaviour?

Of course the answers to this question are multi-faceted, and context dependent. But for all the variability one finds in the *proximate* reasons for engaging in educational activities, one *ultimate* explanation emerges if one adopts a biological perspective. The first step is to consider *Homo sapiens* as just another species that needs to cope with all the challenges biological reality throws at it.

Most of these challenges are perfectly familiar. All organisms have to find a way of reproducing their kind. And all organisms need to find a way of avoiding danger in what is usually not an utterly benign environment. But more prosaically, all organisms must maintain homeostasis. Homeostasis is the term used to describe a stable internal environment of an organism which affords normal physiological functioning. Significant departures from this internal environment constitute illness, and ultimately lead to death if not rectified.

Homeostasis is achieved in various ways across the various Kingdoms of organisms, but one can set aside here consideration of the prokaryotae, the protoctista, the fungi and the plantae (whose ways of life are significantly different from our own) and focus attention on our Kingdom, the animalia. Achieving homeostasis in animals, and more specifically in mammals such as ourselves, includes maintaining blood sugar levels, maintaining the appropriate concentration of respiratory gases in the blood stream and tissues, maintaining blood pressure and body temperature, as well as normal levels of calcium, magnesium, potassium and various other minerals. Maintaining this constant internal environment in the face of variable external conditions is in large part a matter of the animal securing its resource requirements from the external environment. The basic resource requirements of *Homo sapiens* are clean air, food and water, skins or fibres (clothing), fuel (heating and cooking) and building materials (shelter).¹⁹ Without these external resources it is impossible for a human being to maintain her internal environment on a secure basis, secure enough, that is, to be able to consider other biological challenges (like finding a mate) or spend time on any other activities. A similar set of resource requirements can be identified for all animals.

One might be forgiven for wondering what these facts of biology have to do with education. The connection becomes apparent when one considers *how* an animal achieves homeostasis. At the highest level of abstraction, it is by means of actions that form behaviour patterns that an animal meets the challenge of homeostasis. An animal achieves homeostasis by engaging in a suite of behaviours, frequently but not always species specific, by means of which it is able to secure its resource requirements from the external environment. In ethnographic circles these suites of behaviours are known as “extended phenotypes”.²⁰ These behaviours are of great biological importance because an animal’s viability depends as much on its ability to execute these behaviours as upon any purely anatomical feature. The crucial point for present purposes, however, is that the different behaviours or suites of behaviour of different species can be compared and contrasted as different ways of dealing with the fundamentally the same problem.

Again one might be forgiven for wondering what this has to do with education, but the connection is not far to seek. A fundamental challenge facing any animal is mastering the suite of behaviours by means of which resource requirements are secured. How does a nesting bird, say, acquire the skills necessary for nest building? Similar questions can be

¹⁹ These are the so-called Malthusian necessities of life.

²⁰ Konrad Lorenz’ (1937) is the root source for this insight.

asked about the spider's web, or the beaver's dam.²¹ The answer appears to be that the necessary behaviour patterns in non-human animals are largely innate. The acquiring of nest building skills in birds is akin to the growing of teeth in human infants—it is channelized into the developmental programme of the animal, and happens naturally as long as everything else is taken care of, with no intentional action required on the part of the adult or infant.²²

The case of humans is markedly different. We have certain relevant behaviours that are similarly instinctual (breathing and suckling are obvious cases in point). But the vast majority of the behaviours necessary to secure our resource requirements are not instinctive. What is particularly conspicuous about us as a species is that our behaviour patterns have to be intentionally taught and learned. In fact *Homo sapiens* is the only species whose viability depends on one generation teaching the next, for the necessary information regarding behaviour patterns is not inherited along with eye colour and the like, nor can that information be rediscovered anew in each generation. Our way of life depends on knowledge and technology of such complexity that such rediscovery or re-invention is impossible. The practice of education is thus a biological necessity for *Homo sapiens*. We as a species are biologically committed to a way of life that depends on skills and knowledge that must be taught, the learning of which takes years. Our current population levels, our current ecological range, and our current standard(s) of living²³ are made possible only because the knowledge and skills needed to support this way of life are systematically passed on from generation to generation, now more than ever in the form of formal state-run educational programmes. That this is true today is obvious; but it was ever thus, although the necessary information and technology has not always been as copious as it is today. In the Pleistocene a youth had to be taught how to make the tools necessary for successful hunting. A youth had to be shown how to start a fire, how to build a dwelling, how to mend a garment. Although there were no classrooms, intentional vertical and horizontal teaching and learning were vital to our way of life.

