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Public Education and The Retreat from Culture

In an attempt to clarify the phrase, "Retreat from Culture," I would like to offer the concept of "culture" published exactly a century ago by Matthew Arnold, the English poet and critic. He spoke of culture in terms of "the pursuit of perfection," by which he meant "the harmonious expansion of all the powers which make the beauty and worth of human nature." The cultured man has "a liberal and intelligent eagerness about the things of the mind." He wants to "*see things as they are.*"

Arnold was arguing for a broad liberal education which would develop the total potential of our humanity, not one side of it, and no doubt he would have agreed with the following characteristics of the "cultured" man: First, the ability to think critically in spite of emotional interference; second, the ability to react with an appropriate degree of enthusiasm or passion to an aesthetic experience; third, a cosmopolitan range of knowledge and interests, encompassing all the major domains of human knowledge; and finally, charity — an old-fashioned word which is simply intended to suggest that the cultured man behaves well towards his fellow man.

I want to make a couple of points about our present program of public secondary education in the light of this concept of culture. But in order to narrow the field somewhat, I must focus on only one of the characteristics of the cultured man. The question is this: "To what extent does public education produce the cultured man, possessed of a cosmopolitan range of knowledge and interests?"

The bias of my thinking is apparent from the use of the word "retreat" in the title. And indeed, many of the things that we teach in our schools add little or nothing to the broadening and humanizing of the rational and emotional lives of the students. Before examining mathematics and the sciences in this connection, perhaps it would be more diplomatic to use my own field of English as an example of the retreat from culture.

For many years English teachers, textbook writers, and curriculum planners have assumed that there is such a thing as an absolute stan-

dard of "correct" or "proper" English to which everyone with a claim to education should conform. This absolutist, *à priori* philosophy of language proscribes all locutions outside the pale as "bad" English, or "vulgar" English — or simply, "bad grammar." The standards of this prescriptive school are the standards of Formal Written English, and relatively little attention has been paid to the possibility that there might be other varieties of English just as "proper" on occasions that are not formal and not written. Little study has been made of the more informal modes of speech and writing that most of us use most of the time. As a result, the dynamic range and flexibility of the slowly evolving English language from the lips and pens of contemporary men have been generally neglected. Students remained bogged down in quibbles over the 'proper' use of *shall* and *will*, the distinction between *different from* and *different than*, and whether a word like *everybody* should be referred to by a singular or plural pronoun. Perhaps some of them learned something about the formalities of writing term essays in university English courses — if indeed they ever got that far — but otherwise, the unrealistic and often downright erroneous teaching about English has served to do little more than alienate people from their language. That is a retreat from culture.

We have assumed that the study of grammar is a standard phase of everyone's education. Again, it was accepted on *à priori* grounds that one could not learn to speak or write "properly" unless he was drilled over the years in the definition and identification of the various parts of speech and constructions of the English language. That virtually all available research evidence contradicted this view was ignored. Generations of students, no matter what their native aptitude or interests, have been made to jump through the grammatical hoops by defining and picking out participles, gerunds, adverbial infinitive phrases, and compound-complex sentences. Like Everest, these things were mastered because they were there. That is a retreat from culture.

English education has slowly been attempting to rid itself of some of the more blatant of these archaic practices, but there is a great deal yet to do. In the meantime, much valuable time is wasted when it might be better employed in teaching young people some of the more exciting principles and uses of the English language.

In the field of literature there have also been many assumptions about what material is vital in a high school English curriculum. For instance, to challenge the right of Shakespeare to be there is tantamount to insulting God, Mom, and the flag. No doubt many literate adults are right in feeling that the study of Shakespeare, Milton, Keats, Dickens and Hardy is for them a liberalizing and humanizing activity. But it may not be so for everybody. To focus, as the schools have done, almost entirely on the classics of non-twentieth-century literature, seems to me wrong, and because such emphasis alienates many students from the world of the imagination it is for them a retreat from culture.

But now I must enter — with a good deal of trepidation — on alien ground in an effort to discover what the high school curriculum in mathematics and the sciences contributes to the development of the liberally educated man with, as Arnold phrased it, an “open soul and imagination.”

In an attempt to be empirical, I have looked at most of the major curriculum guides from across the country, and have browsed in several of the principal textbooks. I have also obtained all of the government examinations in senior high school mathematics and science given in Canada in 1967. This sampling of the academic smorgasbord outside English education left me sometimes disappointed, and frequently puzzled. Since I can claim no expertise, my view is that of a layman, and should be taken for what it is worth. Perhaps the weakness is in me, not in science and mathematics education. However, specialists in those fields might be gently amused by the reaction of a babe talking about culture in the academic woods.

