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Popper on education

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ABSTRACT
Drawing from the writings of Karl Popper, published over a sixteen year period, this article extrapolates Popper's attitudes to the institution of Education. These attitudes and positions are presented in a synthesis as if they were Popper's own assembled views on education and supported by pertinent quotations. The many attitudes deduced are collated under headings which are helpful for appreciating the range of Popper's comment and the relevance and coherency of his perspective: the nature of education; education and the State; knowledge and teaching acts; knowledge and the disciplines of the curriculum; education and philosophy; language and learning; educational policy and theory. Each section is followed by a critical commentary. A Bibliography of Popper's works is included. There are no published books by Karl Popper which concern themselves with education or which are written with educationists in view as the intended and specific audience. Only four of his very early papers, written in Vienna, deal with matters bearing directly upon educational practice (1925; 1927; 1931; 1932) and the ideas expressed there in German are relatively recondite and have been much developed. Yet Popper's influence on the academic world which produces educationists is immense by any standard, and it is an influence with a dynamic of its own. In one view, Popper's work "has a notably practical effect on people who are influenced by it: it changes the way they do their own work" and "changes their lives" (Magee, 1973: 10).

Nature and Focus of the Analysis

When *The Poverty of Historicism* was first published in 1957 Arthur Koestler wrote that it was "probably the only book published this year which will outlive this century" (Magee, 1973: 13). In 1961 a revised and corrected edition was released. For these reasons this book and 1961 were chosen as the beginning point of this study. *Unended Quest*, Popper's intellectual autobiography, in 1976, marks the endpoint of the period covered, a suitable climax since in this autobiography he reviews and assembles his work in synopsis. *Unended Quest* reveals more clearly that Popper's life's work consists of interconnecting sections of a single framework extending to the whole of human experience.

The list in the Bibliography of seven books and twenty-nine other works, published from 1961 to 1976, was catalogued using Hansen's 'Bibliography of the Writings of Karl Popper' (in Schilpp, 1974: 1201-1287) and Popper's own bibliography provided in *Unended Quest*. It is not easy to categorise these thirty-six publications since each reflects elements of the interdisciplinary approach which Popper adopts in his work and for which he is an outspoken advocate: Eight of the publications have their themes in philosophical history and political science; five in logic; twelve in

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the philosophy of science; six in epistemology; three in ethics; one is autobiographical and one is a reply to his critics. No doubt Popper himself would question this categorisation of his works; it is done here only to throw a little light upon the range of his interests. In these works we see Popper as historian, classicist, linguist, mathematician, logician, political scientist, natural scientist, philosopher, humanitarian, humanist and moralist. It is redundant to add that we also see him as an educationist. This range of works offers the breadth of comment required for a broader analysis of his thinking on education. The reader can gauge from the material itself the relevance of the information resident in the works used.

The study extrapolates and makes deductions from all and any references to education in the published works of the period. It uses the prosopographical technique of the literary historian. The following broad criteria were adopted for the selection of citations for extrapolation. These are criteria amended slightly from an earlier study (Corson, 1980). For the purposes of this analysis, 'education' refers to the specific social act of one relatively active, purposeful individual or collectivity of individuals engaging specifically in the training, instruction or teaching of another relatively passive individual or collectivity of individuals. References made by Popper which include one or other of the following words or words cognate to the following words form the broad basis of source material for the analysis: "education", "training", "instruction", "teaching", and "learning". References which centre on the word "learning" or on one of its cognate forms may seem slightly misplaced in this list. They are included because Popper's attitudes to the process of knowledge acquisition, which is learning, reveal a tension between the activities of teaching and learning which is of interest to educationists. Popper's frequent use of the word "teach" as a metaphor is similarly instructive: When he writes that our "falsifications teach us" or about "the teachings of our trial and error experiences" he is revealing much about his attitudes to teaching and indirectly about his attitudes to the institution of education and its curriculum.

The many attitudes extrapolated have been collated and categorized under headings which are helpful for appreciating the range of Popper's comment and the relevance and coherency of his views. These prose interpretations and interpolated quotations are referenced by footnote back to their primary sources which are listed in a Bibliography of Popper's works for the period. At the end of each headed section I attempt a critical overview of Popper's views.

An Autobiographical Note

For more than a decade, prior to accepting his first academic post in New Zealand, Popper was intimately engaged in teaching and with teachers. Indeed these early associations were critical ones for his later scientific views and for his epistemology (Bartley 1974). His formal training was in education and in Gestalt psychology, under the supervision of Buhler. It is possible to draw a direct connection between the trial-and-error approach to teaching and learning, that was common in Vienna at that time, and Popper's use of error elimination as the central idea in his epistemology: i.e. knowledge grows by a process of conjectures and refutations, by a method of trial and the elimination of error.

Concurrent with school teaching Popper began his formal career as a philosopher, beginning to publish in earnest and having contacts with the vital Viennese philosophical movements of that time. In 1936 he and his wife resigned their school teaching positions for Popper to accept a lectureship in New Zealand, which he held from 1937 to 1945, teaching philosophy (and teaching himself Ancient Greek in order to gain unfettered access to the roots of western philosophy). In 1946 he moved to England where he spent the last twenty-three years of his academic career at London University, as Professor of Logic and Scientific Method at the L. S. E.

The Nature of Education and Schooling

True education is reflexive. We teach ourselves by conjectures and refutations. This idea of 'self-education' is not a contradiction. Intellectual self-education was regarded by Immanuel Kant as self-emancipation through knowledge. It was his most important teaching, one which he exemplified in his own life. This self-emancipation is an indispensable task for a philosopher; it demands immediate action here, now and always; it demands criticism of one's own ideas and detachment from them. Formal education as it has been practised is not always benign to the intelligence. Emancipation through knowledge may occur in spite of formal education, not because of it. Kant's period of tutelage he called "the slavery of childhood". Formal education can sometimes lead to a lack of courage in using one's own intelligence.[1]

The basic principles for those of us charged with educating others must be: "'Do no harm' (and, therefore, 'give the young what they most urgently need, in order to become independent of us, and to be able to choose for themselves')". These aims, though modest, are rarely realised. Too often corrupting values are acquired through schooling. The duty of teachers is not to impose their scale of values upon their pupils; it is "to stimulate their interest in these values".[2]

