

Education reform in India

This is in response to the note on the need to prioritize primary and secondary education reform in India¹. I agree with the author on the larger message, but I feel the need to point several inconsistencies in the note. While the author is free to express his opinion, he has taken liberty with certain facts and some of his opinions are ill-informed.

The author notes the large budget for education and research and the world's second largest education system as positives for the Indian education sector. Any public sector programme in India will end up as the largest or one of the largest in the world just based on the sheer size of our population. So, a large education budget in and of itself may not mean much. Measured as a percentage of GDP, India's budget for education has never crossed 5% since independence. Despite having the second largest higher education system in the world, India has one of the lowest expenditures on higher education per student². The author discusses the low literacy rate in India and ties it to the dismal HDI score. HDI is a result of several factors, literacy being one among the many. India's low HDI is a result of several factors such as lack of access to water, poor health and hygiene, lack of women's rights, etc. In fact, one can argue that lack of access to water and sanitation affects HDI much more than some of the other factors by themselves³. Indeed, sanitation and education have a close relationship^{4,5}, which is even reflected in some of the provisions of the Right to Education Act.

The author's statement that India is among the four countries that have seen a marked increase in attacks on schools is factually incorrect and misleading. The UNESCO report uses the term 'worst affected' to designate countries that have experienced 'more than one hundred incidents of attack, or more than one hundred killings or large-scale recruitment of child soldiers or sexual violence against students and teachers in the two-and-a-half-year reporting period'⁶. Included in the honour roll apart from India (in alphabetical order) are Afghanistan, Colombia, the Democratic Republic of the Congo, Georgia, Haiti, Israel/the Palestinian Autonomous Territories, Iraq, Nepal, Pakistan, Somalia, Sudan, Thailand and Zimbabwe. The readers may have been well-served if the author had additionally included that most of the violent attacks on schools occurred in the Naxal-heavy areas of central and eastern India, and are part of a much broader violent struggle for legitimacy. All of this is not to undermine the grave threat to young minds across several barely existing school campuses in the hinterlands of the country.

The author's assertion that teachers selected through caste-based reservation are unfit to build character and infuse professional ethics among students is a baseless statement at best and borders on racism at worst. It is perfectly legitimate to argue the merits of caste-based reservation to understand if the benefits are reaching the ones who most need the helping hand. But we all have to agree

that people from the 'lower castes' were dealt a bad hand and will need structural support to compete with everyone at an even level. The disruption of schooling in the tribal areas discussed above reinforces this argument. The importance of primary and secondary education in building India's future cannot be overstated, but we should take care to keep out misleading assertions and innuendos from the conversation.

1. Chatterjee, J., *Curr. Sci.*, 2012, **103**, 356–358.
2. Hussain, S., *Business Standard*, New Delhi, 2007; <http://www.business-standard.com/india/news/higher-education-spending-india-atbottombric/273649/>
3. Vedachalam, S., *Aguanomics*, 2011; <http://www.aguanomics.com/2011/05/wash-and-human-development.html>
4. Indo-Asian News Agency, *Economic Times*, New Delhi, 2012; http://articles.economicstimes.indiatimes.com/2012-04-25/news/31399029_1_separate-toilets-cent-schools-water-facility
5. Grantham-McGregor, S. *et al.*, *Lancet*, 2007, **369**, 60–70.
6. O'Malley, B., UNESCO, 2010; http://unesdoc.unesco.org/images/0019/001912/1912_26e.pdf

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Are we wrong in conventional approach of biocontrol?

The green revolution introduced synthetic insecticidal compounds, which decreased largely a variety of insect pest populations, due to their long residual action and wide toxicity spectrum. However by 1950s, the indiscriminate use of these compounds caused a resurrection of pests, due to elimination of their natural enemies and also emergence of pest populations resistant to the insecticides. Serious environmental and health issues

had begun to be recognized due to assimilation of chemical residues in food, water and air. By the mid 1970s, the World Health Organization and other international organizations commenced studies on biocontrol agents. Thereafter, biocontrol has been widely considered as an attractive technique for controlling insect pests, pathogens and weeds, due to its least environmental impact and avoidance of problems of resistance in the

vectors and agricultural pests. Unfortunately by the 1980s, however, population impacts of biocontrol agents on non-target species (e.g. natural enemy populations) as well as adverse outcomes of target species caused researchers to consider the environmental safety of biocontrol^{1–3}. Apparently, this was simply due to ignorance and negligence of the ecosystem complexity and natural balance of diverse organisms. That is why for

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instance, mere enrichment of natural enemy populations does not necessarily support effective pest control. Until we fully realize the ecosystem functioning, it would be unrealistic to expect that we will ever be in a position to be totally confident about the safety of biocontrol. In developing conventional biocontrol techniques, what we have been doing is first experimenting with a segregated portion, in most cases one link of the complex ecosystem food web and then to devise a mechanism to control the pest or pathogen.