The Alberta Program of Studies says that the objective of its senior high school mathematics program is “To develop an understanding of mathematics as a creation of man and to develop an appreciation of the contribution of this discipline to the progress of civilization.” This sounded promising. But in the Grade X textbook, MacLean’s *Secondary School Mathematics Grade Ten*, the only reference to “civilization” I could find was the following comment: “The ideas of geometry have many practical applications. The engineer, the architect, the artist all make use of geometric ideas and the properties of geometric figures in modern design.” It struck me that a few pages devoted to these “practical applications” might have been enlightening. Surely it would have been more enlightening for the students than what they actually did study: “Logical consequents deduced from geometric definitions, postulates, and number axioms” — but I’m willing to admit that perhaps I just don’t understand.

However, I was somewhat taken aback elsewhere in the same text to discover the rebirth of faculty psychology. The author claims that geometry will help us in our “everyday, critical thinking,” and “will help us improve our thinking habits generally.” I don’t believe that, and I doubt if there is a shred of evidence to support such a claim. I’m disappointed that a prominent writer of textbooks has to fall back on that sort of justification for the study of his subject.

May I remind you again of my basic point: A secondary education in all subjects should not be aimed at the specialists, should not be a “preparation” for the pursuit of a specific discipline at the university. All phases of secondary education should be planned so that they will appeal intellectually and aesthetically to as wide a cross-section of students as possible, no matter what their capacities and interests, and no matter what their plans for the future. A truly liberal secondary

education should be intellectually appealing to large numbers, and should be possessed of what we might call "cultural grace," which is the opposite of a narrow, technical pedagogy.

Ontario says this of its 6-year program in mathematics: "This course is intended to suit the requirements of those pupils who have no need to prepare themselves for the mathematics of Grade 13. . . . It therefore attempts to provide a 'mathematics-for-life' with a general, rather than a special, mathematical approach." Some of the topics studied in this 'mathematics-for-life' approach include "Graphing of Solution Sets in One Variable," "Trigonometric Functions of Angles," "Algebraic Solutions of Simultaneous Linear Equations," and "The Use of Logarithms of the Trigonometric Functions." This is no doubt mathematics, but if it is also "for life," and represents an attempt to give students a broad and humane liberal education, I'm afraid I miss the point somewhere along the way.

The Manitoba program of studies says that "A course in Physics should . . . provide an understanding of scientific principles and their applications to human needs, comforts and welfare." The course in chemistry should "develop an understanding of the importance of chemistry in modern society." Again, this sounds as if the emphasis is on broad principles rather than on technicalities. But what happens in fact? One of the major texts, Sienko and Plane's *Chemistry*, flatly admits in its preface that "Throughout the book the approach is quantitative." And what topics develop this "understanding of the importance of chemistry in modern society?" Things like the "Quantitative Aspects of Hydrolysis," "The Isotopes of Hydrogen," and something else called "Simultaneous Equilibria." No doubt these things have something to do with the progress of society, but neither this text nor most of the others I looked at lets the reader in on what it is.

Manitoba also offers what is called a General Course. The stated objective of the general science course is "the development of scientific literacy." That is admittedly a nice turn of phrase, which Matthew Arnold no doubt would have approved of. One of the textbooks which anchors the Biology sequence is Moon-Otto-Towle's *Modern Biology*. This book is used in several provinces, including Alberta and Nova Scotia. Like virtually all high school texts in biology, it is loaded with a freight of technical vocabulary that would cow the spirit and boggle the mind of all but the most intrepid students. But aside from being an example of the biologist's almost perverse tendency to deaden his subject at this elementary level with five-dollar Latinate words, Moon-Otto-Towle reveals other curiosities which seem contrary to the liberal and humane scientific spirit.

For example, pollution is one of the major problems facing this and future generations. And what has a modern biology textbook designed for senior high school got to say about pollution? This:

Our destruction of aquatic environments has been equally disastrous. *Pollution* means that water is poisoned and unfit for most living things. It has created a serious problem in our streams and rivers. As game fish die out, the waters are left to such scavenger fish as carp. Many polluted streams no longer support even these species. Infested with mosquitoes and bacteria, they become foul-smelling open sewers — a health menace and a great discredit to the intelligence of man.

And that's it. That sad little paragraph takes care of pollution. This sort of superficial nod at the problem is typical of the several biology books I examined. If that is the kind of biology education available to young people, it is not surprising that it is chronically difficult to arouse the public to concern over the continuing destruction of our air, land and water.