The demand that people be allowed to think for themselves accompanied the development of the open society. The legacy of those who favour the closed society, by insisting that success should be worshipped, has distorted our intellectual and ethical education: "It is perverted by the admiration of brilliance, of the way things are said, which takes the place of critical appreciation of the things that are said" and done. "We are educated to act with an eye to the gallery", and "it is under the influence of such romantic ideas that individualism is identified with egoism … and altruism with collectivism". Our ethical education needs to turn us away from the romantic historicist morality of fame: "we need an ethics which defies success and reward", even the reward of posterity, (although this is slightly higher on the scale of values than is reward in the present). Sacrifice, for the sake of our work, is a value which should be an aim of education, since work itself is its own justification (even though there is a reasonable need in us all for encouragement, hope, praise and also blame).[3]

We need to change our conception of a 'liberal education'. It is not a form of schooling devised for the leisured dilettante. A contemporary liberal education which does not promote students' interest in science isolates them from a singular development in the history of human affairs: "science can be taught as a fascinating part of human history - as a quickly developing growth of bold hypotheses, controlled by experiment, and by criticism". A liberal education with science at its centre would not produce scientific experts; it would produce graduates who are equipped to distinguish the fake from the genuine.[4]

It is the process of eliminating errors from our most strongly felt theories that is central in learning. Direct teaching, such as lecturing, which lacks this process of self-criticism, does no more than challenge and sometimes provoke. The acquisition of knowledge at the individual level is only the result of modifications made to our theories in the trial-and-error process of learning: "we try to solve our problems, and to obtain, by a process of elimination, something approaching adequacy in our tentative solutions".[5]

Critical Commentary

Popper's views on 'the nature of education and schooling' derive their major premise from his own central epistemological claim: that we acquire knowledge through our attempts to refute our own theories about the world. This belief and its ramifications constitute, for Popper, a 'learning theory' which is fundamental to many of his views on education. Yet it is a matter of public record that education proceeds, in all parts of the world, following methods and curricula that derive their premises from learning theories other than this one. On the evidence of the first hand experiences that educationists

have had of children, most would argue, for example, that learning by induction is a common approach that children adopt for themselves in their learning: in conceptual learning, for instance, children from their early years gather exemplars of a concept in order to understand its meaning and will extend the concept to include borderline exemplars and even non-exemplars if this inductive process is consistent with the notional 'rules of inclusion' that seem relevant in making their selections. On the evidence then, the conjunctures and refutations view of Popper's cannot be taken as the sole learning theory in education, unless its relevance is more fundamental than I have so far indicated. The distinction that needs to be made, I believe, in order to see the true relevance of Popper's view is between conscious and unconscious learning. At the public and conscious level of learning, induction (for example) is an apparent alternative to conjecture and refutation; at the unconscious level, at a level of deep structure, even learning by induction though may filter through a trial-and-error learning mechanism of the kind that Popper implies. I return to this much 'deeper' question in a later section (under 'Language and Learning'). For the moment it is enough to say that Popper's view about an overriding learning theory for education could be a radical one indeed: if accurate it would overturn many accepted educational practices when carried to its logical conclusions.

Popper offers his own reasons to explain why his 'modest' aims for education (i.e. "Do no harm…" etc.) are 'somewhat remote': "The very number of pupils makes all this impossible in our schools" (The Open Society and It's Enemies, Vol. 2, p. 276). This seems to me to be only one of many good reason we could offer in advocating smaller schools and smaller class sizes in education. Moreover Popper claims that because of the impersonal nature of 'contemporary' education (education of about a generation ago) attempts by teachers to impose higher values upon pupils are not only unsuccessful, they actually lead to 'harm', and contradict the basic aim that he offers. There is an influence from Bertrand Russell, I believe, in these Popperian aims for education. Russell advocated applying the 'null hypothesis' in education: we should do nothing in case by doing the wrong thing we do great harm to children. This is a salutary cautionary word, issuing both from Russell and from Popper; however it seems to me that in our knowledge of child development, in our available curricular strategies and in the improving education of our young teachers we have the makings of 'an education' in the future which could be benignly and increasingly interventionist without risking the harm that certainly did arise in the past and may still arise in the present. To do less, except with the most able and the most advantaged (where non-intervention may be efficacious), is to risk 'depriving the deprived' by discriminating against those to whom an enlightened education can offer so much. Popper's view, in this instance, is simply out of date.

Chief among the 'non-corrupting values' that Popper believes should be aims of education is the development of the view in children that work, whether the work of the mind or of the hand, should be viewed as an important good for its own sake, and not solely be regarded as an instrument towards some other value such as success as reward. This is a view which I have expanded on myself (Corson, 1985b) and to which I think we are inevitably committed as educationists: the argument I adopt, briefly, turns on the claim that if we distinguish 'education' from 'training' and see the former as a process of schooling designed by people who view that process as initiation into a worthwhile from of life, we will show regard in education for work as an intrinsically good component of that worthwhile form of life, because work is a part of the normal and necessary range of a life of human activities. Consistent with Popper's view, then, we will encourage students to view work as craftsmen view their craft, whether that work be the work of a job or recreational 'work'. Curriculum recommendations derive from these claims (Ibid, pp. 292-299). The practical difficulties in this recommendation do not escape Popper, however: the processes of schooling that remain commonplace ones militate against establishing and promoting this aim, since the ubiquitous use of competition as a motivating force in schooling promotes "a morality of fame" in students which highlights rewards outside the work activity itself. The corollary of Popper's view, then, is that educationists need to find techniques of pupil motivation that are non-competitive ones if his ethical pronouncements can be truly brought to bear on practice.

In moving 'science' to a place at the centre of his ideal curriculum, Popper offers an argument that is a compelling one (provided that we first Accept his epistemological claims): the history of science is a history of Criticism, of iconoclasm, of bold hypotheses overturning dogmas and prejudices; an education

which focusses on this history will training the critical and iconoclastic faculties of the young. However, the history of science also included a history of closed-mindedness and the frequent misplaced defence-against-criticism of celebrated vested interests. Moreover the teaching of science has regularly been, as Popper admits, the authoritarian transfer of a body of received knowledge, with pupil criticism and conjecture playing little part in that process. In urging this educational reform, Popper is implying not a mere shuffling of curricular priorities, then, but a radical renaissance in approach, aim and interpretation; he wants a curriculum that above all else promotes criticism and constructive scepticism. This recommendation, though worthy, is also a worrying one: how far down the curriculum would Popper go in introducing this change? An education for the young which teachers them to question all received knowledge might promote universal scepticism, even a community of cynics: Everyday ideas and 'accepted' theory need to be acquired and understood by children well in advance, it would seem to me, of their learning to question those ideas and that theory?

