Political Correctness in the Science Classroom (Version 1)

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Abstract

Science has often been lauded for its ability to transcend national boundaries. It's norms of objectivity and universalism would seem to inhibit the invasion of the local political agendas that are so influential in the humanities today. Yet science classrooms today are also sites for indoctrination into the prevailing "diversity" narrative.

Some attempts to make science more politically correct are benign enough: Sidebars featuring the scientific accomplishments of women and minorities may serve as useful invitations for all students to consider science as a career. And digressions showing the relevance of basic science to contemporary America could help students integrate scientific thinking into their approach to life.

Too often, however, the attempts to highlight diversity undermine the very core values of science education. In looking for "role models" absurd claims are made about the accomplishments of ancient Egyptians, Africans, Muslims, and indigenous peoples. It is claimed that there are alternative "sciences" and methods of inquiry into nature that are just as effective or even superior to the scientific achievements associated with Western, white males. Instead of deploring episodes where parochialism or ideology has distorted or impeding scientific understanding, many current educational approaches would tell students that the remedy is to import progressive political values into the heart of science.

This chapter will reinforce the importance of teaching not only the fundamentals of science but also the epistemic norms that make science uniquely valuable.

Intro

Trying to make science politically correct sounds like a quixotic venture. Even before the invention of printing scientific treatises crossed linguistic and cultural boundaries, and long before "globalization" became a buzzword science was an international activity. Just leaf through any science textbook and names from many parts of the world leap out at you: Dimitri Ivanovich Mendeleev, Marie Sklodowska Curie, Chandrasekhara Venkata Raman (discoverer of the Raman effect -- scattering of light), Lee and Yang, who discovered the violation of parity, came here in 1946 but were not US citizens when they won the Prize.

Abdus Salam (Pakistan) put the point eloquently in His Nobel acceptance speech:

> "The creation of Physics is the shared heritage of all mankind. East and West, North and South have equally participated in it. In the Holy Book of Islam, Allah says

> "Thou seest not, in the creation of the All-merciful any imperfection, Return thy gaze, seest thou any fissure. Then Return thy gaze, again and again. Thy gaze, Comes back to thee dazzled, aweary."
>
> This in effect is, the faith of all physicists; the deeper we seek, the more is our wonder excited, the more is the dazzlement for our gaze.
>
> I am saying this, not only to remind those here tonight of this, but also for those in the Third World, who feel they have lost out in the pursuit of scientific knowledge, for lack of opportunity and resource.
>
> Alfred Nobel stipulated that no distinction of race or colour will determine who received of his generosity. On this occasion, let me say this to those, whom God has given His Bounty. Let us strive to provide equal opportunities to all so that they can engage in the creation of Physics and science for the benefit of all mankind."
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> (From Les Prix Nobel. The Nobel Prizes 1979, Editor Wilhelm Odelberg, [Nobel Foundation], Stockholm, 1980)

Because the epistemological basis of science involves intersubjective agreement, perhaps it is not surprising that it can transcend national borders and cultural differences. Yet from another, more pragmatic perspective, it might strike us as miraculous. After all, scientific inquiry is, and has been for centuries, funded by wealthy patrons, entrepreneurs, industrialists, and governments, all of which have their individual agendas. Very few are motivated by the wonder and "dazzlement of our gaze" referred to by Abdus Salam. If it is true that "he who pays the piper calls the tune," how can there be so much consensus in science?

The detailed answer is complicated. Briefly, for centuries scientists have managed a balancing act whereby they satisfy their patrons with useful technological goodies while yet maintaining a commitment to core scientific values that insulate them from the short-term political, economic and ideological demands of the society which supports them. When societal pressure becomes too intrusive, as it did in Nazi and Soviet regimes, the result is either bad science, science that is both epistemically and morally corrupt, or the tradition of science simply fades away as was the case in many Islamic countries at the end of the Middle Ages.

I do not wish to suggest that science in the US today is under such powerful attacks, but yet, as I will argue below, there are troubling indications and to paraphrase Jefferson, the price of scientific integrity is eternal vigilance. I will begin with a bit of history to set the stage for a discussion of the problems that Political Correctness poses for science education today.

