HIGHER EDUCATION PERSPECTIVES FOR AN EXCITING EDUCATIONAL EXPERIENCE – PART VI: AN INDIAN CONTEXT

B. H. S. Thimmappa
Manipal University – India

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Abstract. The special objective and scope of this paper is to highlight the different higher education perspectives to inspire confidence in students that will lead them to professionalism. Nurturing learners' curiosity is one of the most important ways to help them become a lifelong learner. Encouraging them with intellectually stimulating questions can actually help develop their thoughts, ideas and ideologies. Creating an interesting learning environment will guide them towards developing creative problem solving skills and higher education is an approach to maintain overall wellbeing of society. Application of an appropriate, positive attitude keeps professional work in proper perspective and it is a way to greater personal, social and business success. It is important to develop interesting high impact higher education to inspire, motivate, energize and empower the younger generation to bring about a remarkable change in various spheres to transform the society. The upgradation of specialized knowledge and skills of university teachers is required in fine-tuning their teaching skills to deliver lively, energetic and dynamic teaching. The most enduring impact of higher education depends on the extent to which this will lead to the unlocking of people's potential and raise their self-confidence to a higher level. It requires a collective effort in several sectors to create new awareness across the world that eventually leads to scientific, technological and economic progress. A centralized system to collect and analyze information about actual research conditions in various public and private organizations and then build scientific manpower and technically qualified human resources on those intricate details is essential to make significant contribution in their area of expertise. There is a need for decentralized decision making at higher educational institutions and universities without any political interference and following certain centralized norms to reignite the fire of higher education reforms. An insider's insights is needed for effective and comprehensive higher education policy making and implementing the globally established education practices will lead to strategic achievement.

Keywords: educational opportunities, trained teachers, continuous learning, professional competence, smart teaching

Education perspectives

India could contribute substantially in the near future to global demographic transition as its majority of population will be in the productive age group, with a median age of about 29 years. This demographic dividend can be harnessed for civilian and military purposes by a series of reforms in the higher education sector that will bring about a remarkable change in different areas. It is essential and incredibly important to unlock their full potential and channelize their energy in the right direction to have educational powerhouse and a greater global impact. There is an urgent need for higher education landscape to change its plans to achieve the twin goals of higher education viz, individual job satisfaction and socially useful productive work. We have to follow rigid quality control measures and comply with international standards of higher education to succeed, especially in the diverse Indian context (Altbach & Salmi, 2011). We need to simultaneously develop interesting methods of high impact-teaching learning interactions that is both educational and engaging to attract the younger generation of students towards science education and academic research activities (Thimmappa, 2013a, 2013b, 2014a, 2014b, 2015). These articles drew attention to highlight how deep-seated and widespread aspects in higher education sector influence educational outcome and detailed discussion towards intellectual introspection are beyond the scope of this article. The purpose of the paper is to draw attention to various aspects of decline in quality and to trigger a change in perspectives of higher education system. The scope is broad extending from technology changes to establishing a healthy education ecosystem and a broad spectrum of perspectives in the various specific aspects of higher education system is presented. Today, technology has enabled the learner to enjoy the excitement of learning process during student life and contribute to meaningful learning in the classroom as reflected in tangible improvements in learning outcomes (Mayor, 2005). There is a need to create the next best practice rather than just follow the existing and established best practices for strategic achievement. It requires individual and collective efforts, dedication and hard work, fundamental understanding and reaching out by all the stakeholders to inspire confidence among young and modern learners and to promote cautious optimistic and realistic broad outlook towards events, people and places. Numerous educational processes and management mechanisms within the nation are dependent upon growing globalization and development of proper professional attitude. It is important to initiate joint research and technology development efforts in several sectors in addition to formal training and practice sessions to develop domain-specific skills. Advanced technologies can bring about radical change to reignite the fire of higher education reforms. It is about advancing the learner's practical and academic skills and they have ever increasing impact on corporate

and academic performance. Substantial improvement in the quality of teaching faculty, higher education infrastructure development, curriculum development and developing a growth mindset are some of education targets that require immediate attention. The drive for a more assertive national higher education and scientific research strategies, motivation by inspiring speeches, call for participation in higher education movement and streamlining institutional mechanisms acquire enormous significance to bring about meaningful improvements in scientific, technological and economic sectors. The four E's that drive the positive development involving *experiential learning*, *exclusive content*, *excellence in higher education* and *ecofriendly environment* when combined with proper development strategy, powerful vision, dynamic industrial activities, and entrepreneurial passion provide maximum benefit to communities.