The section concludes with a restatement of Popper's fundamental learning theory, to which I return below. He uses this theory to attack the central methodology of didactic education: direct teaching. This is an attack that can be sustained, I believe, if we view direct teaching in the light of Popper's theory of learning: plainly lectures on this account do not promote growth of knowledge in their audiences since they do not falsify the theories of those upon whom they are inflicted; they do not address the theories of recipients, since our theories are fairly idiosyncratic and cannot be precisely known to lecturers; the attempt to change theories, implicit in direct teaching, is a futile one then. If Popper is correct in his learning theory, then it seems to follow unavoidably that didactics is a rather irrelevant method of schooling that is quite alien to the nature of true education. On the other hand, though, it may be the case, if Popper's learning theory is not generalisable, that direct teaching is only inappropriate for some learners, namely those who learn manually by Popperian trial and error. The only 'evidence ' that we have from Popper himself of the inadequacies of direct teaching (Unended Quest, pp. 31-32; 39; 40; 74; 124) are the accounts of his own first hand school experiences of those inadequacies, experiences that antedate the formulation of his learning theory. If his learning theory is not watertight, then direct teaching may be inadequate as a methodology of learning only for Popper himself!

Education and the state

"Liberalism and state interference are not opposed to each other. On the contrary, any kind of freedom is clearly impossible unless it is guaranteed by the state". A degree of state control over education is necessary to ensure that young people do not suffer from a neglect which will in turn deprive them of the ability to defend their freedom. School systems and their facilities need to be open to all. On the other hand too much state control equips the State with the means of indoctrinating the young, which is inimical to freedom. There is a deeply rooted prejudice that the only alternative to laissez-faire in education is full state control. There is a middle course. The State does have protective functions: to see that citizens are given an education which allows them to take an unrestrained part in the affairs of their community; to see that citizens can avail themselves of opportunities to develop their special talents; and lo see that the higher levels of education are available to all regardless of wealth. On the other hand there are areas where the State has fewer prerogatives: over the moral life of its citizens; over the registration and accreditation of teachers; and over the stipulation of a common curriculum. Intellectual freedom, which is the most precious form of freedom, is put at risk if the State exercises the latter prerogatives too exclusively. The manipulation of a curriculum by the State is tantamount to rigid censorship. It is characteristic of totalitarian education. The educational programme which Plato proposed has a similar intention to that provided in modern totalitarian systems; they aim to train a warrior class who are kept in a state of intense and continuous mobilization by their education.[6]

The totalitarian planner will try to use education as a means of controlling and stereotyping interests and beliefs so that centralized power can be wielded more effectively. This form of tyranny though tries to exercise power where it cannot be exercised. It is a use of education that is incompatible with the free expression of critical thought. In using education to forestall criticism of centralized and forced change, totalitarian planners use education to destroy knowledge not to disseminate it. Mono-ideology must not be the product of education: "Such a possibility may perhaps be counteracted by discussing a further set of social institutions, such as educational institutions, to discourage uniformity of outlook and encourage diversity".[7]

Access to education is access to political power, especially if that education is a specialized training in the art of oppressing those without access. This education is obviously a powerful political weapon. A caste State is maintained in part by inequalities in education. Whether the prerogatives of the ruling class in a society are based on wealth or on some other standard, any class prerogatives in education are a social evil.[8]

The group spirit of tribalism, which is a characteristic of the closed society can be revived even in a relatively open society to arrest change and to protect the prerogatives of a ruling class. Education is often an instrument for tribalism A major function of 'higher' education since Plato's day has been 'to put a mark on the rulers" and establish "a barrier between them and the ruled". In the tribalistic sense, this barrier sets aside mystical 'medicine men' who exercise political influence by their possession of political 'medicine'.[9]

Critical Commentary

The 'middle course', outlined by Popper, in the matter of State control in education, seems a very reasonable one. A.s a guide to policy-makers operating at a quasi-political level he offers plausible alternatives to the black and white views that often taint debates about State-interference and State-aid in education, It is possible to follow a middle path in a liberal democracy; it is Popper's view that it is also necessary to do so in order to sustain that liberal democracy. As a substantial bulwark against encroaching totalitarianism and mono-ideology Popper offers the very diversity of higher educational institutions itself as being consistent with the needs and the reality of liberal democracies: Rather than just providing us with an uneconomic and cumbersome network of ungovernable organisations, Popper sees this very diversity itself as a chief deterrent of the closed society. He may be making too much of this claim, however contemplation on and experience of the alternative as it exists in closed societies suggests that the view has much merit.

His attitudes to 'class prerogatives' in education derive ultimately from his celebrated and hostile interpretation of Plato's social programme, out lined in The Republic, for an ideal Athenian city state. Access to education, in Plato's utopia, was certainly to be determined on the basis of class prerogatives, with education unequally available, and with schooling for the privileged directed in large measure towards maintaining a rigid and conservative caste society. There is a tension in Popper's views here though: He argues that even if the intellectual or educational superiority of one or another group in society can be determined, then this establishes special duties and responsibilities for those deemed superior, not special prerogatives for them. I am left wondering where the sociological boundary lies between duties/responsibilities and prerogatives: Many members of the intellectual 'caste' in liberal democracies often see their diverse professional roles and functions as 'duties' owed to society; while an objective outsider might see the occupation of those roles and the special form of education that precedes it as a straightforward prerogative, and as an illiberal one at that.

'Tribalism', as a characteristic of closed societies and as an ever-present Threat to open ones, is a common theme of Popper's. He sees it rearing its head in a variety of places: in the public school system of England; in privileged universities; in the Boy Scouts Movement; in the Hitler Youth; and in the role of 'tribal priest-kings' to be filled by Plato's philosopher rulers. He extends his view of 'tribalism' to include the specialist knowledge which sets the recipients of higher education apart from the rest, which seems

rather inconsistent with his well-known hostility expressed for sociologists of knowledge (The open Society and its Enemies chpt. 23) who often argue exactly along these lines.