Bacon's Dual Vision of the Value of Science

In his description of a new method of understanding Nature (*Novum Organon*, 1620) Francis Bacon, who is sometimes described as the herald of the Scientific Revolution, distinguished between *experimenta lucifera* and *experimenta fructifera*, experiments of light and experiments of fruit. Inquiry using the new scientific method would provide mankind with both understanding and wonderful new techniques for relieving pain and drudgery. Forty years later when natural philosophers in Britain sought public support for the Royal Society they appealed to both kinds of benefits. Similarly in France, Lavoisier was renowned for his research on fertilizer as well as for his oxygen theory of combustion. So from the beginning of modern organized science, scientists have sought outside financial support by promising "fruit" as well as "light".

But the founders of the Royal Society also realized that scientific inquiry would be inhibited if outside political or social pressures were allowed to influence the *results* of research. Setting priorities could perhaps be tolerated (although scientists always argued that in the long run pure research, going after more light, was the best way to produce more fruit), but censorship or redaction or dictation of results would vitiate the whole enterprise. One explicit measure they took was to forbid the discussion of religious differences (a hot button issue at that time) at their meetings.

So it is old news to claim that science is influenced by social factors. The Manhattan Project and the Space Program are obvious cases where political concerns set the agenda for research leading to impressive theoretical as well as practical advances. But although the provider of funds may to a certain extent dictate the questions to be asked, science cannot survive when the government or other patron also tries to dictate which answers are acceptable. Here we only need recall Lysenkoism in the USSR, which set back Soviet genetics for a generation, or the Nazi attempt to get rid of "Jewish physics."

Not only are the choices of the problems to be studied influenced by the availability of funds, the methods that scientists use are limited by the ethical standards of both scientists themselves and those of the wider society. Some of the restrictions, such as the requirement of informed consent, are based on widely shared human values. Others, such as the current limitations on the use of stem cells in federally funded research or demands from animal rights groups, are controversial and the decisions about imposing such regulations are strongly influenced by political considerations. However, although ethical constraints may slow or even halt certain kinds of research, they in themselves need not interfere with the objectivity of the research findings, which are permitted.

Neither Bacon nor anyone with even a casual knowledge of the history of science would deny that organized science is influenced by the needs and values of the society in which it is embedded in the ways I have just described. What Bacon et al. would go on to assert, however, is that the truth claims of mature science can be, and in a democratic society typically are, independent of the ideologies and political stance of either the scientists themselves or the social milieu in which they work. We may know *more* about the chemistry of Uranium than we know about the chemistry of Scandium because the

notorious military-industrial complex takes great interest in the former while the main use of scandium (according to the Wikipedia) is in making lacrosse sticks! But that in no way suggests that our scientific understanding of uranium is distorted by the sponsors of that research.

There is a famous anecdote to the effect that an army top brass (General Groves) visiting a lab during the Manhattan Project was appalled to see the "secret" element Uranium brazenly displayed in a Periodic Table hanging in the public area and asked that it be removed so as not to give the enemy hints about what was being studied. As we will see, some of the current demands for politically correct science are no less absurd.

Social Constructionism, Identity Politics and the Science Wars

The so-called Science Wars, which raged during the last decade of the 20th C, cast a spotlight on a widespread movement within the academy to change lay perceptions of science in dramatic ways. No longer was science to be regarded as a unique and wonderfully successful enterprise for obtaining objective truths about the world. Rather it was to be viewed as the uniquely powerful tool of the oppressive forces that have supposedly dominated human history. On this view the interests of the ruling classes not only set priorities for research, they also put restrictions on the questions that could be asked, the hypotheses that could be entertained, and the results that were socially acceptable. It was the job of scholars to reveal the nefarious history of science's complicity in oppression; it was the job of educators to sensitize students to the dubious character of scientific claims, especially when they were in conflict with the conventional wisdom of a politically correct ideology.

My description above of the revolution in the image of science that was promoted in the humanities divisions of the university is painted with broad strokes, but it accurately portrays the enthusiasm that reigned even amongst scholars who held less radical views because of the new opportunities for publication that it offered. Now people in English departments could legitimately comment on the sexist and racist language not only of Chaucer and Shakespeare, but also that of Darwin and Freud. Articles could now be written about the ideology implicit in the choice of scientific metaphors, such as the Big Bang theory and Black Holes, the penetration of the egg by sperm, the adulation of powerful accelerators and even the preference of scientists for linear equations.