The teaching professors and researchers in academic, industrial and research organizations play a pivotal role in all-round development of higher education sector. Extensive specialized research is required to catch up with sustainable global development issues and establish scalability, innovativeness and cost-effectiveness criteria of solutions. In particular, a sound subject knowledge base, an educational understanding and an intellectual perspective would provide useful pointers to higher education signaling dynamics. The objective of the paper is to present an overview of certain higher education perspectives in the greater national interest, within the very specific context of a review. It begins with educational background, proceeds to fundamental changes in technologies and creation of proper educational ecosystem and finally concludes with future prospects. The emphasis is on the quality of tertiary education landscape that would enhance students' intrinsic motivation to learn and increase attractiveness of science subjects and comprehensive skill development programs to transform the skill landscape. Today, there is a need to look beyond the general solution to fight ill-health, nutrition, energy and pollution problems and to find a productive approach to solve a wide range of human problems. Introducing some new subjects such as academic laboratory safety, cognitive neuroscience, corruption and its control, universal value system, physical health and nutrition, management principles and social service activities, and hobby classes in the college curriculum, in addition to recharging students with an array of specific subjects would help to obtain fresh fundamental insights on sustainable solutions. The implementation of useful methods on how to make the subject more interesting to keep their interest alive would certainly appeal to young learners. An implication of the dynamic and attractive higher education system is that this would lead to establishment of schools, hospitals, employment opportunities and public transport systems. In fact, new ideas, facts, imagination, speculation, hypothesis, lateral thinking,

observations, inferences and interpretation of results are the major intellectual instruments in exploratory and developmental research that will result in radical innovations of practical use. The transformation that far reaching reforms in higher education performs in the lives of people through healthy perceptions and new perspectives can be powerful in the overall achievement of long term success. The universities must follow a challenging path to achieve it and penetrate their thought process built on a foundation of ethics and social consciousness leading to a coordinated action plan for modern model of development. Thought modifications in the right direction can transform the individual and collective consciousness leading to research activities that result in breakthroughs from the subatomic to the cosmic level and innovative solutions from proof of intellectual concept to industrial production. It is important to change the trajectory of science education to drive scientific innovations which integrate all aspects of sustainable development program with environment conservation activities and green initiatives. The key driving force is technology that could transform society with cognitive, physical, emotional development of individuals and overall social progress benefits to be able to truly relate to the real world in transforming the development landscape.

Technology transformations

It is important to have significant scientific breakthroughs and fundamental technological innovations rather than just routine scientific research outputs, incremental innovations, product developments and business model innovations. Fundamental scientific investigations will result in invaluable results and help develop more advanced cognitive skills. The past decade has seen accelerated and intensive scientific research, breakthrough technology and technology development. Recent developments in scientific research and advancements in spectroscopic, crystallographic and microscopic techniques provides information on composition, properties, structure and interactions in different types of materials (Skoog et al., 2006). The overall process of technological change includes invention, innovation and diffusion steps and the key point in building the future involves the most advanced technology. Technology is changing the way we read and think leading to specific targeted and integrated actions for innovation and competence building. This will result in intellectual outcomes involving concepts, principles and theories. The upcoming changes in modern technologies include the increased use of smart sensors, 3D printing, industrial robots, ultrafast computers, smartphones, mapping apps, drones and microsatellites, brain-computer interfaces, and advances in information technology, light emitting diode (LED) lighting systems, solar and wind power generation systems, augmented reality, smart and ecofriendly textiles, sustainable transportation, driverless car and battery technologies. In