Knowledge and Teaching Acts

"There is only one element of rationality in our attempts to know the world; it is the critical examination of our theories". The rationalist tradition embodies a practice which arose in Ionia and lives on in modern science: "the tradition of critical discussion", which is the only practicable way of expanding our now edge. It proceeds by way of conjectures and refutations and requires a teaching approach which actively encourages criticism. Dialogue is its central methodology, though not necessarily from the outset. Critical discussion in the teaching environment can arise when the teacher is struck by the pertinence of some questions asked by a pupil, albeit with no critical intention.[10]

The optimistic but false epistemology of Bacon and Descartes, that 'Nature is an open book' and that people's inability to see truth is due to prejudices inculcated by education and tradition, is hard to reconcile with any attitude of tolerance. Curiously though this 'bad idea' inspired the development of the open society and the demand that people be allowed to think for themselves. Even Plato contributed to this benign but false theory of knowledge in his *Meno* when he had Socrates help an uneducated slave boy to discover his own truth, his own knowledge. The Socratic teaching act - the art of maieutics - is an educational methodology which 1s essentially egalitarian. It assumes that anyone can be taught real knowledge, wisdom and even virtue through an approach of non-authoritarian questioning. It is a process of liberating the mind from prejudice, of learning self-criticism, and of developing respect for the elusiveness of truth. Maieutics does not aim to teach content or belief but to purge false beliefs; to teach us to doubt our own convictions in order to see the essence. In using this nonauthoritarian teaching act teachers need to display themselves that same self-criticism which their uneducated students lack. Said Socrates: "Whatever authority I may have rests solely upon my knowing how little I know". Vet this most democratic of all teaching methods has the same aim and the same shortcoming as the Aristotelian and Baconian method: it is learning by induction, a procedure which uses generalisations from one or more instances of some conjunction of characteristics to infer that the conjunction obtains universally. This is similar too to the Cartesian method of systematic doubt. In each case there is recourse to an authority, whether it be the authority of the senses, or of the intellect, the authority of religion or of some other tradition. Each of these authorities though is fallible. This fallibility leaves the problem of knowledge open to the charge that human knowledge is all idiosyncratic whim and arbitrariness. There is an answer to this: "there are all kinds of sources of our knowledge but none has authority". Critical examination of the facts has priority over the sources of the facts.[11]

Critical Commentary

From the Ionian school of ancient philosophers, through Xenophanes, Thales and Anaximander, Popper traces the development of the 'critical tradition' which he believes created a Western civilization based upon science. He argues that the Aristotelian doctrine of episteme, of certain knowledge, interrupted this tradition only to have it revived, notably by Galileo and then by Einstein. Teachers in this tradition avoid the 'teaching act'; they move away from an authoritarian central position and encourage a conjectural spirit in their pupils. Even Socrates, one of Popper's philosophical idols (along with Kant), erred in his otherwise benign teaching approach: firstly by allowing induction to play a part in the maieutic act; and secondly by allowing epistemic authoritativeness to enter into the learning process. What Popper- leaves us with then, as educationists, is sadly no proper choice at all: the broad choice that we always thought we had between the didactic method (see above) and the socratic method is a choice only between opposite sides of the same coin. Which of the two is less contrary to Popper's theory about the growth of knowledge Popper's answer- is that while Socrates was wrong, he was more admirably wrong than the

didacticists: at least his approach demonstrates to students a self-criticism which is educationally efficacious. Once again, though, I ask: how far down the curriculum would Popper go in inserting his reformation of methodology? Promoting systematic doubt in the young risks creating systematic cynicism. It would take a teacher of genius, like Socrates, to urge pupils to be sceptical of epistemic authority and still retain his own status for them as a teacher. An extended quotation indicates the impracticality of Popper's recommendation:

> *The uneducated seems thus to be in need of an authority to wake him up, since he cannot be expected to be self-critical. But this one element of authoritarianism was wonderfully balanced in Socrates' teaching by the emphasis that the authority must not claim more than that. The true teacher can prove himself only by exhibiting that self-criticism which the uneducated lacks (The Open Society and its Enemies Vol. 1, pp. 129-130)*

What Popper is after is perhaps possible on a one-to-one tutorial basis, but not in a classroom of 30 seven, twelve or sixteen year olds. The corollary of Popper's attitude is, once again, that recent and contemporary education may be badly misdirected and perhaps largely miseducative.

Knowledge and the Disciplines of the Curriculum

A discipline is a fairly loose cluster of theories which undergo challenge, change and growth. It is theories rather than subject matter which constitute a discipline. There is a naive belief that there are such things as 'physics' or 'biology' 'philosophy' or 'archaeology'. "But subject matter, or kinds of things, do not I hold constitute a basis for distinguishing disciplines. Disciplines are distinguished partly for historical reasons and reasons of administrative convenience (such as the organization of teaching and of appointments) and partly because the theories which we construct to solve our problems have a tendency to grow into unified systems". There is a tradition of believing that a theory must proceed from a definition of its own subject matter and that it is this enclosure of a subject matter which allows one discipline to be distinguished from another. These distinctions are relatively trivial however. ''We are not students of some subject matter but students of problems". Problems are interdisciplinary and demand an interdisciplinary analysis. Problems may 'belong' to one discipline or another since they may arise from discussion peculiar to the theories or traditions of one discipline or another. This is not to say, though, that discussion about problems belongs to one discipline.[12]

The "myth of the framework" proposes that rational and worthwhile discussion is impossible where there is no common framework of basic assumptions or no agreement on conceptual bounds for the discussion. A discussion without framework may be difficult, as will be a discussion where there is only a little common ground; hut its fruitfulness will be increased immeasurably because participants are in a position to learn more from it; their intellectual horizons are more likely to be extended. Breaking through the barrier of a framework is a discovery akin to learning a foreign language and being able to use it to interpret the culture of its origin. It imposes another prison upon as, but it is a much larger and wider prison which we can again examine critically and again escape from. The act of breaking through a framework is not a matter of routine: it demands critical and creative effort. "Those who have learned only how to apply some given theoretical framework to the solving of problems which arise within this framework, and which are soluble within it, cannot expect that their training will help them much in another specialism". By wrestling with broader problems, whose understanding, clarification and formulation prove difficult, we are compensated for our efforts by gaining an understanding of fields far beyond our own specialism.[13]