Many of the examples displayed in these "critiques" of science were ludicrous and the attempts to build new "epistemologies" based on feminism, postcolonialism, or social constructionism were seriously flawed. And there eventually arose a corpus of hard-hitting and cogent criticism of the "critiques." Members of this audience will likely remember the impact of Gross and Levitt's *Higher Superstition: The Academic Left and Its Quarrels with Science* (1994) and the furor provoked by the "Sokal Affair" in which a postmodernist cultural studies journal at Duke University published what should have been an obviously satirical paper by physicist Alan Sokal with the trendy title "Transgressing the Boundaries; Towards a Transformative Hermeneutics of Quantum Gravity." (*Social Text*, 1996) There followed a stream of important publications that not

only corrected blatant errors but also proposed positive accounts of the proper relationship between science and social values [cf., Susan Haack's *Defending Science - Within Reason*, my edited volume, *A House Built on Sand: Exposing Postmodernist Myths about Science, Scrutinizing Feminist Epistemology*, *Scientific Values and Civic Virtues*, Philip Kitcher's *Science, Truth and Democracy*, James Brown's *Opinionated Guide to the Science Wars]*.

Some of the research inspired by the various liberation movements was interesting. We now know more about the biographies of women in science and the folk astronomy, biology, and mathematics of various indigenous peoples. Looking carefully at the history of science in Islam or Ancient China may be motivated by people who want to undermine Western European "exceptionalism," but that same research, unless it is hopelessly biased, may be used by those who want to isolate those factors that caused science to flourish in the West. There is always more to learn about the evolving social structure of science itself and details of its relationship to other institutions. Even the concerns raised by "Science-for-the-People" advocates may serve to focus our attention on useful questions about the allocation of resources in medical research: Why do we spend more money on prostate cancer research than on ovarian cancer? Why are new, expensive so-called Me-Too pharmaceuticals tested against placebos instead of being compared with the leading generic drugs? Are we doing enough research on possible male-female differences in the course of diseases and treatments? (Ironically, the notorious Tuskegee Study was severely criticized for even asking about the possibility of racial differences in late stages of syphilis, while today "race medicine" is becoming politically correct.) But in my opinion the overwhelming majority of this ideologically motivated output is dross. (See the collected articles in my anthology, *A House Built on Sand: Exposing Postmodernist Myths about Science,* and co-edited collection, *Scrutinizing Feminist Epistemology*.)

In Science Studies programs and Departments of Science, Technology, and Society some good work is being done through the combined efforts of historians, philosophers, and sociologists of science, although there is often too high a tolerance for any work that pays lip service to politically "progressive" goals. In "Identity" Studies programs, however, the old glorification of oppression and recipes for liberation still prevail. And although some Women's or Gender Studies partisans claim they want more women to become scientists, the picture they paint of science is so cynical and so bleak, it is difficult to imagine their efforts would succeed with anyone but martyrs and masochists. (See my co-authored *Professing Feminism: Education and Indoctrination in Women's Studies*.) Ironically, they do highlight the importance of attracting underrepresented groups into technical disciplines, although their reason for doing so is to change science from within.

Political Correctness and Scientific Literacy

Clearly, students may be presented with a pretty jaundiced view of science in their humanities classes but surely their science classes will provide a different picture. My impression is that this is largely the case, at least in the natural sciences at the university level. There are exceptions, of course. There were discussions sometime ago on the

WSTListServe about the possibility of structuring an intro physics course by first discussing wave phenomena before turning to mechanics. The assumption was that women students would like the wavy stuff but be put off by talk of colliding rigid bodies. And John Kellermeier advocates doing some consciousness raising in statistics class by using examples from feminist studies on date rape and child abuse. (See his homepage at http://www.tacomacc.edu/home/jkellerm/index.htm.) (One might think that if rape is actually as common as claimed a considerable number of his female students might be made uncomfortable by being reminded of the unpleasant matter in a math class, but evidently the "sensitive" professor didn't think of this possibility!) And since science teachers at the college level actually understand and like the science they are teaching, one might hope that their enthusiasm will serve as a prophylaxis to the other messages the students are getting. But by the time students reach the university many of them already dislike and distrust science, based on their K-12 experience.