the future, drones can be used for pesticide and fertilizer spraying, mapping crop growth pattern and soil conditions, and even for transporting human organs for emergency transplants. It is essential to establish special economic zones and industrial hubs to promote manufacturing and export of goods. Necessary steps should be taken to address the practical issues related to technology changes to drive sustainable progress in the years ahead. In this rapidly changing context, it is important to promote digital bookstores and companies, organic farming practices and sustainable slow fashion and responsible consumption that may change the world for better. The advances in medical nanotechnology may help in life-saving and life-enhancing efforts or in molecular manufacturing capabilities. Potentially promising directions of future research in nanomaterials using bottom-up approaches might be decisive in in-depth understanding of natural phenomena and design of engineered systems relevant in the current global situation. It is better for many countries to focus on sector specific development with higher growth, and social and environmental benefits. An approach to attracting large investing in labor intensive industries such as leather, textiles, food processing and electronics would be beneficial and help create large scale employment opportunities in new manufacturing units. Small scale industries play an important role in the economy as they generate large scale employment opportunities. The issues which need to be addressed in this sector include lack of technical assistance, shortage of skilled manpower and necessary infrastructure, increase in prices of raw materials, shortage of funds for expansion and modernization, inability to meet quality standards, and inadequate marketing support. The insightful discussion, exchange of ideas and sharing of views specific to a particular sector by various experts of different domains and expertise on environmental issues would lead to benefit all concerned and it will further broaden the outlook for the steady planned long-term growth in different sectors. Further developments in the areas of sensor technology, internet of things, artificial intelligence, autonomous vehicles, genetic engineering, artificial body parts, earthquake sensors, cryptocurrencies, 3D aerial camera system, mobile health units, and low cost medical innovations can change the current situation in this mobile and app-driven, aggressive and competitive world. Digital healthcare technology can deliver predictive power of health prospects and detailed monitoring of an individual's state of health. Recent developments in solar- and electrically-powered vehicles, hybrid engine systems, high-speed bullet trains, weather balloons and satellites, robot- and computer-aided surgery, artificial cloning of selected genes, genetically modified foods, ecofriendly or sustainable houses, self-cleaning surfaces, speech recognition systems, highly sophisticated desalination plants, shape memory alloys, and tissue engineering that are at the research stage is expected to contribute to solve certain socially relevant is-

sues. Some other sustainable features such as rainwater harvesting, sewage treatment plants, green open spaces and paper manufactured from sustainable raw materials also provide tangible dividend to tackle the subject of sustainability within a wider contemporary context. Similarly, continuing advances in international space station (ISS), very large telescope (VLT) global positioning system (GPS), communication satellites (CS), interactive television, virtual reality (VR), artificial intelligence (AI), high-tech sensors, quantum computers, advanced photosystem (APS) and digital photography, nuclear fusion power plants, and world wide web (WWW) will have powerful global implications for both science and industry. There is a need to put our energy into solving problems which are really important, significant and permanent in the local, national and global contexts. Small and medium-sized enterprises (SMEs) will drive the economy as they are the backbone of transformation through growing workforce and they should be oriented towards rapid growth and sustainable development. Exploratory engineering research can lead to developments in certain future technologies useful in the path of rapid development (Parker, 1993; Seidel, 1998; Lee, 2006; Nalwa 2004).

Higher education must help us to become more original, more creative and stay focused to find out a number of sustainable solutions, implementation of Greenfield projects, various transformative projects and a broad range of constructive applications useful to the society. For instance, study on stem cells has already created a significant impact in the medical field and such studies in a frontier field can result in key strategic technologies. The discovery and development of life-saving medicines and generic drugs to maintain healthy cognitive system within the reach of patients would have far-reaching societal implications and productive outcomes. The developments in medical technology innovations such as fast DNA-sequencing machines, internet of DNA, telemedicine, bionic eye, methods for growing human brain cells, nanoparticles to treat HIV, vaccinations without needles, CyberKnife radiosurgery, prosthetic limbs with brain power and targeted therapy for cancer could have a dramatic impact on healthcare sector in the coming decade. Recent developments in materials research has resulted in the design and use of special biomaterials such as programmable pacemakers, contact lenses, dental and cochlear implants, hip replacements and tissue grafts. Further advances in artificial plants, synthetic blood, smart materials, corrosion resistant materials, medical imaging systems, healthcare products, biomedical techniques, digital technology and high throughput screening for drug discovery would lead to practical specialized solutions with significant social impact. The discovery of new class of antibiotics helps us to fight against drug resistant bacteria called superbugs. The developments in nitrogen fixation, refrigeration technology, genetically modified foods, agricultural machinery, agricultural biotechnology, organic

