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A Crisis of Ignorance

David Ford's *Three Mile Island: Thirty Minutes to Meltdown* tells how the failure of the Joint Committee on Atomic Energy to understand technical issues undercut the performance of the Nuclear Regulatory Commission and its predecessors, and how scientific and technical ignorance compounded to create the situation of the Three Mile Island accident. What might have been a minor mechanical failure became an economic and psychological disaster.

This is one example from a growing list of failures of American leaders to comprehend the technical and scientific aspects of major issues they have had to decide. Anyone acquainted with science who calls upon wise counsel and does the requisite homework is vastly more likely to make the right or well-advised choice than the untrained person who is totally vulnerable to rhetoric and ignorant of even what questions to ask. Whenever legislators and administrators are in such roles, they put our safety in jeopardy.

For generations, scientists and engineers could afford the luxury of cynical resignation to the technical ignorance of our political leaders. This is no longer so; it has become too dangerous. Understanding modern weaponry, arms control, environmental management, energy, agriculture, and nutrition, and especially their interactions, requires a level of scientific advice and understanding that far too few public figures have. The situation is perilous: cynical resignation becomes outrage.

So this is point one: we are being governed by people largely incompetent to evaluate questions with major scientific or technical components. What is to be done?

Point two: The situation will get worse until popular education includes a modicum of exposure to mathematics and science. I do not refer here to education of scientists or engineers; that is a far easier problem. The larger issue is making the elements of science and mathematics so much a part of our cultural background that any lawyer elected to Congress will be competent to challenge the mathematical and scientific snow jobs he or she faces.

Point three: The initiative for changing the situation must come from the scientific community. The scientifically ignorant laity is not motivated to address the problem. We who recognize it must take responsibility and initiate curricular and institutional approaches to help address it. Supplemental school courses given by scientists from industries and universities may be one helpful step. Keeping competent science teachers in the classrooms is more basic and more difficult. Convincing, honest arguments can persuade young people that science and technology can be rewarding as pastimes for amateurs as well as fulfilling callings for professionals. Home computers and stimulating, entertaining, accurate books by scientists and engineers will help convey those arguments.

Finally, a caution to those scientists and engineers who want to help educate our intelligent but ignorant colleagues: we have tried before, with few successes. We scientists cannot assume we know how children and young people learn. We must have the humility to learn from those who do know something about this very difficult subject, and to work with them both on curriculum and on political and institutional problems.

It is imperative that we find a way to make acquaintance with science and mathematics general. The fabric of our industrial, democratic society cannot survive if ninety five percent of the people depend without understanding on the mandarins of technology, the five percent that keep things running.

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