To use the jargon of ethnography, *educational behaviour is our species' most important extended phenotypic adaptation*. If one is to understand education, one has to remember its core biological function. So the answer to our initial question, “Why do *Homo sapiens* devote so much time and energy on educational activities?” is: “We have to. It is by means of intentional teaching and learning that we achieve mastery of the suite of behaviours deployed to secure the resources necessary to achieve homeostasis. Other animals do this instinctively; we don't.”²⁴

²¹ These are just particularly vivid examples of complex behaviours animals engage in in their efforts to meet the challenge of homeostasis.

²² Animal infants are often given the opportunity to practice a skill, and an infant might observe an adult performing a particular action, washing a potato in salt water, say; but there is little to no evidence that there is intentional vertical or horizontal teaching and learning in non-human animals.

²³ Measured by the Human Development Index employed by the UN which focuses on life expectancy, morbidity rates, infant/mother mortality rates, nutritional intake, access to potable water, clothing, shelter, security, *education*, and GDP—note that the biological significance of these factors is fairly obvious.

²⁴ Notice that this argument would not be affected if it turned out that another non-human species engaged in educational activities as well. At issue is how we achieve mastery of the necessary suite of behaviours. We must learn them, and so the biological function of education in humans is to meet this need. It need not be unique to our species in much the same way as the function of teeth in humans remains mastication despite the fact that teeth play the same role in other species.

To summarise:

1. For an organism to be viable it must be able to maintain homeostasis (a universal biological imperative).
2. Homeostasis is achieved in animals in significant part by their engaging in a suite of behaviours by means of which they are able to secure their resource requirements.
3. Mastery of this suite of behaviours appears to be innate in non-human animals. That is, the behaviour appears to be channelized as part of the developmental programmes of non-human animal species.
4. The vast majority of resource acquiring behaviour in *Homo sapiens* is *not* channelized.
5. Resource acquiring behaviour is *taught* and *learned* in *Homo sapiens*.
6. A comparison across species brings to attention the fact that education is the master behaviour in the suite of behaviours that forms our species specific strategy for maintaining homeostasis. Education is a species specific phenotypic adaptation.

These observations are likely to meet with favour amongst biologists. Their response is likely to be something like the following: Given the importance of meeting the biological challenge, and given the value and reliability of vertical and horizontal intentional teaching and learning, why do we not find more of it in the animal world?²⁵ But many non-biologists, while granting (1)–(5), will balk at the emphasis of (6). Many will want to say that the fact that we engage in education is the very mark of our profound difference from non-human animals. That we engage in educational activities just goes to show that *Homo sapiens* has elevated itself above the ‘merely’ biological by acquiring culture. Education, they will say, is specifically human, and specifically cultural, and so there is little wonder that it is not found in the rest of the animal world.

There is something profoundly right about this response, and something profoundly wrong. It is right inasmuch as culture and education truly are outstanding features of *Homo sapiens*. But this does not obviate the fact that education is how we deal with the biological challenge—a challenge facing even culture bearing creatures such as ourselves—and that if we desisted from educational activities the *biological*, not just cultural, implications would be enormous.²⁶

A better reply would be to suggest that while education might have been about meeting the challenge of homeostasis in the Pleistocene, it is now about something else, in the same way that feathers, say, might have been used to regulate body temperature when they first appeared, but were then redeployed to aid flight. The reply to this line of thought is to grant that educational activities have been turned to various other uses in the course of human history; nonetheless, these uses must be seen as additional to, and not replacing, the

²⁵ See Caro and Hauser (1992) “Is There Teaching in Nonhuman Animals?” as a case in point.

²⁶ Consider our current numbers. The global population has been able to explode because we have learned how to increase our food production, allowing us to produce enough food to support such numbers. Agricultural innovations are responsible for this. Agricultural techniques of the Roman period, say, would not be able to support current numbers. If we failed to pass this agricultural knowledge on to the next generation there would be mass starvation and our numbers would plummet. Consider our moving from tropical or temperate climates to the much colder parts of the globe. This continues to be possible in our current numbers because we have learned to use fossil fuels for heating, and have learned how to extract fossil fuels from inaccessible places underground, and how to transport such fuels great distances around the globe. If the knowledge and skills involved in all of this were not passed on to the next generation, we could not continue to live in the numbers we currently do outside the temperate zone, leading to mass migrations.

