

Liberal Education and STEM Education
St. John's College 50th Anniversary Conference Presentation
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Abstract:

One of the single biggest obstacles to the proliferation of liberal education is the modern tendency to consider STEM fields as the most or only important fields of study. I argue, to the contrary, that the beneficial cultural effects of progress in the natural sciences and related fields depend in part on a foundation of liberal learning both in scientists themselves and in the broader populace. In a post-Baconian scientific world, scientific progress has both a technological/practical aspect and a philosophical/theoretical aspect. Success with regard to the first aspect is necessarily defined in terms of one's conception of human flourishing, the philosophical debate over which is behind disputes over, e.g., energy, nuclear, and agricultural policy. Interpretations of the second aspect inevitably influence the first, as is seen in the tendency of physicists to extrapolate from their scientific research to broader conclusions about its implications for human nature and existence. It is not a foregone conclusion, then, that education in STEM fields will achieve the goods at which it aims, unless the resulting knowledge is first recognized as fundamentally human and therefore necessarily understood in the broader context of the human good. Establishing this context is one of the fundamental tasks of liberal education, upon which the good of specialization thus depends.

Presentation:

In a 1944 letter to Robert Thornton, then a new professor of physics at the University of Puerto Rico, Albert Einstein wrote the following in response to Thornton's desire to introduce the philosophy of science into his classroom:

I fully agree with you about the significance and educational value of methodology as well as history and philosophy of science. So many people today—and even professional scientists—seem to me like somebody who has seen thousands of trees but has never seen a forest. A knowledge of the historic and philosophical background gives that kind of independence from prejudices of his generation from which most scientists are suffering. This independence created by philosophical insight is—in my opinion—the mark of distinction between a mere artisan or specialist and a real seeker after truth.¹

¹ Einstein to Thornton, December 7, 1944 (EA 61-574).

The generational prejudice, the seeing of the trees but not the forest that Einstein described seems to me to be a common consequence of contemporary education, in large part because of our society's focus on STEM education and corresponding disinterest in liberal education. My intention in this talk is to show how the task of fully reaping the fruits of STEM education cannot be separated from the project of liberal education, and that the latter is essential both on the part of scientists themselves and on the part of the broader populace if the former is to be achieved. In the interests of time, I shall focus primarily on the "science" part of STEM education.

After the early modern era in which Francis Bacon declared that knowledge and power are really the same thing, science came to be seen by many as fundamentally oriented toward technological and practical application. In the modern era, this idea has taken such strong root that scientists have had to deal with politicians wishing to restrict public funding of scientific enterprise to areas that will have a significant practical application, as if this could always be known in advance. Disciplines in the humanities, such as philosophy, or liberal education in general, are ridiculed as a waste of time, their critics saying such things as "If it's not producing food, I'm not interested." Higher education has come to be seen as just being vocational training, with programs such as the St. John's College liberal arts program considered outdated at best, almost a relic of a pre-scientific age.

These sentiments lead us into the first issue I shall discuss. What such critics are really saying is that one ought not devote one's life to activities that are not in some way conducive to human flourishing. Supposing that this is true, the conclusion that one ought not devote one's life to the humanities or to liberal education does not immediately follow, since we cannot know whether this is conducive to human flourishing until we have established what human flourishing

is. For example, the only reason we care whether a discipline is producing food is because we care about food. But why do we care about food? Unless we are hedonists, it is principally (though not only) because we need food to live. But why do we care about living? Presumably because we wish to do something with our lives that goes beyond eating. Thus, it is clear that whatever this “something” is, it is worth doing even if it is not producing food.

This example is an instance of a more general observation, namely that the extreme position that maintains that only what is useful is good is implicitly a contradiction in terms. For the useful is by definition useful *for* something, for the sake of another good; and the ultimate good, also by definition, cannot be for the sake of another good. In the human sphere, the ultimate good is the human good, human flourishing. Thus, again, it is pointless to criticize some branch of learning for not being useful unless we first know what human flourishing is.

This issue arises in many concrete contexts, not just in abstract philosophical discussions. It lies behind the desire of some public figures to reduce funding for NASA, on the grounds that much of NASA’s research is not useful, or at least not obviously so. In a similar vein, sometimes people object to the production of GMO crops not just because they believe them unhealthy but also because they maintain a particular view of the human race’s relationship to nature and what constitutes the good of this relationship.

The foregoing may give the impression that I see the role of liberal education to be restricted to the study of ethics and politics, in which the notions of human flourishing and the common good are considered. But the debate over human flourishing itself depends on prior theoretical philosophical questions, such as what it means to be human in the first place, and what the relationship of human beings to the rest of nature is. These questions cannot be escaped if one is to have a complete account of reality. And if one assumes from the start that one’s own

discipline ought to yield such an account, one will naturally attempt to answer these questions from the perspective of that discipline. Thus we have the phenomenon of physicists, biologists, and other practitioners of the sciences lecturing the public on the “meaning” of their discoveries for human nature, the nature of the universe, and of existence itself.