farming practices, and yet another green revolution by advances in agricultural methods could change the current scenario in the agricultural sector. There is a need to ensure sustainable livelihood opportunities, particularly in rural areas, by practicing integrated farming system to have tremendous impact in the water table and microclimate in the area. Co-operative agricultural production, improved soil health, adoption of technology, and remunerative marketing will certainly help stabilize agricultural production. The ecosystem-based approaches to management of human activities will address the new challenges caused by climate change and global warming. It is essential to move towards climate justice rather than climate action through an appropriate sense of aggressiveness in climate-friendly initiatives. There is an urgent need to understand the role of technology enhanced higher education in creating sustainable society and to adopt advanced technologies for a wide spectrum of constructive applications and services in different fields. There is a need for integrated energy planning including alternative energy solutions through public-private partnership initiatives and take proper control measures to prevent environmental pollution and a shared approach to safety. The promising results in the sate-of-the-art laboratories reveal exciting times for active research in green catalysts, solvents, reagents for fuel production, commodity chemicals and alternative technologies. A large number of skilled and professional persons who work hard to protect abundant natural resources including the diverse flora and fauna could create concrete social awareness on environment care practices and sustainable development approaches (Fig 1). Recent change in people's participation pattern in environment related activities shows that they are more willing to contribute to environmental conservation efforts. A revolution of entrepreneurial outreach to the rural areas by making sophisticated technology affordable like low cost portable diagnostic devices, equipment used in grading agricultural products and e-commerce distribution centers will ensure sustainable growth. Life-changing and more socially progressive developments can occur with technical advances in wearable computers, unmanned aerial systems, autonomous systems, farmer-owned cloud, electric motor and drive systems, soil and crop sensors, high-speed planters, mobile computing, telematics and radio-frequency identification (RFID) technology in the agriculture sector. Understanding of important principles, set of concepts, unique characteristics of modern materials, highly specific approaches, advanced functional applications, specific emerging applications and smart solutions to a growing range of production problems are of considerable importance in different technological fields. Other emerging technologies such as vertical farming, conductive polymers, organic LED displays, e-textiles, flexible electronics, microfabrication, thin-film technology, quantum computing, nanosensors, swarm robotics and laser weapons provide opportunities to develop specific aspects.[1)]

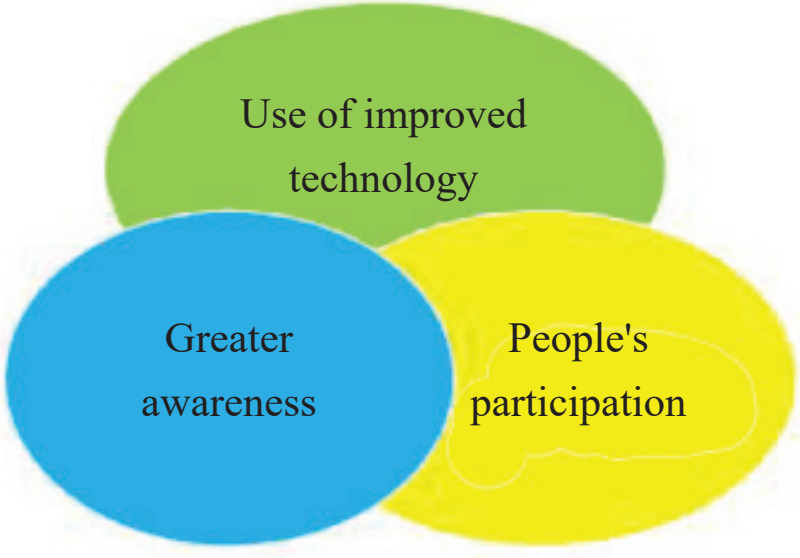

Fig. 1. The awareness programs involving people's participation using improved technology will encourage them to engage in conservation activities

A long-lasting societal impact can be built on the solid grounds of life-long learning initiative that drive courageous, creative and caring citizens to move forward in the right direction. This will be reflected in performance outcomes and solutions to problems in a wide range of scientific fields. Current advances in technology include the discovery of drugs to combat disease, catalysis for chemical processes, energy conversion techniques, and micromachining for microelectronics area (Elvers et al., 1993; Lee, 2006; Buschow et al., 2001; Mark, 2015) Current trends in technology and future needs of society suggest the importance of creating modern higher education ecosystem that involves changing attitude and practices in addition to commitment, competence, creativity and dedication.

