Editorial

New Education Policy and Science & Technology Vision 2032 - Catchy Slogans to Action

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The increasingly large numbers of Indians occupying leading positions in diverse areas across the world should be a pointer to significant progresses in India in fields of education and science & technology. However, in spite of these global successes, the rankings of the country as a whole in education or scientific research or technology development remain abysmally low. Even if one were to question some aspects of validity of the methods that are used for deriving the global rankings and also notwithstanding instances of significant achievements in some cases, common sense itself indicates that the country as a whole is way behind in education and S&T related activities and unfortunately, continues to slide down. It is in this background that the country looks forward to the periodic assessments and course corrections in the policies for education and the long-term S&T vision. Presently we are in the midst of such an exercise.

The ministry of human resource development (MHRD) of the government of India has placed online the report of a committee constituted to make an assessment of the current scenario and recommend the future course of actions (http://www.nuepa.org/New/download/NEP2016/ReportNEP.pdf), a draft of the new education policy issues (http://mhrd.gov.in/sites/upload_files/mhrd/files/Inputs_Draft_NEP_2016_0.pdf) and sets of questions relating to school (http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_ document/Themes_questions_SE.pdf) and higher education (http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/Themes_questions_HE.pdf) for public to participate and make suggestions. This is indeed a welcome step.

The Committee's report and its recommendations are fairly comprehensive. However, the documents on inputs for draft NEP and for themes and questions for school and higher education prepared by MHRD seem to ignore several basic and critical issues relating to education in different domains of knowledge.

In view of the extremely high unemployment and the unemployability of a large number of our educated youth, the MHRD document on the new education policy (NEP) has placed considerable emphasis on 'skill' development as part of the school and higher education. This seems to shift emphasis on vocationalization of education, especially the higher education. It is true that the enormously large number of youth needs to be adequately trained to become self-employed and/or to be competent for the variety of industries, including those that need soft skills. Therefore, our education system needs to be geared to fulfill these gaps. However, the NEP document seems to be going overboard on 'skill development' as the main thrust of the education policy. There is little or no mention of "basic sciences", "science education" or "mathematics education" in the draft policy document. Likewise other subjects in humanities, social sciences or arts etc also do not find any significant attention. The need for adequate teaching and learning of basics of science, mathematics, humanities, arts etc cannot be over-emphasized since these are core areas of education and strengths of any society. These have to be the focus of learning at levels of school, college and university education. Emphasis only on 'skill development', required for the job market, will further aggravate the paucity of good qualified educators and quality researchers in the future. This would obviously have very serious cascading consequences. Likewise, while training and research in applied areas need vigorous promotion, the success of country's R&D

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activities resulting in novel inventions and applications would indeed depend upon the quality of country's training and research in basic disciplines. This would require strengthening of labs at all levels, but more so in the colleges and universities to provide for research-based learning. The main policy framework, therefore, needs to have adequate emphasis on basic subjects in all domains. Sarvepalli Radhakrishnan, a great educationist and teacher of recent times, stated "to help the students to earn a living is one of the functions of education, *arthakarica vidya*", but "Education, according to the Indian tradition, is not merely a means of earning a living ………. It is initiation into the life of spirit, a training of human soul in the pursuit of truth and the practice of virtue". Radhakrishnan also said "all education is, on the one side, a search for truth; on the other side, it is pursuit of social betterment" and, therefore, "Education should give the children not only intellectual stimulation but a purpose" and "any satisfactory system of education should ….. insist on both knowledge and wisdom, *Jnanam vijnana-sahitam.* It should not only train the intellect but bring grace into the heart of man". A holistic development of society, therefore, requires availability of equally good quality of education in all domains of knowledge (humanities, arts, literature, music etc), besides the so-called skill development in science and technology. The NEP document, unfortunately, seems to miss this holistic planning.

