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THE SCIENCE TEACHING AND RATIONALITY INDIA NEEDS

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

A speeding autorickshaw driver once told me that slowing down might not be very useful to avoid an accident. He was responding to my unease, sitting behind him, feeling helpless about the consequence I might have to face on account of his reckless manoeuvres, especially at turns and roundabouts. He agreed to slow down because I asked him to, but he was not convinced that it would help avoid an accident. I was intrigued to hear this view and asked him to elaborate. He said that if another vehicle was going to collide with him in the coming few minutes, speeding might save you from that collision. The collision itself was a matter of destiny, not chance, for him and his logic was based on that perception. He wanted to persuade me to realise that an accident is something inevitable. When it is to happen, it will happen. Therefore, slowing down might invite it as much as speeding would.

In academic parlance, this kind of logic has long been regarded as an expression of fatalism. This label does not allow nuances to be recognised in what is a broad framework for making sense of human life and its encounters with sudden changes, especially tragedies. Recalling this autorickshaw driver's logic has helped me to make sense of arguments given in the context of diseases such as malaria and typhoid. When it comes to malaria, whether you get it or not depends on your ability to avoid being bitten by a mosquito. Of course not every mosquito, and not every bite, can cause malaria, but avoiding the proliferation of mosquitoes does prevent the chances of being infected by the parasite that causes malaria, carried by mosquitoes. Malarial mosquitoes breed in stagnant water, and that is where the imperative of avoidance begins.

Imparting direction to science in India

For many decades now, schoolchildren have scored marks by giving the correct answer to the question, 'How can mosquitoes be stopped from breeding in our neighbourhoods?' It is a rare school that gives children a task of going around noticing stagnant puddles formed during the rainy season containing visible mosquito larvae. The standard textbook line of action is to spread kerosene on stagnant water. That is what municipal workers supposedly do, and that is what is taught in the lesson on the services that municipalities provide.

As the pedagogic calendar goes, once a lesson has been delivered and the test based on it taken, there is no reason to recall its content in the later parts of the year, except for the final examination. So, if malaria, dengue and chikungunya persist during the long autumn and winter months, it is unlikely that a teacher will relate them to the lesson taught earlier on mosquito prevention. Thus, while mosquitoes are avoidable, the diseases they cause take on an inevitable character, quite different from the inevitability that my autorickshaw driver was associating with an impending accident.

Before the advent of antibiotics, typhoid fever and jaundice were life-threatening, and especially in the case of children. Doctors knew that it was possible to prevent both these diseases by avoiding contaminated water. And this could be done by boiling drinking water. But more usually, boiling of water only started after someone had been diagnosed as suffering from typhoid, or from jaundice. In any case, boiling was cumbersome and expensive. Along with antibiotics, water purifying devices and bottled water have distanced us from the grim experiences associated with water-borne diseases prevalent before the 1970s. Common diarrhoea is still a threat to the life and health of babies. Instead of preventing it by ensuring the

supply of clean water in all geographical locations, India as a nation has ended up addressing the problem of drinking water by popularising personalised devices.

Only through the prism of science

The absence of public systems has proved costly both in health and in education. The teaching of science from the primary levels was a major policy initiative taken in the early decades of Independence through which the welfare state hoped to create general awareness on crucial matters of disease prevention and health. But the teaching of science is more than talking about science and telling students what ought to be done. In the case of boiling water, for example, it is hardly enough to say that high temperatures kill microbes. To achieve the belief that it actually does, one needs to see microbes with one's own eyes.

For an overwhelming majority of children, our system of education fails to provide them this kind of experience, even at the higher secondary level. The idea that boiling purifies water remains a matter of giving the correct answer in the examination, rather than a belief based on evidence seen through a microscope. This can hardly be described as a failure of education, because the seed of a capable public system was never sown, and, therefore, we could hardly expect a harvest. The novel coronavirus crisis has fully revealed the price that the neglect of education and health has wreaked.

Just this week I had the opportunity to talk to a city-based rickshaw puller who had booked a seat in a private bus which would take him to his native village in Uttar Pradesh. When I asked him why he was going, he gave me the obvious answer I had expected, referring to the sheer inadequacy of income to sustain himself in the city. But then he mentioned another reason why he had to go urgently, and this had to do with a wedding in the village. He had to attend it, he said, otherwise his relatives would feel upset with him. It did not help our conversation when I alluded to the risk of him contracting the novel coronavirus while travelling in a bus and later attending a wedding ceremony.

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He was not particularly interested in my concern that he must take every precaution, and especially make sure that he did not remove his mask during the journey and during the wedding ceremony. His response to my concern for his well-being reminded me of what the autorickshaw driver had said many years ago, namely, that the inevitable cannot be avoided. In this case, the inevitable was hardly a matter of fate. In fact, it is the wedding that was inevitable and therefore unavoidable, even if it posed the risk of getting sick.

My interlocutor also shared with me the feeling that the pandemic is mainly in the big cities and that villages are free of it. Apparently, despite being on WhatsApp, he had not heard about the surge currently being witnessed across rural parts of northern India. But the most interesting part of this conversation had to do with the mask. If the mask, a bit like boiling water, prevents an invisible microbe from entering the human body, it is a matter of faith for someone who has no idea of the world of invisible pathogens.

We may wonder why several western countries, where education is supposedly better, also failed to convince their citizens to wear masks. This argument is based on a positive stereotype of the West. Looking more closely at different countries that comprise the West, one noticed sharply differentiated levels of the quality of their school science. Over the last half century, some of the richest countries have allowed science at school to decline. India's education

system, which was already impoverished, suffered severe cutbacks under the repeated waves of lopsided economic reforms. New norms of public financing have undermined science teaching, robbing ordinary citizens of the intellectual resources they might have acquired during childhood.

How science can be made both engaging and effective

But science teaching alone cannot create miracles. For science to mean anything, a rational social environment is needed. Moreover, for science to acquire meaning during school life, it is important that children grow up in an ethos where dissent and debate are encouraged. It is obvious that the benefits of science and its teaching do not accrue when the democratic order, and the institutions on which it is based, are not in good health.

Krishna Kumar is a former director of the National Council of Educational Research and Training and the author of 'Education, Conflict and Peace'

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