Modern graduates are not truly educated if they are not interested in science. Science is not divorced from human affairs: it is one of the most important spiritual movements of our day. Without a contact with science, school graduates are left ignorant of "the most remarkable development in the history of human affairs". Arts Faculties in their present form are obsolete if they concentrate their students' attention on literary and historical studies which exclude a history of mankind's

intellectual struggles and achievements. A history of ideas is no history at all if it avoids scientific ideas. A more serious effect of an education divorced from science is that it often fails to produce intellectual honesty in its graduates. A graduate spared the experience of erring is unable to see the place of trial and error in expanding the frontiers of knowledge: where it cannot produce experts, the inclusion of science in a liberal arts curriculum will have as its aim "to produce at least men who can distinguish between a charlatan and an expert".[14]

Yet the sciences, if taught as technologies, can run counter to the spirit of humanism. The tradition of humanism is a tradition of criticism and reasonableness which is concerned with the growth of the human mind. It depends upon individuals identifying standards of objective truth and rational criticism. These standards allow people to move from the subjectivism and voluntarism of our animal past to a moral and intellectual responsibility which is inconsistent with the romantic and irrationalist philosophies which snare the unwary. The 'humanist' approach to the disciplines has an educational priority. "I admit that the natural sciences are in danger of stifling mental growth, instead of furthering it, if they are taught as technologies (the same is probably true of painting and poetry); and that they should be treated (like painting and poetry) as human achievements", as a part of the history of human ideas and the criticism of those ideas.[15]

Answers have been offered to the question: what is the use of history? One response has been to argue that history has special educational value for the political training of statesmen or generals. Among the Stoics, history was regarded as a means of moral education. This is a valuable interpretation of the place of the historical disciplines and it is relevant to the education of statesmen and generals as well. However, experience teaches us that peoples and their leaders learn very little from history. In consequence history has become the domain of the professional historian. To counter this development a pluralistic approach is needed. History's interest rests in its attempts to resolve interesting historical problems, such as the causes of war. Informed interpretations, offered as answers to problems, are essential information for politicians and for anyone who wants to understand the world. More than this, history can encourage us to understand people and situations previously unencountered. The methods of history are much more like the methods of science than historians think. In both we start from myths - prejudices filled with error - and we proceed to eliminate errors critically. Evidence corrects our mistakes, changes our theories. New problems are raised, conjectures are made and the process of myth-debunking begins again.[16]

In training researchers teachers advise them badly if they urge them to observe and start afresh. As in the study of philosophy, so too in science there is a need to study the problem situation in context. This demands an engagement with the issues people. are currently discussing, with the lines of enquiry which are currently proceeding, and with the theoretical frameworks which are available. Teachers advise beginning researchers well if they urge them to stand on the shoulders of their predecessors; to check and criticise the scientific tradition. Progress results.[17]

Critical Commentary

Popper's discussion about the nature of a discipline, that opens this section. seems quite reasonable and unexceptionable: Would even the narrowest of disciplinarians query the view that if we are to solve real-world problems they are best viewed [ran the widest possible range of perspectives? Yet Popper's claims, which argue against our tendency to reify disciplines, lose their point and impact in practice because they threaten vested intellectual interests: it is not 'illogical' nor 'impractical' to follow his conclusions into practice; to do so "may be a danger, though, to the steady state of established norms and values and of entrenched opinions which the intellectual world of education is. If we accept, at least in part, the view advanced by Bernstein (1975), and other sociologists of the curriculum, that the way classifications and frames of knowledge are organised in school systems is in some important respect a direct reflection of macro-social arrangements and historical forces, then we can see more clearly the real world situation that militates against widespread acceptance of Popper's views: his proposals that disciplines are 'unreal'

and that the distinctions between disciplines are trivial, threaten not just the vested interests of the educational institution itself, but also the social arrangements in the very society in which that institution is embedded. Bernstein warns that once the structure of a curriculum has been changed from a 'collection code' to an 'integrated' one, in which structures and distinctions between disciplines are blurred, then the power structure in the social institution changes accordingly: On one level a mismatch may be caused between that institution's structure and wider social arrangements; and on another level the movement towards integrated codes may offer symptoms of a serious moral crisis in the wider community. Indeed, on this account, Popper is opening a real can of worms when he urges that we take disciplinary boundaries less seriously and abolish the 'myth of the framework', should this become a general policy. However at the individual level there is great merit in Popper's proposals: Much of my own research (Corson, 1985c) has been concerned with advancing a cross-disciplinary theory in education and in the language disciplines (i.e. philosophy of language, sociology of language, psychology of language, general linguistics and anthropological linguistics) using as a guide a Popperian epistemology (Corson 1985a). This task has proved a harrowing one for me: not for reasons of difficulty in integrating data and concepts from different realms of discourse (although this has been complex enough); but because the work, in its early stages, was regularly misunderstood or not taken seriously by workers and journal editors enmeshed in the framework of one or other single education specialism or language discipline and who took exception to strange data and concepts from other realms being introduced into their own. In spite of this, the theory has matured and it does have explanatory power in its developed slate which it would not have had if it were not cross-disciplinary. This leads me to conclude that Popper's claims as well as being reasonable, are practical at a personal level in at least one area of research and teaching, provided that the research itself is firmly grounded in all the relevant disciplines and is not just a dilettante approach drawing superficial inferences from an inadequate understanding of various subject matters.

My comments under an earlier heading on the place of science in the curriculum apply equally well to Popper's views on science in this section. The problem of incorporating the natural sciences into a humanist curriculum leads Popper to draw a facile analogy between the sciences, and painting and poetry. On the one hand his point is well made that painting and poetry, if taught as technologies, would stifle rather than advance pupil achievement. I believe that the main justification for the inclusion of these items in the curriculum, though, is because they have established themselves within our culture as rich expressions of the creativity, imagination and emotion that are characteristic of what it means to be human. To suggest that painting and poetry could be taught as technologies in a general curriculum is absurd, since the technicians' skill is aimed at controlling for the distractions of creativity, imagination and emotion; a student skilled technically in 'painting' and 'poetry' would have acquired little of painting and poetry. At the same time, however, science can be approached as a technology; mastering science requires that scientists be technically expert, and it can be no other way if true mastery is to be achieved.