Education ecosystem

Higher education is a means to ensure livelihood generation, effective governance, industrial growth, sustainable development, economic and social progress, and social justice. Passing on higher knowledge, skills and values from one generation to the next through formal higher education systems is necessary to provide society with competent professionals and industry with capable workforce. It is fully recognized as essential to rapid economic growth and social progress and to make learning from the highest standpoint an integral, dynamic and constructive part of their life.[2,3)] Every citizen with certain

prerequisites should have equal access to formal institutions of higher learning and good placement opportunities. Special emphasis on scientific and technical education as an important instrument of change and development helps develop a rational, objective and modern outlook of the country and to acquire a strategic position in the future world map. The vision to build leading universities, creating value for stakeholders through customer centric, technology driven and user-friendly approach act as a catalyst of sustainable development in every sphere of specified human activity including mainstream scientific and educational activities. Change in perspective within the idea of learning and developing will have a different social significance and immense implications to fine-tune education delivery mechanism, excellent teaching delivery, and to have sustainable form of education market economy. Multiple intelligences that we all have in different degrees offer an engaging and stimulating environment to move forward in productive directions when nurtured with training, practice and experience. At the individual level, exploring multiple skills allows for a stimulation of different parts of the brain and the vital link with their innate resourcefulness helps to work out better solutions with a unique sense of fulfilment. There is a need to build valuable intellectual ecosystem in India that motivates educational entrepreneurs to excel in their role and positively impacting individuals through a set of valuable tools on a daily basis to inculcate some of the prominent features. This leads to both an increase in revenue of education providers and improvement of learner satisfaction. Apart from establishing educational infrastructure, the change in the mindset of the society and administrators of education systems may result in development of innovative skills, independent minds leading to economical and ecofriendly methods. It is essential to spread the tangible message of higher education in science to the rest of people to attract the best talent as a vital component of science research system to achieve self-sufficiency in scientific manpower and to obtain better scientific outputs. There is a need to enhance innovative efforts to achieve the top ranking status of higher educational institutions through accreditation by international agencies. The recent world ranking of universities and academic institutions indicate the need for improvements of standards and meaningful engagements to promote academic achievement. There is a sense of urgency in decision making and execution to reach higher ranking in the global innovation index (GII) and human sustainable development index (HSDI).[4,5] It is also important to choose the methods and practices with wisdom that promote higher order thinking skills (HOTS) of individuals in these learning centers and openly share the smart teaching techniques and educational research results with the scientific world. There is an increasing trend in educated unemployment and underemployment status that results in weakening of students' motivation, as well as unrest and indiscipline among students. The creation of an overall working culture and enabling environment has a profound impact on the performance and a valuable contribution to offer an illustrative insight into solutions across diverse sectors. Apart from academic activities at one level, promoting entrepreneurial ecosystem including business development strategies and research services business within an academic system, would

eventually lead to accelerated industrial growth without causing ecological damage. Further investor-friendly policies and incentives for commencing commercial production of some new and innovative functional products and providing certain concessions like tax holiday for initiating energy conservation schemes or adopting pollution control measures would certainly encourage youngsters on the path of development. It is important to initiate reward-based industrial activities and support by providing six year tax holidays for startups and firms taking technological advances further to translate into commercial products. As we look into the future, intense and comprehensive training in research methodology to those keen in pursuing research career must be provided to create a force of scientists. The scientific conferences, targeted workshops or symposia on the theme of higher education would provide a platform for productive discussion on the practical difficulties connected with tertiary science education and the recommendations can be used to bring about meaningful improvements in the sector. An international conference with simultaneous interactive sessions and specific events on new perspectives in science education will be held in Italy on 17 – 18th March, 2016.[6)] It offers an excellent opportunity for academicians, researchers, teachers, experts, content providers, and practitioners from all over the world to share innovative ideas, meaningful experiences, relevant research findings and responsible best practices in the field of science education. The transformation journey involves inspiration by vision, innovation, originality, discipline, hard work and perseverance, team spirit, staying passionate and future prospects in addition to coping with modern day pressures of living as a citizen of the country. The creation of appropriate education ecosystem inspiring enough to impact the learners' lives would certainly lead to knowledge society and make people feel personally responsible for the state of society and ecology.