I do not mean to suggest that scientific inquiry never has relevance to these questions. Rather, I mean that the kind of relevance it has is subtle and difficult to discover, and one cannot hope to judge well of it without much learning and practice. The learning required, however, is not training in the hard sciences but rather liberal learning, which teaches one to consider human knowledge as a unified whole and to distinguish accurately the scope, nature, and limitations of each of its parts. This is why interpretation of the results of scientific inquiry is naturally posterior to liberal education.

Here is a concrete example of what I mean. Physicist Sean Carroll, in a thought-provoking article entitled “Abortion and the Architecture of Reality,” writes about the types of issues that arise in debates over abortion, such as the notions of life and personhood, and argues that it would be foolish to think that scientific knowledge of the world cannot bear on questions such as these. Regarding this general claim, I think Carroll is quite right. But, as is typical in such cases, when he attempts to apply the general principle to specific cases, he mistakes his philosophical presuppositions for the conclusions of science. Science, he writes,

tells us that there is no magical moment at which an incorporeal soul takes up residence in a body. Indeed, the concept of a “person” is not to be found anywhere

in the natural world; it's a category that is convenient to appeal to as we try to make sense of the world.²

Now, physical science does strongly suggest something relevant to the concept of soul, which is that (as Carroll himself points out) however closely one inspects the matter of living things, one will not find it following physical laws different from those followed by inanimate matter. But soul is a fairly nebulous concept, and there is still a long way from the claims of physics to Carroll's interpretation of them. Likewise, that "person" is not a concept in physics is not much more significant for debates over abortion legislation than the fact that the same could be said of "tax return" is significant for economic policy debates.

The general point is that it is actually very difficult to delineate precisely what philosophical, ethical, or otherwise humanitarian implications the scientific worldview ought to have for our broader human worldview. And it is exceedingly unlikely that one will be able to do this well if one has never even studied that broader worldview and the writings of the thinkers who formed and influenced it. Yet this is implicitly what we expect when we encourage students to pursue careers in STEM fields without first exposing them to the liberal education that will allow them to understand what they are actually doing in those fields and how it relates to their lives as *human* lives and not merely as employees.

What does all of this mean concretely? I am aware, of course, that universal liberal education is not in the cards for the foreseeable future. A more plausible first step is the recognition of disciplinary boundaries. Someone need not be an expert in physics to recognize

² Sean Carroll, "Abortion and the Architecture of Reality," Discover Magazine, <http://blogs.discovermagazine.com/cosmicvariance/2009/06/04/abortion-and-the-architecture-of-reality/#.VBeNaBagv-o> (accessed September 15, 2014).

that the physicist is stepping outside of his discipline when he speaks about free will, or the soul, or the meaning of life; or to see that medical training does not automatically render a person competent to speak about ethical matters. Yet questions about these things arise perennially, and if the scientist as such is not the expert on them, someone else must be. Until we are able to distinguish between questions that the hard sciences can and cannot answer, we will be unable to see the value of the education that actually does teach one to answer the questions that STEM cannot, nor even see the true value in STEM itself.

I want to conclude by saying a few words on that last topic, lest I seem to belittle or denigrate the natural sciences, which I in no way intend. Though a philosopher, not a scientist, by profession, I have an amateur's (in the etymological sense of that word) interest in natural science and have the honor of teaching it via my own institution's interdisciplinary program. In the process, I have come to realize that the profundity of the modern scientific worldview faces severe impoverishment if it is approached without a background in liberal education. The significance of the historical shift from geocentrism to heliocentrism simply cannot be appreciated by one who has never dwelt on the thoughts of generations to whom the evidence of heliocentrism was unavailable. I am told that something close to forty percent of Americans reject the biological theory of evolution. This is true even of many who are well-educated, which suggests that a lack of scientific training is not the root cause. For many, religious issues are at stake, but I suspect that this is only a special case of the more general problem I have been describing, which is that we have lost the habit of understanding scientific discoveries in the context of our broader worldviews. As a result, the public frequently receives ideas such as evolution alongside shallow and ill-informed explanations of their "true meaning." Richard Dawkins is a well-known culprit in this regard. Dawkins is a fine biologist, but he is not a great

philosopher—he is a scientist who suffers, as Einstein said, from the prejudices of his generation, seeing the trees but not the forest. This sort of behavior is ultimately detrimental to science itself, which is really much richer than is suggested by presentations of it stripped of human context. Though superficially science may seem to be more exalted by a culture that has lost its sense of the importance of liberal learning, in the end it cannot help but be degraded by the same.