What we have not considered here is the other interactions of the link that were separated out from the food web, which is why we would not be confident about the safety of biocontrol agents. Thus, the development of large-scale biocontrol strategies requires a more holistic ecosystem approach. However, studying completely the complex food webs in nature and then formulating mechanisms for harmless biocontrol would not be an easy task and hence apparently unrealistic. So, is there a shortcut to do safe biocontrol in an ecosystem approach? Yes, of course, recent microbial biotechnological advances show that there is a way.

It is a well-known fact that the collapse of soil microbial communities, and hence biodiversity in agroecosystems and managed ecosystems in general, due to chemical inputs and tillage results in the numerous issues threatening sustainability. In this, emergence of pests and pathogens is one of the major problems. Direct application of developed microbial communities in biofilm mode called biofilmed biofertilizers (BFBFs) has been shown recently to start restoring depleted tropical cropland soils, soon after their application, within 1–2 months, with better yields⁴. Major role of BFBFs in the soil is to increase biodiversity, thus improving ecosystem functioning and sustainability. Biofilm actions of the BFBFs tend to break dormancy of microbial, plant and animal seed banks in the soil, thus increasing biodiversity of the ecosystems (G. Seneviratne, unpublished). This has evidently resulted in natural emergence of biocontrol agents of common pests⁴ and pathogens (G. Seneviratne, unpublished), thus reducing infestation. In organic farming too, there are several examples to show that increased biodiversity helps biocontrol in the long run^{5,6}. However, the use of BFBFs is a quick and easy remedial

measure for safe biocontrol. This is a novel biotechnology; therefore its further research and adoption as an alternative to unsafe conventional biocontrol should be initiated soon.

1. Pratt, P. D. and Center, T. D., *BioControl*, 2012, **57**, 319–329.
2. Simberloff, D., *BioControl*, 2012, **57**, 263–276.
3. Prithiviraj, B. and Singh, U. P., *Curr. Sci.*, 1997, **73**, 643–644.
4. Seneviratne, G., Jayasekara, A. P. D. A., De Silva, M. S. D. L. and Abeysekera, U. P., *Soil Biol. Biochem.*, 2011, **43**, 1059–1062.
5. Crowder, D. W., Northfield, T. D., Strand, M. R. and Snyder, W. E., *Nature*, 2010, **466**, 109–112.
6. Vandermeer, J., Perfecto, I. and Philpott, S., *BioScience*, 2010, **60**, 527–537.

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Research projects funding

We read the letters of Gowrishankar¹, Balasubramanian² and Vijayan³ on processing of applications for R&D projects. Our experience is also similar. The time taken for processing various R&D project proposals by funding agencies has been 1–2 years because of the unnecessary delays by the Administration and Finance departments. Even after final sanctioning of the project, the releasing of funds from the Finance Department takes a long time.

We feel that the sanction itself is taking a long time because of undue delays and the procedures adopted by funding agencies. It is understood that the proposal is referred to an expert committee for sanction or otherwise. After the expert committee sends its recommendations, there should not be any delay

beyond about 2–3 months. After that the administrative and financial scrutiny is not really called for. This scrutiny puts the entire recommendations of the expert committee fruitless. As it is well known, unless a project proposal is processed within a reasonable period of 3 months, there will be many difficulties in organizing the processing, and execution and implementation by the applicants who have requested for project funding. We feel that no proposal should take more than 6 months for sanction or approval and funds release after the recommendations of the expert committee are received. Sometimes constitution of the expert committee and its meeting may take a long time. But efforts should be made to avoid this. Otherwise the researchers will find it difficult to wait for this unneces-

sary delay in receiving funds. This results in slow progress of research in the country.

1. Gowrishankar, J., *Curr. Sci.*, 2012, **102**, 1499.
2. Balasubramanian, D., *Curr. Sci.*, 2012, **103**, 355.
3. Vijayan, M., *Curr. Sci.*, 2011, **100**, 815–816; 2011, **101**, 605–606.

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