Here is what this textbook tells students about alcohol, narcotics, and tobacco: "Certainly, tobacco is a blind alley leading nowhere. Alcoholism is a dangerous detour which leads only to misery and failure." Those sentences summarize nine pages of almost totally destructive commentary on the subject of smoking and drinking. Can we justify this sort of thing in terms of a liberal education which should help us, as Arnold said, *to see things as they are?*

And how scientific is it at the senior high school level when the word "evolution" doesn't appear in the index of the biology text, or when a series of anatomical transparencies of the human body is accompanied by this comment: "The structures shown are detailed and accurate. This presentation of the human body will serve as an adequate basis for anatomical study in any degree of thoroughness and complexity you may desire" — and in the transparencies the reproductive organs are omitted. All this is a retreat from culture.

Ontario says that there are two main objectives in teaching biology in Grade 13: First, to provide some general knowledge for those who will not study this subject further, and second, to provide a good foundation for those who will proceed to advanced work. It is surprising that the impossibility of doing both at the same time did not occur to the science teachers who wrote the curriculum guide.

The British Columbia curriculum guide doesn't mince words, but freely admits that its main stream high school education is intended "to provide the basic preparation necessary for continuing education in such institutions as universities or institutes of technology." This honesty is admirable, but the sad thing is that, like everywhere else in the country, the student who wants a general academic education without worrying about university simply has no place to go. He either suffers through the technicalities of a university-oriented program, or gets shuffled off into something called the "commercial" program, or the "general" program. It is also curious to note that British Columbia makes a distinction between the "General Education Constants" (English, Social Studies) and "Programme Constants" (Mathematics, Physics, Chemistry, Biology). Apparently one is to assume that English and

Social Studies are liberal studies, and that the sciences are not. That is a sad assumption to have to make, and further exemplifies what I mean by a "retreat from culture" in the schools.

Before concluding, I want to offer one specific instance of the difference between a liberal, humane, "cultured" treatment of a subject, and a pedantic, illiberal treatment of it. Let us take, from the field of atomic physics, the dramatic and even terrifying discovery in 1932 of the neutron, the particle later used to bombard the nucleus of the atom and produce atomic fission.

Following is the treatment given by the prestigious Physical Science Study Committee to this revolutionary discovery in physics:

In much this way James Chadwick discovered the neutron in 1932. In his experiments protons at rest were hit by unknown invisible particles which came from a region where beryllium was bombarded by the alpha particles from polonium. After the collisions the tracks of protons could be 'seen' and their kinetic energy measured. After examining a large number of collisions, Chadwick concluded that one kind of invisible particle of a mass almost equal to the proton would explain all the observations. Furthermore, when the invisible particles hit atoms, the energy transferred was just what was expected. The 'invisible' particle that Chadwick thus discovered is called the neutron. It is one of the building blocks out of which atoms are made; but its existence was only suspected before Chadwick's work.

Compare this sort of dull and uninspiring prose with the following excerpts from Robert Jung's book, *Brighter Than A Thousand Suns*, which is the story of the scientists who made the atomic bomb, written for the average educated man:

At the beginning of the thirties, during the same period in which politics had so brutally invaded the quiet world of the laboratories, nuclear science also knocked at the door of politics. In 1932 James Chadwick discovered the neutron, the key to atomic fission. . . . The Hungarian physicist Leo Szilard was wondering, as a realistic student of future events, how politicians, industrialists and soldiers would be likely to react if success were really achieved one day in the generation of atomic energy. . . . Other scientists were also troubled by similar speculations. Paul Langevin was sufficiently stirred by these ideas to say to a student of history who had made his escape from Germany: 'you're taking it all much too seriously. Hitler? It won't be long before he breaks his neck like all other tyrants. I'm much more worried about something else. It is something which, if it gets into the wrong hands, can do the world a good deal more damage than that fool who will sooner or later go to the dogs. It is something which — unlike him — we shall never be able to get rid of: I mean the neutron. . . . Seven fateful years were now to pass before physicists recognized the full significance of the neutron, seven years in which atoms had already been split with neutrons in Paris, Cambridge, Rome, Zurich and Berlin without anyone suspecting the fact. The scientists themselves were not aware of it. From 1932 until the end of 1938 they simply refused to believe what their instruments told them, and therefore the statesmen in their turn fortunately did not learn the nature of the extraordinarily powerful weapon that lay within their reach. It is interesting to speculate what the consequences would have been if the chain reaction in uranium had been correctly interpreted, in Rome, in 1934, when it probably took place for the first time. Would Mussolini and Hitler then have been the first to develop an atom bomb? Would the atomic-armorments race have begun before the Second World War? Would that war, we may wonder, have eventually been fought out with atomic weapons on both sides?