For India to become one of the leading players in specialized teaching and research space, it is essential to understand every aspect of the higher education right from admission process to degree awarding ceremony including intricacies of teaching and research. It is absolutely essential for the country to conduct a detailed study to assess the intricate pattern of people distribution in different scientific disciplines and to study the crucial factors such as lack of infrastructure, quality teachers, research potential or industrial needs that influence this distribution and to arrive at broad generalities. We have to identify and promote those areas by providing financial and intellectual resources, device more effective encouragement strategies and monitor the efficiency of their implementation (Benjamin, 2012; Rasool, 2011; Rashmi, 2012; Agarwal, 2009). In this connection, it is important to establish a standard input control system in the selection of superior students to higher educational institutions based on their interest, aptitude, subject knowledge and ability. The solid training of the individual in a special field of competence must be given to those who will continue their education. The recruitment of high quality faculty members is equally important and this problem can be solved through better financial rewards and enhanced social prestige. Our educational structure and philosophy should facilitate and promote the process of development of a new generation of intel-

lectual or social leaders, social reformers and nation builders of the future. The transfer of appropriate knowledge, skills and attitude from the institution to the individual learner must take place via established minimum standards of performance. At the undergraduate (bachelor's degree) level more focus should be on breadth of intellectual experience while at the postgraduate (master's degree) level the focus will be on the advanced professional studies in a specialized field. It is clear that an average student should acquire basic education in a four-year program while superior students should obtain adequate professional training in a two year program. The terminal degree (PhD) should involve super-specialization and rigorous research orientation to produce scientists and scholars. It is important to note that the individual differences in aptitude, intellectual capacity, and interest would require maximum flexibility in learning basic skills, practical and analytical skills and specialized knowledge at different levels. It is essential to have uniform segments structure, consisting of fixed number of years, for instance (4+2+4), in all the subjects in different streams ranging from basic science to state-of-the-art engineering and management to medical technology to avoid many issues in the present educational structure. The dissemination of knowledge of medicine to deserving aspirants via intermediate level study to graduates with a four year program would certainly help people avail primary healthcare and general medicine services at very affordable cost in rural India. At the same time, conducting integrated master's degree program of five years duration in different streams would help to ensure coherent foundation for scientific study and will open a new window to livelihood opportunities for youngsters. Some proactive steps have to be taken to induce closer cooperation between specialized schools of basic disciplines and those of law/management/medicine/engineering. It is essential to introduce several innovative multidisciplinary, transdisciplinary and interdisciplinary courses within each program and sufficient number of open and core electives should be incorporated to have flexibility. A hybrid content model involving offline component of physical spaces and online component of technology platforms has the potential to inject fresh inspiration to the intensive education system. The development of a student body capable of intellectual growth and building an overall ecosystem with multiple beneficial effects at different levels would create performance culture. This will lead us to adopt an ideal of excellence and contribute significantly to the field of science, engineering, technology, management, and medicine. The culture of debate, discussion, lectures and seminars must be developed in the national interest to transfer ideas and to capture the bigger picture in an area. The academic excellence and professional competency in higher education must be achieved with continuous improvement in quality at each level while addressing the physical and digital sides of the issues. This includes redesigning of educational programs, courses and assessment patterns as well as establishing required infrastructure, framing policies and their effective execution. The designed syllabus should make it easier for learners to understand and appreciate the applications of science and engineering to simulations of complex molecular systems, development of many new applications, movement towards miniaturization, large-scale production and fabrication

aspects as well as manufacturing and marketing issues. Higher education policies should take into consideration the basic goals, factors influencing, essential employability skills required and pros and cons of reforms. And above all, concerns between the education policies and execution aspects must be addressed to maintain an individual identity and entirely different identity to fit into the global scenario. Maintaining a healthy educational ecosystem and scholastic environment can lead to a greater intellectual effort and stimulation of mental prowess, both at the fundamental and applied levels. An enormous effort is required to take the nation forward and to put the Indian higher education system on the top 100 of world university ranking. It is becoming increasingly relevant to understand India's inner educational dynamism and it is to be located in both the private and public sector expansion, emphasizing the special ties between them to create a ripple effect with a much wider reach in society. The investors must support the mission and values, and must work towards enriching stakeholders to generate wealth and overall development. It is essential to follow established framework of regulations for all the universities in India to streamline academics and administration. An effective higher education system as a whole has the capacity to improve performance in future and to change substantially the lives of the next generation. The higher education system consisting of a three tier structure involving universal broad, targeted deep and talented specialized learners can trigger rapid growth and motivation in progressive direction.

