Challenges to education in modern India*

Science education in India faces several challenges and obstacles within the classroom, higher education and society at large. The seminar organized recently stressed upon the important challenges that science education faces. The obstacles to progress were explored and substantial suggestions were provided to proceed smoothly.

The programme was coordinated by H. C. Pradhan (Homi Bhabha Centre for Science Education (HBCSE), Mumbai) and Aniket Sule (HBCSE). Anil Kakodkar (Atomic Energy Commission) chaired the session. Kakodkar, in his opening remarks stressed that education is an area of public investment and it imparts leverage to demographic advancement in the country. Kakodkar stressed that there is a need to excel in imparting good quality education. Today, the preparation of youth to be able to deal with the emerging tomorrow should be done in a different manner since whatever was relevant earlier would keep changing rapidly.

The session began with a talk by Varun Sahni (Jawaharlal Nehru University, New Delhi) on Technology Vision 2035 – Education. Since 2011, TIFAC (Technology Information, Forecasting and Assessment Council, the Government's autonomous technology think-tank) has been engaged in a vast consultative exercise to formulate a Technology Vision 2035 (TV 2035) for the country. This is a vision document which generates 12 sectorial roadmaps, among which education is one of the core aspects.

The vision for education is 'Realizing the full potential of every Indian'. In pursuit of encompassing this vision, Sahni depicted the core aspects of the sectorial roadmap comprising (i) literacy, creativity and skills, (ii) culture recreation and good life, (iii) access: anyone, anywhere, anytime, (iv) lifelong learning, (v) testing, evaluation and certification, (vi) integration, aggregation and flexibility and (vii) technology in education. He also revealed that the sectorial document considers that by 2035 there would be eight broad, non-mutually exclusive categories of Indians, each with very distinct educational needs: (1) rooted and remote, (2) global diaspora, (3) drop-outs or late bloomers, (4) left out or left behind, (5) second chances and double dips, (6) alternate lifestyles and worldviews, (7) creative, innovative and imaginative, and (8) beehives and production line.

The sectorial report delves in detail into evolving notions of teaching and learning, including adaptive learning, blended/hybrid learning, mass learning, bring-your-own-device (BYOD), massive open on-line courseware, collaborative and social learning, reputation metrics, do-it-yourself (DIY), virtual learning, flipped classrooms, and virtual/open/meta universities. Sahni disclosed that in the document, some of the emerging technologies that have specifically been examined and analysed include 3D printing, 4G/5G communication technology, artificial intelligence, brain–computer interface, cloud computing, gaming/gamification, gesture recognition, holography, internet of things, machine vision, machine-augmented cognition, photonics, quantum computing, real-time translation, volumetric screens and wearable technology.

Sanjay Dhande (IIT, Kanpur) discussed education for global leadership in technology. Indian higher technical education has been well acknowledged all over the world due to the impact of institutions like IITs, NITs and IIMs. Dhande said that excellence in industry, research and academia at the international level has been due to the 'analysis' orientation of education. In the coming years, he proposed that the global leadership in technology would need a strong emphasis on the 'synthesis' orientation of education.

Technology is rapidly evolving; every five years, there is a new technology that addresses the challenges faced by the society. In the coming years, there is a dire need for the global leaderships in technology to address the challenges of energy, environment, infrastructure, healthcare, population and security. Indian higher technical education needs to change the present curricular structure and also the pedagogical approach. Dhande focused on how the Indian higher technical education can concentrate on creation of various types of intellectual properties. The present system is lacking in international exposure. India would have to create a global character of higher technical education. It is said that India has achieved a global leadership position in IT services and automotive components. Similar status can be achieved in higher technical education too through high-quality education.

Pandit Vidyasagar (Swami Ramanand Teerth Marathwada University (SRTMU), Nanded), talked about revitalization of the teaching–learning process. According to him, revitalization is essential for raising academic standards, bringing about innovation and satisfying the need of holistic education. Rote learning hinders the progress of students. In India there is a vast diversity in governance, structure patterns, curriculum and evaluation methods. It is therefore essential to bring uniformity in the various aspects of higher education, besides the revamping of teaching–learning process.

Vidyasagar stressed that without a total change in the whole education process, India will not be able to face challenges in the 21st century. University Grants Commission (UGC) and National Assessment and Accreditation Council (NAAC) have included components such as consistent curricula, rich learning resources and sharing of resources, use of information and communication technology (ICT), concept-based learning and including skills as an integral part of education.

Vidyasagar informed that SRTMU, has recently introduced a skill-based learning programme as an integral part of higher education in addition to a novel scheme 'One teacher one skill' that is supported by Maharashtra Chamber of Commerce, Industry and Agriculture.