fundamental purpose which remains ever the same. For education is the only way we can master the behaviours necessary to maintain homeostasis.^{27,28}

The Curriculum from a Biological Point of View

The upshot of the preceding section is this: Whatever else educational activities may be for, the *raison d'être* of education is the teaching and learning of behaviour patterns necessary to maintain homeostasis, skills that are innate in non-human animals. But what are these skills that we need to teach and learn? If the preceding section is on the right track, we can assume that these skills are keyed to our resource requirements, so we know that they are the sorts of behaviours that secure food and water, skins or fibres, fuel, and building materials. So at one point in human history, when individuals were far more directly engaged in the procuring of these requirements from the environment than we are today, teaching and learning would have focused on the hunting, gathering and growing of food, shelter construction, etc., etc. But few people today, or for some considerable time, obtain their resource requirements in the way we once did in the Pleistocene, i.e., by engaging in behaviours that put them directly in contact with the external environment. No one today grows all their own food, makes their own clothes out of fibres they themselves have gathered or grown, while also gathering or producing the necessary building materials with which to build their own house, while also mining, drilling or foraging for wood or dung to get the materials with which to heat their house and cook their food. And the reason for this is that meeting the challenge of homeostasis is increasingly a *co-operative* venture in *Homo sapiens*, a joint venture in which a division of labour has reached a very advanced stage indeed. The behaviours necessary to meet the challenge of homeostasis in *Homo sapiens* are now widely dispersed and divided amongst members of our social order. I do not grow my own wheat, say, and grind my own grain, and then bake my own bread in order to have something to eat. I rely on the farmer, the miller and the baker, plus a myriad other intermediaries, each with their own particular knowledge and skills, to produce bread

²⁷ Here I am echoing James' point regarding the primacy of the biological/practical over the cultural/theoretical. He writes: "Deep in our own nature the biological foundations of our consciousness persist, undisguised and undiminished. Our sensations are here to attract us or to deter us, our memories to warn or encourage us, our feelings to impel, and our thoughts to restrain our behavior, so that on the whole we may prosper and our days be long in the land. Whatever of transmundane metaphysical insight or of practically inapplicable aesthetic perception or ethical sentiment we may carry in our interiors might at this rate be regarded as only part of the incidental excess of function that necessarily accompanies the working of every complex machine... I shall ask you now—not meaning at all thereby to close the theoretic question, but merely because it seems to me the point of view likely to be of greatest practical use to you as teachers—to adopt with me, in this course of lectures, the biological conception, as thus expressed, and to lay your own emphasis on the fact that man, whatever else he may be, is primarily a practical being, whose mind is given him to aid in adapting him to this world's life (2014, Ch. 3)."

²⁸ Of course, another way of countering this argument is to deny the factual nature of propositions 1–5, and to insist that they constitute mere "interpretations" of the biological order that one may or may not choose to respect. If adoption of propositions 1–5 is optional, then one can avoid the conclusion by rejecting 1–5. The idea here might be that all alleged facts are products of an interpretive process, and that there is no theory or interpretation free observation. All that needs to be said about this here is that whether props 1–5 are the product of an interpretative process is not to the point. At issue is whether there are mind-independent states of affairs in virtue of which these interpretations are true or false. This is not the place to air arguments for realism in biology. For such a discussion see Boulter (2004). In any case, to counter this argument one must show either that there are no facts of biology because the biological order is not mind-independent (embrace anti-realism in biology), or show that propositions 1–5 are false. Neither follows from the mere fact that 1–5 are the products of an interpretative process.

I buy in my local store. We do not have to do everything ourselves (mercifully) because we now secure the vast majority of our resource requirements from the external environment *indirectly* by participating *directly* in the collective activities of the *social order* to which we belong, an order which touches upon the external environment only at the periphery. To put it picturesquely, the social order is to humans as the dam, web and nest are to beavers, spiders and birds.