The policy document should also provide broad indications about the administrative, fiscal and other steps that are to be followed to implement the proposed policy changes. Extremely good policies fail completely if not properly implemented. One of the reasons for education not being able to make its impact is the limited funds allocated for this important sector. In spite of repeated recommendations of earlier committees on educational reforms that education should receive at least 6% of GDP, our budget for Education remains around 3.5% of the GDP. Notwithstanding the old saying that limitations make human efforts more productive, education cannot be effective without the availability of adequately trained manpower and well-equipped material resources. Education is a social and philanthropic responsibility. Money and effort spent on this activity must not be evaluated directly in terms of monetary returns. Unfortunately, the draft policy statement also recommends that education should receive the

promised 6% of GDP; but does not commit. One would, after having experienced the alarmingly rapid deterioration in quality of education at all levels, expect a more unequivocal commitment on part of the policy planners and government that the desired levels of resource inputs would indeed be made available. Without an overhaul of our limping education system, no vision of academic excellence would fructify. The overhaul, requires not only objectively planned long-term visions and policies, but also ample material resources to convert the vision into reality (Mashelker, 2005; Lakhotia, 2005). The bulk of resources have to come from the governmental funding.

Class-disparities are, unfortunately, continuing to be a fact of social life in India. Besides the historical caste-based fragmentation of the society, recent years have also witnessed a phenomenal rise in the proportion of youth in the middle-income class. While discussing equity and inclusiveness in the NEP, we need to also consider as to how we nurture and promote academic excellence on one hand, and, on the other, support the large numbers of growing middle-income group who neither come under the umbrella of 'reservations' nor can afford studies in the better-endowed academic institutions because of financial limitations. Consequently, a large number of bright students in this category find most doors shut for them. Success of any education paradigm depends, not just upon what the best among the students could achieve, but more upon how the average students could be transformed. As emphasized recently by Ramakrishnan (2016) "Depth (namely having a large number of universities offering education of comparable content, this being confirmed by objective criteria), and world level quality need to be there. The twin goals of equity and excellence need to be kept in view, always".

The quality and competence of human resource available for educating the youth and for carrying out R&D activities is a critical factor that determines how well and how fast we move to be a real knowledge society. The NEP needs to seriously take this into consideration and develop appropriate strategies for harnessing the best of our students within the country to contribute to India's progress. The prevailing perception, whether stated or unstated, in S&T areas is that those who have had some experience outside the country are better than those who chose not to go

or could not go abroad. In spite of the numerous discussions and statements about curbing the brain drain, this largely unfounded belief is a major factor that continues to promote it. I believe that we need to develop policies and strategies that can identify the brighter of our students for supporting and mentoring from an early stage so that their inherent capabilities can blossom into independent and competent individuals within the country. A common argument is that with increasing globalization, we cannot prevent our youth from seeking the best opportunities. However, if some of the relatively less advanced countries have also become preferred destinations for our youth in recent years, it is clear that we have not been able to provide attractive opportunities to our youth within the country. My conviction is that when we talk of "broadening of the intellectual horizon" because of the western exposure, we are betraying our own lack of self-confidence. At least some of the research laboratories in this country are as well equipped as any good western laboratory. Unfortunately, it is such institutions that attract the best young students for research but 'export' nearly all of them for post-doctoral exposure abroad. If we are not able to believe in the capabilities of our own well trained students, there is something wrong in the way we do things and look at them. As long as we continue to have such one-way traffic of talent, we would remain followers rather than become leaders. Obviously, there is an urgent need of a paradigm shift. The NEP needs to have well-defined policy statements and follow-up actions not only for developing appropriate opportunities but also for creating the required environment for productive and satisfying work-culture in different institutions in the country.