H. C. Pradhan enlightened the audience regarding science and mathematics education – perspectives and prospects. He reviewed the significant attempts at

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reforms and innovations in the area of school and undergraduate science in India. He also suggested specific measures to be adopted in science education. Pradhan stated that although India has made substantial progress in setting up a number of science education establishments and has achieved remarkable qualitative success in research, taking benefits of science to the underprivileged and masses remain unfulfilled. In the light of the demographic advantage that India has until the year 2030, this matter is of concern and urgency.

According to Pradhan, the key to take on the challenge is reforming the system of education from primary to higher education, including research. He suggested that education should be viewed as a future investment as it was done in countries like Finland, where the process of reforms once undertaken was sustained irrespective of the political group in power. He felt that the educational system requires massive infrastructural contributions such as proper toilets, classrooms, blackboards, laboratories, equipment, etc. in addition to recruiting and training of teachers and educational administrators. The whole educational initiative requires a paradigm shift in thinking and orientation.

Pradhan mentioned about many positive developments that have taken place during the last two decades, for instance, the national curricular framework (2005) brought out by NCERT, the national curricular framework for teacher education (2010) brought out by NCTE, the RTE Act, the national assessment and accreditation exercise, autonomous colleges, establishment of special science education institutes, talent nurture schemes, undergraduate research schemes, etc. Many of these reforms have brought about path-breaking changes in the fields of educational philosophy and pedagogy across the world. Today, both ICT and knowledge explosion have enforced one to think differently.

Uday Panchpor and Amit Ranade (Maharashtra Knowledge Corporation Limited (MKCL), Pune), gave a joint presentation on technology for large-scale access to holistic education. MKCL is a company promoted by Higher and Technical Education Department of the Government of Maharashtra and was established in year 2000, with an objective to bridge the digital divide. To achieve this, a course of IT literacy is designed and over one crore students have become IT literate in Maharashtra, informed the speakers. They also revealed that the company has set up a network of public–private-partnership framework of 5000+ authorized learning centres in more than 400 talukas of Maharashtra. A holistic education process 'From inform-to-perform and perform-to-transform approach' is adopted. This is achieved through high-quality learning content, unique learning process and good learning environment. Panchpor and Ranade have designed 'situation-based content' with integral skills and best global practices. They lead the learner to create 'Socially useful and productive output'. According to them, learning happens through four steps of principles of andragogy, which include appreciation, imitation, emulation and self-direction, and that learning should be problem-centred rather than content-oriented.

Education happens through the principle of continuity of challenges leading to continuity of creative engagement and enjoyment. MKCL's e-assessment management and evidence-based on-line testing system emphasizes on five major areas – e-objective evaluation, practical-based evaluation, e-portfolio, process-folio and peer assessment methods. The focus is on learning and not merely on technology alone.

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MEETING REPORT

Human–wildlife conflict or coexistence: what do we want?*

In recent times, human–wildlife conflict has received much attention in scientific, popular and social media as it poses major threats to the wildlife populations, man and his crops in forest fringes and also in the urban areas. Some of the pertinent questions raised by the human–wildlife conflict are: Is this conflict in an increasing mode? If so, what are the plausible reasons? and how can we reduce the conflict and facilitate coexistence? To brainstorm some of these volatile issues, the Central University of Kerala (CU-Kerala), Kasaragod, organized a national-level symposium. Participants from all sectors of the community, including farmers, forest officials, wildlife biologists, National Wildlife Board and Biodiversity Board members, behavioural ecologists, media persons, researchers, post-graduate and secondary-level students of local schools, colleges and universities attended this symposium.

In the welcome address, P. A. Sinu (CU-Kerala) highlighted that the glorified coexistence between man and wildlife in India, if switched to the conflict mode, certainly has something to do with the threshold level of tolerance of both man and the wild animals. The unprecedented loss of wild habitats has decreased the tolerance level of wild animals to man and his actions. Urbanization, climate change, crop loss, steady depreciation of crop products, import and export policies of the government and occasional wildlife raids to 'encroached and intensified' farmlands affected man's tolerance level to the wild animals. G. Gopakumar (CU-Kerala) in his presidential remarks emphasized that the increase in human population, resulting in encroachment of the habitats of wildlife and unscientific planning of our land for developmental activities are obvious reasons for the conflict, and we should try to regain the coexistence between man

*A report on the brainstorming symposium on the 'Human–wildlife conflict or coexistence: what do we want?' organized by the Central University of Kerala Padannakad, Kasaragod on 15 October 2014 as an event of Swasraya Bharath 2014.