It is this social order within which individuals now operate directly that becomes the focus of our attention, for each of us relies on the functioning of the social order to meet the challenge of homeostasis. What are the operations of a social order? Following the lead of sociologist Ernest Gellner, one can take the collective institutions and practices of any social order to fall into three core categories: the productive/economic, the coercive/political, and the cognitive/legitimative.²⁹ A brief word on each is in order here. It is obvious that every social order has to provide for the material needs of its members. It is these productive activities which secure raw materials from the external environment, turn these into finished goods for direct consumption, and eventually distribute these amongst the members of the social order. In addition to a productive/economic sector, every society has to have some mechanism by mean of which it arrives at decisions regarding the collective activities of the social order. This is the politico/coercive dimension of the social order. Finally, every social order has to have a method by means of which it arrives at authoritative knowledge claims about the world in which we make our way. This is the cognitive, or knowledge producing and legitimating sector of the social order. Every social order has to find some way of carrying out these functions, and distinct social orders can be characterised by the different ways in which these functions are carried out.³⁰

Now, viewed from this perspective, it becomes apparent that the ultimate purpose of education *per se* is to prepare individuals for participation in the running and maintenance of the social order to which they happen to belong. With this in mind it becomes clear what constitutes an education, and what needs to be prioritised in the curriculum. First, to be educated just is to have acquired the knowledge and skills necessary to be able to participate in the running and maintenance of the social order to which one belongs. But although what constitutes “being educated” is the same for all, the particulars of the knowledge and skill set to be acquired will be as diverse as the social orders to which individuals belong. Second, achieving competency in the set of practices and institutions that comprise one’s social order is what needs to be prioritized in the curriculum—everything else that is taught and learned are additions to this core of the curriculum.

Now preparing individuals to participate in the running of the social order is in effect to prepare individuals for the workplace. No social order will last if it lacks individuals competent to carry out the functions of the various orders of society. So the curriculum

²⁹ See chapter 1 of Gellner’s (1988). This division of the social order goes back to at least Plato’s *Republic*, but also famously features in Adalberon of Loan’s *Carmen ad Rotbertum regem* where he separates society into the three estates: *oratores*, *bellatores* and *laboratores*. It is also echoes Talcott Parson’s categories of “goal-attainment” (the coercive/political), “adaptation” (the productive) and “integration” (cognitive/legitimative) although it does leave unmentioned Parson’s category of “latency” (motivating individuals to adopt a role in one of these sub-systems). See Ch. 2 of Parson’s (1991), particularly the section entitled “The Functional Prerequisites of Social Systems”.

³⁰ One might want to add a fourth function. It might be thought that every society needs some way of maintaining the order in its existing forms in the three mentioned domains, a ‘stabiliser’ so to speak. There might be a role here for customs, ethics and a legal system. No doubt such a stabilising force is required in a society; but it is not clear that such a stabiliser need be additional to and independent of the political and cognitive aspects of the social order.

needs to reflect this. This is not a matter of conservative political ideology but simply a fact about human societies grounded in biological realities.

But being prepared for the workplace, in whatever sector of the social order, is not yet to be educated. One is *trained* when one has been adequately prepared to take on the responsibilities of a role in the economic, political or cognitive orders.³¹ And while such training is a crucial stage of one's education, it is not the end. For the *maintenance* of the social order requires more than the mere replacement of competent worker for competent worker in all sectors of that order. A social order's medium-to-long-term viability depends on its ability to make appropriate adjustments to changing circumstances in order to maintain and hopefully improve the standard of living of all its members.³² This is the sociological analogue of biological adaptation. But the point for present purposes is that an ossified social order, accepted uncritically, and stubbornly conserved in the face of new circumstances, is destined for the scrap heap of history, and, before it ultimately collapses, will consign its members to less than optimal living conditions. So the curriculum needs to reflect this. This is not a matter of progressive political ideology but simply a fact about human societies grounded in biological realities.

Now the need to be able to make appropriate adjustments to the social order poses a particular challenge, because not all change is in the long term interests of the social order, and by extension, is not in the long term interests of individuals trying to meet the challenge of homeostasis. In order to distinguish appropriate adjustments from policy mistakes the members of a viable social order responsible for introducing changes need to be familiar with the key elements of their current social order and how these elements are interwoven to create a viable (if always less than optimal) whole. It is also necessary that these members be aware of alternative social orders (both possible and actual) and the relative merits of each so as to be in the best possible position to make improvements to the existing order whenever the need/opportunity arises. This, on the view being defended here, is what it is to be *educated*, and it is this which most clearly distinguishes education from *indoctrination*. When one is fully versed in the fundamentals of one's social order, and when one is familiar with the relative merits of alternative economic, political and cognitive orders, then one is in a position to make reasonable judgments about proposed changes to one's social order with a view to the common good. Then, and only then, is one educated.

