



Coronavirus: A Sputnik Moment for Science Education

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EXECUTIVE SUMMARY: The coronavirus pandemic has tragically revealed the shortcomings of many institutions, but it has also exposed how poorly science and technology education have shaped the understanding of both policymakers and the public. Like the Sputnik satellite launch in 1957, the coronavirus pandemic is an opportunity to transform science and technology education—but powerful institutional and cultural forces are working against such a goal.

On October 4, 1957 a 58cm-diameter sphere became the first object launched into space. The Soviet Union's Sputnik 1 satellite transmitted signals to earth for three weeks before its batteries died. Less than one year later, in September 1958, Congress passed the National Defense Education Act. The legislation transformed the American educational system by providing funds for a slew of initiatives designed to increase American scientific capabilities.

As the coronavirus pandemic encircles the globe, societies everywhere are experiencing the same shock. We are all realizing that our scientific and technological capabilities, while in some cases prodigious, are insufficient to do more than stem the growing loss of life. A vaccine remains months away if not farther, and the treatments that are available, though numerous, are controversial. More fundamentally, the pandemic has revealed how inadequate scientific and technological education is among the public and among the world's leaders, few of whom have even the most basic conception of what a virus is.

The inability to present, evaluate, and compare statistics on infection rates and deaths, including such simplistic qualifications as raw numbers versus per capita averages, has been woefully displayed. Even models used by epidemiologists to estimate possible numbers of deaths—the models on which political leaders have made wrenching decisions to shut down vast swaths of the world economy—have

been shown to be flawed. The way those models work, be they flawed or otherwise, is obscure to everyone but specialists.

So too with the cost-benefit analyses being used to evaluate when economies can reopen. Reconciling the approaches of physicians and economists requires understanding their contrasting premises and applying a moral calculus that accepts some level of risk. Even such prosaic questions as understanding toilet paper shortages means addressing complex technologies; namely, supply chains, which must then be multiplied countless times from every product from antibiotics to milk.

The shock that accompanied Sputnik's launch was felt throughout American society, shaking it out of the self-satisfaction and complacency that had developed at home during the peace and prosperity of the 1950s even under the growing threat of nuclear war. The "missile gap" that loomed large during the 1960 presidential campaign turned out to be illusory, but the space race that developed between the US and the Soviet Union was a tangible means of generating national pride and, more fundamentally, developing science and technology. This hardware-oriented goal was accompanied by similarly transformational concepts throughout the 1960s and 1970s aimed at eradicating poverty and disease and improving the environment.

Today's coronavirus shock is rightfully focused on Chinese mendacity regarding the pandemic's origins and spread, and growing horror at Chinese domination of key global industries. But the deeper shock should be the realization of how poorly we understand the science and technologies that underpin the 21st century, even as we rely on them wholly. That knowledge, from a basic understanding of how viruses work to where food comes from, can only be transmitted by an educational system that has gradually moved away from its basic responsibilities.

Making the most of this Sputnik moment means overcoming the shock and attempting to remedy gross shortcomings in educational systems. The futurist cachet and patriotism that were associated with the space race and the Cold War saw students stream into the burgeoning fields of aerospace engineering and computer science. But today's American students routinely test lower than others in mathematics and are far more likely to pursue an education in business than in science or engineering.

Could today's students, scarred by the pandemic, be drawn toward biomedical fields and other vital disciplines? Will the life and death debates over infection reproduction rates (R_0) spur greater interest in biostatistics, epidemiology, virology, mitigation technologies such as antimicrobial coatings, and the techniques and ethics of mass testing and mass surveillance? Will shortages in consumer commodities and critical medical supplies drive students to study manufacturing techniques and supply chain management, from rapid prototyping of hospital ventilators to

transportation and logistics? Indeed, fields from nanoscale drug delivery to robotic agriculture are critical to 21st century security, not simply economic competitiveness.

But enhancing US science and technology is far more complicated today than it was 60 years ago. The military-industrial complex that President Dwight Eisenhower warned against in his farewell address now has serious rivals. The higher education industrial complex alone accounts for over \$600 billion of the US economy. Elementary and secondary education in the US cost another \$700 billion. These industries, which are distributed throughout every state and community, are—if nothing else—experts at explaining why they deserve yet more money.

The sums already spent on medical research are vast: the National Institutes of Health has a budget of \$41.7 billion, while the pharmaceutical industry spends over \$70 billion annually on research and development. US healthcare costs are over \$3 trillion annually, with an additional \$550 billion spent on research and development. Over 70% of that R&D expenditure comes from the private sector.

So how much funding for science and technology is enough? How are existing funds allocated, and how much is siphoned off for other purposes? In elementary and secondary education, American communities spend vastly more per student than almost all their global counterparts—but the students receive worse outcomes, even as administrative, pension, and health care costs continue to escalate.

One of the most tangible effects of vast federal funding to higher education over the past decades has been an even faster rise in tuition, around 8% per year, far exceeding the rate of inflation, as institutions extract dollars directly from students and their families and through government-backed loans. Outstanding loans to students total some \$1.6 trillion. Among the costs of these massive debts are dramatic drops in the formation of families and purchases of homes by at least one generation of citizens.

Another more recent dysfunctional higher education phenomenon is the rapid growth of a vast managerial stratum devoted to “diversity” and “inclusion” that already extracts tens if not hundreds of millions of dollars from college and university budgets. It is vital to keep any additional money out of the hands of this grievance industry.

In short, there is little reason to think already well-funded institutions that should be directly responsible for improving science and technology education—some of which are teetering on collapse as a result of pandemic-related interruptions to their cash flow—would do so effectively.

Perhaps the root of the problem is a culture that takes science and technology for granted, where inculcating self-regard is more important than understanding how

the world works, where displays of moralistic posturing are rated higher than examples of intellectual rigor, and where it is the norm to rely on streams of non-Americans, from graduate students to farm workers, to undertake the basic work on which society is founded. Among other things, this culture of risk aversion and intellectual laxity is the product of many decades of foundering leadership that equated throwing money at problems as success.

Like so many tragedies, the coronavirus pandemic offers clarity regarding the failings of institutions and leadership—from the WHO, which has been revealed to be a dishonest Chinese franchise, to local police and governors in free countries acting out dictatorial fantasies in the name of protection. Educational institutions should be examined with similar ruthlessness. But like so much needed change, the call must come from below.

The problems of complacency, greed, and pettiness are fundamentally human questions of character and courage. Rather than place further blind faith in “experts” and institutions, we should be looking carefully at who is providing real leadership and new ideas, as well as cultivating true character and courage within ourselves.

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