I think that Popper's claims about the centrality of science in a humanist Curriculum are romantic nonsense. If his 'science' is to appear in the curriculum, stripped of its technology, then it needs to be brought in under a different rubric altogether: either as a branch of history of ideas or of philosophy. Students are more likely to acquire the critical spirit that is characteristic of a humanist education if they are confronted with the great developments of science set firmly in the context of the historical, moral and social forces in which those developments were originally and intricately embedded.

Popper's views on history fall into two categories: those that relate to history's use; and those that relate to its methods. His views on history's use or point betray a rather jaundiced perspective that he commonly brings to discussion in the humanities and social sciences, a perspective which colours the 'use' which he is prepared to attach to that range of disciplines. There is some explanation for his prejudices against history: Popper as a man of Jewish descent living in Vienna and with left-wing leanings lived through terrible times in the recent history of the world and was in close proximity to great suffering: he concludes that history teaches people very little since, for humanity, things seem not to be improving. He bypasses in this claim some obvious objections to it however: members of interpretative professions, such as journalists, find great hermeneutic support, as individuals, in their understanding of patterns of

change in history, even while accepting the randomness of it all; also students of history, as individuals, find in it a vicarious diachronic alternative to the obvious difficulties presented by the methods of anthropology and sociology for studying distant cultures and societies synchronically; and finally Popper himself, as an individual, displays great benefit accruing to his work through his historical analyses of science and philosophy.

Can Popper seriously deny that this 'use' of history that is made of it by Individuals does not filter through and influence peoples in general? Popper is excessively pessimistic about the capacity of history to teach us things, especially if we take into account too, his views on the methods of the historian. Here he seems to be on much more solid and acceptable grounds: He regards the methods of history, quite reasonably, to follow a course akin to that which he has identified for theory development in science: we begin with a tentative theory about the past, which is a response to some problem or other, filled with conjecture, with common-sense judgements and even with prejudices. Our task, as historians, is systematically to eliminate error from that tentative theory until it 'roves its mettle' and becomes the best available interpretation of past events. It remains, like all theories on Popper's account, always susceptible to -refutation by new tests of truth that might be designed or that might a-rise f-rom the sifting of evidence from the past.

Finally Popper's comments on training young researchers modify his abovementioned claims on the integrity of disciplines and their subject matters. In urging that we abolish the influence of the myth of the disciplinary framework, he is not suggesting that we ignore frameworks entirely, only that we learn to disregard them when the need arises. Plainly, as beginning researchers, we must stand on the shoulders of our predecessors, and these predecessors will mainly be expert within one or other discipline. It is the next step in research that especially requires an interdisciplinary approach: In our designing of rigorous test statements to be applied to our theories, theories perhaps developed within only one discipline, Popper urges that we bypass no subject matter from any discipline that may be relevant to the problem situation.

Education and Philosophy

The case against specialization in the sciences is a strong one, but the case against specialization in philosophy is even stronger. Yet we approach even the teaching of philosophy by presenting it as a specialism. The conventional method of teaching philosophy is to give the beginner the primary source material: the works of the great philosophers themselves. We assume in this that beginners are unaware of the history of mathematics, cosmology and other sciences, and of politics, but that these things will be 'acquired' in the process of reading. The conventional method in this way disguises the relevance of abstractions in the primary sources: "Thoughts and arguments are put before his mind which sometimes are not only hard to understand, but which seem to him irrelevant because he cannot find out what they may be relevant to". Beginners' experience in philosophy, as a result, may lead them to a superficial grasp of its importance or to a pretentious display of understanding or even to self-deception. Students need to study in advance the problems underlying the abstractions in the writings of the great philosophers: they need a wide acquaintance with the mathematical and scientific issues which the great philosophers found urgent and unavoidable. An engagement then with the extra-philosophical context is a prerequisite in the education of philosophers if they are to understand the problems which inspired the great philosophers.[18]

'With Aristotle, Platonic philosophy gives up her great aspirations, her claims to power. from this moment it could continue only as a teaching profession ... an annex to the traditional education of a gentleman": Philosophy moved from a barren preoccupation with power then towards the equally barren province of the dilettante. Philosophical speculation became a part of a gentleman's leisure, a method of whiling away his time, a part of 'the good life'. Aristotle's concern for 'the good life' though was not an interest in a life of good deeds. "But this interpretation is a mistaken

idealization of Aristotle's intentions". Neither Plato's nor Aristotle's conception of the task of the philosophy teacher lends worthwhileness to its practice. Professional philosophy had an inauspicious beginning in establishing a role for itself. Socrates though was to find momentous purpose in his work, in championing the open society; after Socrates, David Hume is perhaps the most candid, modest and rational of philosophers. Yet Hume's doctrine that reason is and ought to be the slave of the passions is a frightening one. The opposite is the case. Mankind's hope rests in its ability to use that limited reasonableness which it possesses in order to tame the passions. Even Kant, an admirable and original philosopher, failed to solve Hume's problem of the rejection of reason. That failure and others vindicate the judgment that academic philosophy has not done too well.[19]

Critical commentary

An extensive discussions on the nature of philosophical problems is offered by Popper in support of two theses: that philosophies which have forgotten their extra-philosophical roots are much ado about nothing; and that extra-philosophical roots are easily forgotten by those who 'study' philosophy instead of being forced into philosophy by the pressure of non-philosophical problems: His arguments for these theses are detailed ones: they are beyond the scope of this paper and this writer either to summarise or analyse. Suffice to say that perhaps Popper has erected a straw man here in attacking academic philosophy as too specialized a field: my experience in universities suggests to me that the problem is not one of broadening philosophy to include within its problem situation other areas of enquiry; rather it is to inject philosophy into the theories devised in other areas as responses to their own problems.

His discussion on the inadequacies of 'professional philosophy', from Plato And Aristotle through to Kant, is presented here in the briefest of outlines only. It is quite relevant to education and Popper's attitudes. Again I dodge the task of offering a major commentary upon Popper's views; my own views would be as idiosyncratic as his are. The reader is directed to his extensive statement on the subject in the The Owl of Minerva.

