

Editorial

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With mass education, a very high degree of homogenization has crept into many aspects of school education. Children at a given age seem to learn the same material, the same way, with the idea of finally producing a Model T student. A child gifted in mathematics usually stands out in such a system. However, a potential naturalist like Darwin or an inventor like Edison or an original political thinker like Gandhi may be buried. The problem has been realised and one can see pockets of reforms, within some existing schools and in the starting of new ones offering alternate methods of education. One point all knowledgeable and concerned people agree on – unburdening a child with less material and just teaching essential concepts will give her time to find her natural way.

Yet another type of homogeneity is increasing in elite engineering institutions like the IITs and the NITs. The severe competition to get into these colleges and the single entrance criterion (for example, performance in the JEE) has led, with a few exceptions, to one type of entrants – mainly from urban areas, intensely coached for at least two years and many times burnt out by the time they enter. Ideally there should be a good mix of (capable) students from different socio-economic backgrounds, geographical locations and with different interests – a daughter of an Ambani, a son of a village school teacher (it is so often a village teacher, is it not?), someone with a passionate interest in mechanics but passable knowledge of chemistry. While this utopian state is difficult to achieve, it is worth striving for, because of the tremendous benefits that will accrue to society.

Diversity in the subjects offered and studied and researched is as important to an institution as diversity in the student population. A liberal dose of courses in humanities, economics, management, art and biology would undoubtedly enliven and



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broaden an engineering student's horizon. In research, strides often occur from cross-fertilization of ideas from different disciplines. Designing a new drug delivery system or a mechanical heart valve would be done so much more efficiently and effectively if it involved the collaboration of a doctor and an expert in fluid flow with, ideally, medical and engineering departments present in the same campus.

Robert W Floyd, the computer scientist and Turing Award winner, featured in this issue of *Resonance* had an unusual career. A child prodigy, he got, in an accelerated program, a BA degree at age 17, a BS degree in physics at age 22, wrote five seminal papers on compilers while working in software firm, and finally got into academics (without having a PhD degree!) at age 29 as an associate professor at Carnegie Mellon University and a few years later moved to Stanford. That he could do research in a software firm, something perhaps unthinkable today, illustrates the importance of flexibility and opportunities a gifted individual should be given.

Bugs in a Windows operating system bug us, but are usually harmless. However, bugs in programs running a complex system, like the Space Shuttle can be disastrous. Meenakshi's article on verification, an area of interest to Floyd, discusses the techniques to reduce such bugs. Shirali gives an interesting derivation of the shape of a suspension bridge without using differential equations, but has the ideas of calculus in it.

Finally, continuing our celebration of the centenary of Einstein's miraculous year, Mukunda weaves an insightful story behind the man and his work. We see Einstein to be, at the same time, humble, tenacious, ever questioning, willing to change viewpoints, and most importantly setting no self-limiting boundaries on his thinking. As Planck points out, though not in an entirely complimentary tone in relation to Einstein's hypothesis of light quanta, "... it is not possible to introduce new ideas even in the most exact sciences without sometimes taking a risk".

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