We also need a better coordination between different governmental departments and agencies so that the schemes floated by one are implemented in synergy with those of the others rather than each remaining a stand-alone effort. One example is the INSPIRE programme initiated by the Department of Science & Technology (DST) with a view to not only inspire young school students to take up careers in science but also to provide attractive opportunities to young PhDs to start their independent careers in science within the country. However, this ambitious, much needed and potentially very useful scheme has not been able to make the desired impact because the UGC, universities and research and other academic institutions have not adequately moved in to be in sync with it. The UGC runs its Faculty-Recharge Programme independently. Likewise, the lucrative fellowships introduced by other agencies to attract young Indians back home remain isolated efforts. One would expect that in view of the experience of past years, the NEP would effectively address these issues so that the investments under the different good schemes have wider and long-lasting effects.

The Niti Ayog of the government of India has formulated 'India Science & Technology Vision 2032-33'. As in the case of NEP and the earlier directives of the government to country's various research institutions to engage in applied research, the emphasis of the S&T Vision 2032-33 is also on industrial and social relevance of research activities. However, as discussed above and also on earlier occasions (Lakhotia, 2015), over-emphasis on short-term fancy deliverables would scuttle high quality evidence-based science and technologies. We must not forget that 'blue-sky' basic research is the fountain-head for all technological developments. India's recognized successes in fields of Atomic Energy and Space have indeed been based on continuing basic science research by many. Therefore, while we promote applied research, we must also allow and promote enthusiastic and competent scholars to work at the cutting edge of research in their chosen fields of study without worrying about the immediate 'applied impact' of their work. Emphasis on short-term socially relevant deliverable runs the risk of catalyzing another instance of 'Lysenkoism' that afflicted Stalin's Russia.

It is rather disappointing that the vision 2032-33 looks more of a social vision than a S&T vision. If the vision is to harness S&T to achieve clean & potable water for all, food and nutrition security, universal healthcare and public hygiene, 24x7 energy and so on by 2032-33, the country would ever remain a follower, rather than being anywhere near to technological or industrial leadership. In fact the 14 objectives to be achieved by 2032-33 in the vision document are primarily short-term objectives of social relevance rather than hard-core S&T objectives. In any case, our planners need to realize that the pace at which developments in S&T are taking place, we cannot afford to take 15 years to achieve the stated goals. To take an example, one of the objectives in the S&T vision documents relates to 'Universal Healthcare and

Public Hygiene'. The vision statement for this is: "A public health centre would have to be established in every gram panchayat with telemedical access to specialists and super-specialists. Every district would have a multi-specialty hospital with air ambulance and trauma centre. Development of affordable non-invasive diagnostics and surgical procedures, inexpensive drugs and targeted delivery mechanisms would have to be on top of the list of priorities". Unfortunately, this vision is entirely based on today's technologies and capabilities. It does not envisage the new technologies that would emerge during the long period of 15 years. We need to think of promoting development of novel technologies and approaches to facilitate reaching the continuously increasing masses. The S&T vision also does not talk about strengthening and modernization of the traditional and holistic health-care systems, which, going by the international scenario, are poised to be of great relevance. We need well-defined policies and follow-up actions that would strengthen an unbiased scientific and rational base for the traditional wisdom.

The S&T policy and vision document does not talk about India's activities in Space, Atomic Energy, renewable energy etc. One of the economic strengths of India is supposed to be in computing and software. However, unless we plan more aggressively about developing expertise in computing hardware and software development, our youths' skills will only be available to others for rent, rather than for creating something that we can really call 'Make in India'! Since basic research is the primary source for developing, sustaining and promoting new technologies, the country must develop long-term vision and plans to achieve leadership there. Country must move out of the current trend of using borrowed and outdated technology. There has been much, and welcome, talk on the "Make in India" slogan. However, this dream can be fulfilled only by developing innovative "home-grown" technologies based on sound S&T initiatives of our scientists and technologists.

Good and holistic education and research remain the backbone of any knowledge society. Recent years have witnessed some positive but scattered signs of improvement in quality of research and innovation within the country. Therefore, it is appropriate that the country takes a holistic and long-term view to catalyze and foster all round development of India's youth. The government and the planners should increasingly engage the different science and other academies/professional bodies to benefit from the available expertise and experience.

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