Language and learning

"My main point was that the dogmatic way of thinking was due to an inborn need For regularities, and to inborn mechanisms of discovery; mechanisms which make us search for regularities". The dogmatic way of thinking grows from an innate need for discerning regularities; from mechanisms which direct animals to discover settled routines and the 'thingness' of structural invariants of the environment. In their early thinking children search for these regularities, seeking variation as they mature but even then often within a limited and largely anticipated framework. They learn about their environment by the dogmatic formation of expectations, which are their theories critically checked by the gradual elimination of error. Limitation is one special form of dogmatic discovery learning. Learning by practice is another; it is not pure repetition. Rather it involves the elimination of error until the action or reaction becomes automatic and is performed without attention. On the other hand it is too simple to postulate a general learning theory which suggests a dogmatic phase followed by a critical phase: Language learning proves an exception. It involves the discovery of regularities and rules in response to innate dispositions and needs. "Moreover the child's learning of a language is almost entirely an instance of learning by imitation. Yet reflection on various biological aspects of language show that the genetic factors are much more important". In all learning though there is a need for some dogma, some expectations or regularity of behaviour to be formed before error elimination can begin to operate. Passive experience does not exist. Even at its earliest, learning is a modification, confirmation or refutation of inborn expectations and latent knowledge. We learn by finding answers to questions which have their roots in our existing knowledge; by conjecturing and refuting. In any of the senses of the verb to learn - 'to discover', 'to

imitate', 'to make habitual' - discovery, of a trial and error kind, is proceeding. Even the act of making 'knowledge' habitual contains some discovery and prepares the way for later discovery.[20]

"We have reason to conjecture that there is an hereditary basis to our decoding skills''. We learn to decode so well that every skill, like reading a book, becomes 'direct' or 'immediate' to us: it is done without consciousness in spite of the complicated process which the mind is performing. Mistakes occur, especially during learning or in unusual contexts, but there is certainty enough to assume that the decoding functions are amongst our inherited faculties.[21]

The bucket theory of the mind, in any of its forms, including Aristotle's notion of the 'tabula rasa', is naive and mistaken. Yet its influence remains a wide one. We do not receive all our experience from information received through the senses. In addition to knowledge in the subjective sense, consisting of dispositions and expectations, there is also objective knowledge, consisting of linguistically formulated expectations submitted to critical discussion. The bucket theory sees the acquisition of knowledge as largely a passive process. It must be clear though that most of our dispositions are inborn, either in the sense that they are present at birth (breathing, swallowing) or in the sense that the environment elicits the development of the disposition (language learning).[22]

Human language and human thought evolved together, in mutual interaction. A thought, once formulated in language, becomes an object outside ourselves, capable of criticism and therefore part of the world of objective standards. It becomes an objective representation of the contents of our subjective thought processes. Only when expressed in some language, can thought contents stand in logical relationships to one another such as equivalence, deducibility or contradiction. The argumentative function of language is a vital one because it underlies all critical thought: it is only through language that deliberate criticism occurs; criticism presupposes objective knowledge in the form of linguistically formulated and linguistically falsifiable theories. With language, Mankind has created the objective world 3, which is a world of civilization, learning and non-genetic growth: growth which is not transmitted by the genetic code but which depends on a selection based upon rational criticism.[23]

The faculty of language is responsible for the uniqueness of Man among the animal world, even for achievements in non-linguistic areas such as music. The human mind is essentially the producer of human language and for this we have inborn basic aptitudes. Indeed, language comes first: it is almost the only exosomatic tool at Man's disposal which is genetically based. The physiological basis of the human mind might be found in the speech centre of the brain. Human language helps to explain the emergence of the human brain, the human mind, human reason and freedom.[24]

Critical Commentary

In this section we see more clearly the 'deep level' foundation of Popper's epistemology: certain very fundamental biological mechanisms ape presupposed by his theory of knowledge. Whether or not we describe learning at a surface level as induction, imitation, stimulus and response, classical conditioning etc., what happens at the deep level is all the same for Popper: inborn mechanisms of discovery, primitive expectations of one kind or another, provide us with our most fundamental conjectures, against which real world experiences operate in order to eliminate error. That is to say, we possess innate 'knowledge', as a result of belonging to our species, which provides us with our first dogmas and upon which the world operates to confirm or disconfirm expectations. Even language learning, Popper concludes, is an instance of this: it may appeal' imitative and inductive on the surface., but fundamentally the language of others is an example to be learned from, not a model to be copied. This view is consistent with recent theory in the language disciplines. Although Chomsky 's theory of 'universal grammar' is now suspect in its hard version, it seems inevitable that a softer version of that influential theory will remain in place: we do possess dispositions towards acquiring language of a certain structure that are given to us as a part of our genetic inheritance and which are not a mere and random residue of linguistic socialisation. More

important for this discuss-ion, though, is the question of the existence of those primitive 'items of knowledge' that Popper postulates as underpinning all processes of learning. They are, I believe, a key to his whole epistemology. If it can be shown that we do possess structural invariants of the kind that he suggests, then a premise is offered that fills an important hole in his theory of knowledge. To date there is encouraging evidence for the existence of these universal semantic primitives, but at best it is very hypothetical. I collate some of this evidence in another paper (Corson, 1986a in press). The existence of these structural invariants, at base level, is an empirical question to which empirical fields such as physiology, cognitive neuropsychology and social biology a.re increasingly posing theoretical responses.

Popper mentions our 'decoding skills' as an example of the heredity derived equipment that we bring to the task of learning. This common-sense example presented in a 1972 text (Objective Knowledge), antedates empirical evidence now available to support a theory of reading based on some similar decoding skills idea. The intellectual equipment that Popper conjectures about here certainly seems to be a real world phenomenon, if recent work in cognitive neuropsychology is used as a guide (Allport, 1983).

He concludes that almost everything is wrong in what he calls the 'common-sense theory of knowledge' (also known as the 'bucket theory of mind', or the 'tabula rasa' of Aristotle, or the 'banking theory' of Freire). While he admits that we do experience much of the world as if it were immediately given to us by experience, yet our decoding apparatus eliminated a great many of the mistakes we make in decoding, so that once skills are developed we seldom err. I take this to mean, too, that our sophisticated decoding apparatus is able to receive and automatically to correct even markedly misleading messages, such as those grammatically awry messages exchanged in human conversations, and still to create intelligible signals from them. The possibility of error remains however, and this is the cornerstone of Popper's philosophical position: we are always fallible.