There are many reasons for this. Many Middle School and High School science teachers in America are under-qualified. But in keeping with our theme of Political Correctness I will concentrate on other factors. One major problem is that school teachers are expected to conform to professional standards and one goal that is to be emphasized at all grade levels is that children are to learn about the Nature of Science. This goal for science education has been in place for decades, at least since the time of John Dewey. The original idea was that scientists had methods of inquiry that would be useful in all realms of life. Butchers, bakers and candlestick makers all need to test hypotheses and learn from their mistakes. They need to make careful observations and accurate measurements. A respect for data and a willingness to correct preconceptions are indispensable values for any citizen and where better to learn them than in science class where they can be made salient in explicit and dramatic ways.

There was a renewed emphasis on teaching the nature of science after Sputnik. One popular idea was to include more material from the history of science. Not only would famous episodes illustrate the nature of scientific inquiry and the methods by which scientific concepts are refined, it would also introduce students to the personalities of great scientific heroes, an excellent way of showing the human side of science. (My Department of History and Philosophy of Science at IU profited greatly in the early 60s from an NSF program encouraging our disciplines to become involved in science education.) Some of these initiatives were quite successful. (Recall Gerald Holton and Duane Roller's popular physics text and James B. Conant's famous *Harvard Case Studies in Experimental Science*. The journal *Science and Education* continues to publish research in this area.)

But what happens to the tradition of teaching students about the Nature of Science when the received view of science within the university is dominated by postmodernism, postcolonialism, feminism and other politically correct perspectives? Well, for a start the historical figures in the sidebars will certainly change. The featured scientists will be chosen for the obstacles they overcame and how well they fit into an obligatory rainbow of identities rather than for the centrality of their scientific contributions. And the story of

science as “politics by other means” (Sandra Harding) and a tool of the oppressors will be woven in at various points.

A particularly flagrant example of this trend is provided by the little Cambridge University Press paperback *The Golem: What You Should Know about Science* by Harry M. Collins and Trevor Pinch, which has now been followed up by *The Golem at Large: What You Should Know About Technology* and *Dr. Golem: How to Think about Medicine*.

Some of what Collins says is obviously wrongheaded but there are other, more subtle ways in which it can have a bad influence on science education. First is his suggestion that knowing about how science works is more important for the student to know than are the fundamental concepts of science. Even if he portrayed science as the archangel Gabriel instead of the Golem, I would still insist that citizens need basic scientific information, about energy, atoms, genes and fossil fuels. As our scientific knowledge of the world increases it is all too easy for all of us, and K-12 teachers are no exception, to say that as long as our children know how to find the information they need (on Google, say), they don’t need to internalize anything but the methodology. And if that methodology sounds sophisticated, with talk (or should I say “discourse”?) about social constructions and hegemonically induced “silences,” etc., you can hold your own at any cocktail party.

The *Golem* approach has an additional shortcoming as a resource for education. Even if all of his comments about priority conflicts, inconclusive data, and maneuvering for funding were placed within a balanced context, one might still ask whether these are the most important things for students to learn about science. Of course, we don’t want our students to be naïve and credulous, especially as they get older, but do we really think science today is so dangerous and so out of control that we want our students to be wary and suspicious of it from the gitgo? (I would make the same comment about how beginning students are taught history, politics, economics, and civics. If teachers are discouraged and pessimistic they should be professional enough not foist it onto their students. Cynicism is not a strategy for improvement.)

There is much to admire in the latest National Science Education Standards [1996]. They note that learning about science as process is not enough. Understanding of content is also required and they emphasize that the needs of all children, regardless of their back ground or learning abilities, should be addressed. Their vision is universal science literacy. But one of their goals opens wide a door through which political correctness will surely intrude. This is the requirement to present Science in Personal and Social Perspectives. "An important purpose of science education is to give students a means to understand and act on personal and social issues." What might this mean in practice?