With these points in mind let us now turn to the social order of Western democratic societies in which the general population has a say via elections regarding how our society is run. Three broad topics come into view as core elements of the curriculum. The curriculum in a democratic society ought to prioritize (1) understanding the fundamentals, as well as the merits and demerits, of representational political systems (and the alternatives as known from other contemporary societies and history); (2) understanding the

³¹ This applies to all professions, from janitor, to hairdresser, to surgeon, to diplomat, to scientist to banker.

³² Two points are worth making here, if only in a footnote. First, whatever one's political stripe, all parties agree that the institutions of our social order are responsible to the community at large and the well-being of all its members. Even neo-conservatives have come to accept that this progressive agenda is now mandatory for any political movement that hopes for electoral success in the West. See Michael William's (2007). Second, while there are outstanding issues to be resolved about what constitutes well-being, the basic non-moral goods or prerequisites are clear enough. The uncontentious elements of human well-being are those adopted by the United Nations Human Development Index as the criteria for measuring social development. These include access to adequate nutrition, potable water, serviceable clothing, shelter, education, health care and security. Measurable criteria of successful national development include increase in life expectancy at birth, decrease in infant/mother mortality rates, decrease in morbidity rates, increase in literacy and numeracy, per capita income and gender empowerment.

fundamentals, as well as the merits and demerits, of exchange economies (and the alternatives, both historical and actual); and (3) a sound grasp of the sciences, particularly the STEM subjects, and scientific method in general—since the sciences play the role of the cognitive/legitimiser in the West (and the alternatives). If one is not versed in these three areas, and matters propaedeutic to these, one is simply not in a position to participate fully in the running and maintenance of the social order—whatever else one may know and be able to do. For our current social order is characterised precisely by its commitment to these three pillars.

The Progressive/Conservative Dichotomies Revisited

I want to end with some remarks on both the merits of, and likely objections to, this biologically based approach to education. In what is essentially a position paper it is not possible to deal with either at any length; but a brief word is useful if only to underline the point that the results of this approach to education are not arbitrary. Nor are they pre-fabricated to suit any ideological disposition that may be at issue between progressives and conservatives.

Perhaps the first point is that this approach allows for plausible distinctions to be drawn between education, training, and indoctrination. As stated above, one is *educated* when one is fully versed in the fundamentals of one's social order and when one is familiar with the relative merits of alternative economic, political and cognitive orders. The mark of the educated person is a particular capacity, viz., the ability to make reasonable judgments about proposed changes to the social order with a view to the common good. By contrast one is *trained* if one has acquired the knowledge and skills necessary to fulfil the responsibilities of a role in the economic, political or cognitive sectors of the social order. Finally, one is *indoctrinated* in a particular domain if one has not been exposed to the possible or actual alternative orders in that domain, undercutting one's ability to make responsible judgments about the merits and demerits of the order to which one belongs.

Second, it goes without saying that literacy and numeracy, being propaedeutic to all advanced study, are crucial components of any sensible curriculum. Nothing on the picture of education being offered here contradicts this truism. More important is that the emphasis placed on the STEM subjects will strike many as entirely appropriate, particularly those whose main concerns are development and employment related. One is simply not an educated Western European if one does not have a grasp of the fundamentals of the basic theories of physics, chemistry and biology, and, perhaps just as importantly, of scientific methodology. However, I also take it to be a point in favour of this picture of education that by its lights there is more to being educated than achieving proficiency in STEM subjects.

Third, the insistence on *economic* literacy will cause alarm, but not because there is any serious doubt that a sound education ought to include this competency. The worries are probably twofold. First, many who consider themselves educated will have to reconsider that assessment, since so few people in Western societies are economically literate. Second, there is the worry that economics is such a contested domain that it will be difficult to determine which economic doctrines ought to be taught, or worse, that a particularly narrow form of "orthodox" economics will become dominant. This is a pressing point, particularly so since the crash of 2008 has raised serious concerns about the state of academic economics in English speaking countries. But this is not a legitimate complaint

against the position defended here, since to be economically literate demands that one be aware of the fundamentals of one's own economic order *and* the alternatives. Similar remarks apply to *politics*.