I cannot overstress the importance for education of the views on the centrality of language expressed by Popper. I accept them without qualification. Popper gives the central place in the development of mind, and of much else, to the faculty of language. These ideas are developed along empirical lines in a recent book co-authored by Popper and John Eccles, The Self and its Brain. I think that by consciously engaging In the richly reciprocal activities of thinking and using language, we tacitly lend our approval to Popper 's views in this area. Our accepting these views entails, of course, weighty consequences for the place of language in education: our very capacity to enter Popper's objective world 3 (the world of knowledge created and stored by human beings) is determined by our capacity to use language to formulate and to criticize the theories that are embedded in that abstract world.

Educational Policy and Theory

"The piecemeal engineer knows, like Socrates, how little he knows. He knows that we can learn only from our mistakes. Accordingly he will make his way, step by step, carefully comparing the results expected with the results achieved ... and he will avoid undertaking reforms of a complexity and scope which make it impossible for him to disentangle causes and effects, and to know what he is really doing". In changing the educational institution, the social engineer's approach then should be a piecemeal one, which entails making small adjustments in the direction of reform and improvement. Th is approach will be governed by the knowledge that we can learn only from our mistakes; that we know too little to move forward too fast; and that reforms which are ambitiously complex often produce inhuman and unwanted consequences. In contrast to the piecemeal reformer, a holistic or utopian social engineer attempts reforms which from the outset are impossible to control. The greater the changes attempted, the greater will be their unintended and serious repercussions. A holistic approach accepts naively in advance that a complete reconstruction is possible and necessary, thereby ignoring the human factor, the values and sensitivities of the participants in the reconstruction. On this model the problem of organizing human impulses and directing them towards the 'right process of development is tantamount to a prior admission of failure since human impulses are beyond organisation and an attempt to do so

produces distrust, disharmony, confusion and resistance. The goal of edging an educational system towards a reformed system which is sensitive to human needs is displaced by a goal which attempts to mould people to fit into a preordained system.[25]

There is much truth in the claim that Plato provides the model for modern secondary schools and universities. Schools and universities often create the unity of the group spirit of tribalism, which is a characteristic of the closed society. It is not just the trivial elements of tribalism which survive in schools, such as its badges and emblems. The tribalistic authoritarianism of schools also makes them bastions of reaction and their teachers petty dictators. It was no accident that when Plato failed in his attempt to create a tribalistic closed society, he founded a school instead.[26]

Lack of educational opportunities represents one of the greatest evils which beset the social life of Mankind. The malaise can be remedied and relieved by social cooperation, yet the problem remains very serious in spite of sincere and energetic attempts to grapple with it.

"Work for the elimination of concrete evils rather than for the realization of abstract goods". for example, illiteracy is an evil in society which can be fought by direct means, as we fight criminality by direct means. Once identified as an urgent evil of society, patient efforts are needed to convince people that we can end illiteracy.[27]

Too often educational theory is expressed in terms of nonsensical 'higher' aims such as 'the full development of the personality'. Psychological holism of this kind, which at times dominates educational theory, suggests the impossible. It is a nonsense to claim that all or nearly all social and personal relations are susceptible to control, since with every attempt to control relations new relations are formed. A commitment to romantic and holistic aims bypasses the modest first principle of an educational system: do no harm. It is an indictment on education that this simple aim's realization remains somewhat remote.[28]

Critical Commentary

Popper borrows the major conclusion of his epistemology to construct a theory relevant to promoting social change and improvement at the institutional or micro level. His conclusions are especially relevant to the task of formulating education policies. The following argumentative chain derives from his discussion:

1. our conjectures are our theories about the world, about what is possible, to which we apply ingenious and imaginative test statements in order to eliminate error;
2. a policy or a plan is a conjecture about what is possible: its theoretical force depends upon how susceptible it is to refutation which means that its formulation, or the formulation of the stages of which it consists, must be unambiguous;
3. any policy which is not a refutable theory in the sense of being testable against experience, or which alternatively does not provide integral stages of development that are each themselves susceptible to testing, is a holistic or utopian policy and is in principle beyond the rational control of its authors.

Apposite to these conclusions is the view that policy makers in education too often design plans which disturb equilibrium; what is needed though are more sophisticated and imaginative proposals designed to invigorate the institution, rather than to tear it apart. More than just agreeing with these views, I have found some support for them within the social institution of education through an analysis of the collapse of a process of holistic policy implementation (Corson, 1986b).

His views on 'tribalism', as they apply especially to education, are already discussed. As a modifier on these attitudes from Popper I should stress that they derive from a text first published In 1946 (The Open Society and Its Enemies) and so relate to impressions of an educational world very different from today's.

Much more germane to the present are Popper's views on "abolishing the greatest evils which have hitherto beset the social life of man"; these are contained in his 1972 revision of *Conjectures and Refutations*. I have already discussed his account from *The Poverty of Historicism* about the methods of the social engineer: In this later context he offers what he considers to be admissible plans for social reform. The example of 'illiteracy' is one of those given and Popper addresses and issue which has rarely been taken seriously as a social problem in modern Western societies, in spite of the best efforts of individuals and of individual agencies: A great deal of lip-service has been paid to the problem of illiteracy, yet attempts to address it still largely depend on the use of volunteer workers and receive a low budgetary priority in post-compulsory educational agencies. The "patient efforts to convince people" continue, but with illiterates a disguised if large minority (and probably a functionally disfranchised one) the "patient efforts" that Popper recommends are bearing little fruit. This is not to say, though, that his main points here are wrong: we should not allow our dreams of a beautiful world to lure us away from the claims of people who suffer here and now; they cannot be sacrificed for the sake of future generations, for some ideal of happiness or for any utopian ideology. These points are basic to his condemnation, in the final section, of high-blown and holistic educational theories, and they draw him back to restating his cardinal injunction for educationalists: do no harm. Integrated, then, in these final admonitions we see the product of a tight and unified framework of insight, theory and dogma which gives Popper's wideranging views on education an integrity that is compelling for more reasons than for its mere consistency.

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