One topic is personal health. Children in K-4 should learn the difference between bacteria and viruses, contagious and non-contagious diseases or other health problems, and the importance of nutrition. Even at this age children should become aware of the "science and technology in local issues." By High School this standard is extended to national and

global challenges. But what *are* these challenges? Perhaps you might think of world hunger and the promise of genetically engineered grains? Or you might think about how science and technology might help us attack malaria or poverty or illiteracy. (I am particularly intrigued by the new $200 XOcomputers developed at the MIT.) But these are not the sorts of examples we find here. Rather the standards specify that the students learn about human-induced hazards and a host of environmental issues. K-4 kids will learn about pollution, grades 5-8 will develop "a more conceptual understanding of ecological crises" as well as an understanding of acid rain and ozone depletion., in grades 9-12 students will be disabused of the naive idea that scientists provide the facts relevant to social issues while society sets policy. "There is some research supporting the idea that S-T-S (science, technology, and society) curriculum helps improve student understanding of various aspects of science- and technology-related societal challenges."

Once again, the idea of relating science lessons to current events has a long tradition, although I would guess that it has always been more successful as a way of piquing children's interest than of preparing them to take direct action as citizens. Following World War II the NSF supported summer institutes for teachers as part of an "Atoms for Peace" initiative. I attended a couple of these and we learned where to get inexpensive Geiger counters and isotope samples that were safe to use in the classroom. Undoubtedly, one goal of the NSF was to decrease laypeople's concerns about the use of radiation to prolong the shelf life of produce and medical treatments using radioisotopes, as well as nuclear power plants. And post Sputnik there was a proliferation of materials for teaching Space Science. Undoubtedly, concerns about the quality of the environment are important public issues today. So, one might ask, why not teach about this topic in the schools?

I have a comment and a caveat. First of all, much of the science that underlies environmental issues is difficult to present to beginning students. The science of space exploration, by contrast, is perfectly suited for students. Rockets are ideal for illustrating Newton's Third Law; an astronaut bounding around on the Moon is a vivid example of the varying force of gravity; and the need for space suits in outer space is an excellent way of talking atmospheric pressure and how it varies with altitude. Radioactivity is a somewhat more complicated topic, but again it lends itself nicely to a discussion of fundamental particles and the Periodic Table. In these cases it was easy to make the science relevant to current events without upsetting the basic structure of the curriculum.

The science of climate change, by contrast, is a very messy subject, in part because our understanding of the phenomena is immature and also because it involves a patchwork of results from many specialized disciplines, ranging from the interpretation of ice cores to computer models of the reflective properties of clouds. Even if students could understand the various strands of the argument it is not an efficient route to the learning of concepts that will be useful elsewhere. The most obvious take-away lesson is that science got us into this mess and New Yorkers are going to drown.

Which leads me to my biggest concern about mandating the topic of environmental science as part of national science standards: Given the current view of science within many parts of the university today as a thoroughly politicized, destructive force in

society, and given that science education programs for K-12 teachers require such a rudimentary knowledge of actual science, and given that it is intrinsically difficult to present the relevant science, the temptation will be for teachers to do a lot of handwaving and sermonizing. (Attempts to get "An Inconvenient Truth" into the schools by distributing free copies is a case in point.)

Conclusion:

After 9/11 there was a moment when our country seemed to come back to an appreciation of the eternal verities: some cultural practices are better than others, democracy is worth preserving, and it is important to have good evidence for empirical claims. Even the most vehement critics of Bush seemed to be espousing the importance of objective knowledge. They are now calling for our intelligence agencies to come up with *reliable* information; the specifications for levees in New Orleans should be based on *good actuarial data*; they say so-called Republican science is not a good basis for policy because it is *distorted* by political agendas. One might have hoped that liberal intellectuals would have also realized that Democratic or Progressive or Liberal or Feminist science would also be distorted and inadequate. But I'm afraid that hasn't happened. There are complaints from the left about the redaction of scientific reports by governmental bureaucrats by the very same people who call for the resignation of anyone who dares introduce the possibility of gender differences as one hypothesis among others to be tested when trying to understand why there are relatively few women in science and engineering. They can't have it both ways!

The latest indication of the failure of epistemic nerve can be found in a report from the AAUP that talks about "disciplinary truth." [http://www.nas.org/nas-initiatives/aaup_acfree_initiative/answer_aaup_01.htm] Not only does this doctrine license the teaching of bizarre views in Cultural Studies classes, it also suggests that results from the discipline of science cannot be used to argue for or against the "truths" of other disciplines! Yet we should not despair. Reality has a way of intervening, especially when it has friends such as the people here today. And as postmodernism, etc. becomes old hat, other fads will arise. Who knows, maybe Truth, Beauty and Goodness will once again become fashionable!