This speculation on the social, political, psychological and moral ramifications of scientific research is what the proponent of a broad liberal education would substitute to a considerable extent for the present technicalities taught in high school. The majority of students, who will never see the inside of a university, would be far more intelligent, informed people, while these bound for college work in any field would have a firm philosophic basis in science for more specialized studies.

To summarize and conclude what I have been trying to say, perhaps I should return to Matthew Arnold. As a man intimately involved with public education in his day, Arnold wrote a good deal about his views in the field. And although we might reject some of his subject matter and methodology, I think that the best thing that public education could do at present would be to reconsider Arnold's vision of a well-rounded, general education designed to produce men and women with, as he termed it, "open souls and imaginations."

Today it seems that we are in retreat from this traditional concept of general education. The trend is to make academic courses "harder" and more specialized, particularly in mathematics and the sciences. On the other hand, we are more and more splitting up the high school population into "streams" according to vocational, commercial, or artistic interest and aptitude. We are drifting from the idea that there is a general body of liberal knowledge that all educated men should have in common.

The trouble is not that we fail to give students enough English, enough Social Studies, enough Mathematics or Science, but that too often we give them the wrong kind. Public education is far too quantitative. I want to see more qualitative emphasis in all subjects. The focus in secondary school should be on *values*, which traditionally have been left to the English teachers. Science and mathematics, meanwhile, ostensibly concerned themselves with more "practical" matters. I see nothing "practical" in Graham's Law of Diffusion, or in "Quadratic Equations with Literal Coefficients" — unless you happen to be one of the tiny minority headed for university majors in physics or mathematics. And I am not altogether sure these things are "practical" even for them. I put such concepts in the same category as anapestic pentameter or the terms of the Constitutional Act of 1791: they simply cannot be justified as liberal, humane education. I am not altogether facetious when I suggest that if instead of a high school education, students were given *Time* magazine, the *CBC Times*, a radio, and a couple of hundred dollars to spend in a good paperback store, they would probably end up after four years of directed reading and listening as more informed, rational, competent people. If you wanted an "accelerated" program, you might throw in the *Saturday Review*, which also takes a broad, liberal outlook on the world of human affairs. If the programs of study, the textbooks, and the examinations reflect the content and emphasis of mathematics and science education in Canada,

there is little attention being paid to the history and philosophy of these disciplines, to the role of mathematics and science in the modern world of technology, or to the serious moral and social problems often inherent in pure and applied research. These are the studies that produce "cultured" men — as opposed to the technicians we turn out at present.

The trouble these days is that as soon as someone starts talking about "culture" he is shrugged off as an unrealistic reactionary, as an eccentric who is not in touch with the dynamic modern world. "Practical" educators assume that the proponents of culture want to get Latin and Greek and Spenser's *Faerie Queene* back into the curriculum. But that is not it at all. What has happened is that we have abandoned the idea that a hairdresser, auto mechanic or plumber needs to learn much about rational thinking and sensitivity to beauty. There is something very wrong in this, as Matthew Arnold would agree. I do not intend in the least to be melodramatic when I reflect on the future generations of semi-civilized graduates of our schools who will surrender happily to an electronic culture without ever having been offered any real chance to enrich their lives with what Arnold called "sweetness and light." Arnold was often wrong-headed or narrow in his thinking, but he had a vision of gentility — in the fullest sense of the word — that must somehow be nourished by public education if man's dignity is to be preserved amid the bewildering sociological and technological revolutions of the future.

The following comment by the American humanist Ashley Montagu is pertinent:

It is not that our schools have failed, but they have never begun to do what they were presumably created for — namely, to educate. We instruct. We do not educate. Instruction is the training in the three R's, in practical skills and techniques. These have their place and their importance, but only in the secondary service of by far the most important skill: the ability to relate oneself warmly, cooperatively, and creatively to other human beings. This entails not only the cultivation of the human spirit, of humanitas, but also the training in the ability to think, to use one's mind as a finely critical instrument. It is principally because this has not been done in our schools, as well as outside them, that the New Yahoos are so many among us.

The product of public education today, as in the past, is often bored and bewildered by what he is offered by the educational establishment in *all* subjects. The people responsible for the quality of public education in Canada must constantly reflect on how much cultural "sweetness and light" that education is providing for the students. Educators must beware of the day when society points at the student, and then asks them,

Who made him dead to rapture and despair,

Whose breath blew out the light within this brain?