Fourth, the demand that one be aware of alternatives to one's social order means that there is an obvious place for the *historical* disciplines. Historical studies reveal alternative orders we have previously occupied, and provide the brute data required for comparative judgments. Of course scientific, political and economic histories receive pride of place on this picture of education. For similar reasons comparative studies of other societies (*sociology* and *anthropology*) are crucial if one is to be in the best position to make informed judgments about possible alternatives to one's current social order. This will include alternatives to our current cognitive order, presently dominated by the sciences. To fully appreciate the relative merits of our commitment to the sciences one needs to be aware of other putative ways of knowing that have been, and continue to be relied upon. This means that the fully educated person will have to have some familiarity with traditional *religious* modes of thought if only, as Mill might have put it, so as to more fully appreciate the significant achievement that is enshrined in standard scientific method.

One further discipline is vital on this picture of education, although it might not be immediately obvious. *Philosophical reflection*, at least as traditionally conceived, begins when one notices tensions or outright contradictions in the lines of thought one is pre-theoretically disposed to find plausible.³³ More often than not these lines of thought include basic assumptions that underpin the three sectors of the social order. Assessing the merits and demerits of one's entire social order (particularly with a view to its internal coherence) and making comparative judgments between alternative orders (possible and actual) requires a second-order level of critical reflection which is characteristic of philosophy. Achieving some degree of philosophical sophistication is therefore a necessary element of being educated.

One final point in favour of this approach to education is that it provides an over-arching framework within which these various disciplines find their place and their specific contribution to the educational project. At a time when "inter-disciplinarity" is in vogue, such a framework is potentially very valuable. The relations between disciplines are not always obvious, and it is not always easy to see how all are part of a single intellectual endeavour. The biological point of view offers a way of organising and co-ordinating these disciplines in a coherent fashion.

It is clear that being educated is rather demanding, but again I think this is a point in favour of this picture. Being educated is a matter of degree, and one can always become more fully educated than one already is. But that a level of competence in the productive, political and cognitive sectors of one's social order is deemed necessary to qualify as educated will strike many as plausible. But some more or less obvious objections to this picture of education are not far to seek:

First, on this view education is *not* aimed primarily at individual salvation, personal autonomy, soul making, or the spiritual benefits beloved of the liberal tradition. While there is nothing inherently illiberal or 'anti-progressive' about this view, individual salvation understood in this sense is at best a secondary aim of education as understood from the biological point of view. That said, personal growth and development are more than likely to be achieved, if only incidentally, in the course of meeting the primary aims of education as understood here.

³³ For extended discussion and defence of this meta-philosophy see Ch. 1 of Boulter (2007).

Second, preserving a reasonable degree of civil harmony is crucial to the viability of the social order, and an educational system must recognise this. But civil harmony *per se* cannot be the ultimate goal of education because harmony will have to be compromised, if only in the short term, when, inevitably, changes to the social order are required. Change always disrupts some vested interests, and being able to make sensible judgments about the accommodation and disappointment of competing interests is part of what it is to be educated. This means that *neither* the maintenance of class structures *nor* the promoting of social change *per se* can be taken to be the ultimate aim of education.

Third, on this view knowledge transmission is a crucial aspect of one's education, but it is not the final end either. Knowledge transmission is more about training than education *per se*. For ultimately the mark of the educated person is being able to make sensible judgments about proposed changes to the social order, and this requires not just a knowledge base but critical thinking and evaluative skills which are not simply a matter of information. It is also worth pointing out that not all knowledge is equally relevant to such judgements.

But perhaps most concerning will be the objection that important domains have been passed over. The most obvious perhaps are the various arts. On the view defended here, literature, drama, music, painting, and sculpture are matters of *enculturation*, not education *per se*, unless they are pursued with a view to gainful employment in the entertainment business or some other professional capacity, in which case their study would constitute a form of training. Alternatively they might be taken to be revelatory of social orders other than our own, as one might read the Classics of Ancient Greece and Rome. No doubt this will strike some as an unacceptable result, and some will take it as a *reductio* of the position defended here. The best response to this objection is to insist that there is much of value that is not best seen as a core element of the curriculum. Sport, and other forms of play, is an example of an important life-enhancing activity which finds no natural place in this picture of education. But as long as the term "education" is not taken to be a catch-all, feel-good term which must embrace every life-enhancing activity—from the appreciation of fine cuisine to acquiring a detailed knowledge of the history of ballet—and as long as priorities have to be identified, the mere fact that something of value is not recognised as core to educational activities should not be taken as a *reductio* in and of itself. But most importantly, however "philistine" such a view of the arts might be, it is not arbitrary, nor the result of a subjective value judgment or ideological *parti pris*.

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