Progressive pathway

The vision to become a developed nation requires for its realization integrated and progressive actions in areas like education, energy, healthcare, agriculture, information technology, manufacturing and infrastructure development. Our science, technology and industrial policies have to be reframed to facilitate knowledge and technology acquisitions, knowledge protection and application, and application of technical knowledge. An important link among science, technology and products/processes/systems and risk management must be strengthened in policy changes and implementation domains, organizational structure and function, and training and recruitment systems. The synergy between technology, industrial policy and stakeholders' efforts play a pivotal role in contributing to improve industrial productivity. We need to encourage active participation of youngsters in framing policy matters and also develop patriotism to be a part of the bigger picture and passion for science to be part of the equation of creativity. The societal transformation and wealth generation will lead us towards economic growth of the nation. The massive change produced by multi-pronged action plans, education, infrastructure development, healthcare, industry, agriculture, weather forecasting and disaster management will play a crucial role in a nation's development and will eventually lead to refined tactics, right strategies, services, processes, progressive policies and structured work practices. We have to ensure that progress is sustainable and inclusive in a country with diverse needs and responsibilities and the country will have better productivity tomorrow from our individual and collective actions today. The higher educa-

tion reforms would assist in expediting the process of development and achieve its full potential while promoting social harmony. The nature of higher education enrollment, people's perception of higher education system and human interactions of the learners were changed over the years and hence education investors understand the need for more cohesive approach towards the result-oriented academic institutions. It makes all the difference in the rapidly changing world, how we educate our young learners to empower them through access to quality higher education and it can wield a powerful influence on research directions in the future, trends in technology, and economic trends. Obviously, educational institutions have to innovate, evolve and work constantly at providing learner satisfaction through a clear and comprehensive learning resources and progressive practices. The learners in the university system should have an easy access to a wide range of study materials in the e-library including books and journals hosted on a common platform to avoid duplicating expenditure and universities can share the valuable resources through an inter-university portal. In addition to establishing a national digital repository (NDR), global digital repository (GDR) of key literature varieties can enrich the lives of the current generation and also act as a backup mechanism. Novel learning materials with tailored features and stimulating the senses of students by teaching-learning interactions will have a greater impact on individuals by creating indelible impressions helping them to build much better and remarkably successful career graphs. The change in public perception about models of development and right approach to green development by adopting sustainable lifestyle with realistic expectations of the concrete action and outcome would go a long way in achieving success. A healthy lifestyle is an extremely important aspect that determines our capability to work hard for the development of a nation. Educational research and the development of innovations could greatly benefit mankind and scientific scholars help build higher education platforms for the future to offer numerous education functions. Meaningful improvements in modern higher education sector are possible through broad-based international cooperation, appropriate mechanisms and procedures backed by legal remedies and specific regulations. Using collective intelligence involves having an effective working model of society and to be able to use administrative wisdom and integrated information on life skills to enhance the quality of our lives on this planet and to make a mark on the world research map. It is essential to allow the standard international universities with relevant experience and proven track record to open their branches in selected educational hubs in India to set a chain reaction of improvement in important quality parameters in a world of scientific wonders and futuristic technological advances. In the process of scaling up their reach, opening the portals of higher educational institutions to the teachers and foreign students would eventually lead to long-term economic productivity. In the larger context, it is the demand for quality that will drive the significant change and a shared socio-economic, teaching and research partnership with other countries help in developing a culture of research excellence and capacity building to establish world-class universities (Kulandai Swamy, 2006).

It is increasingly important to see the bright future of the next generation in the light of higher education reforms that adds to a justification to travel the extra mile for deserving students' education through a multilayered approach leading to several physical and psychological benefits to make the world a better place to live in. Building high quality technical institutions, directed learning curve and special research strategy of a particular discipline can motivate the raw learners into refined individuals by ever evolving process of refining, perfecting and maturing. An inspiring environment in education system allows a large number of young minds to blossom into mature intellectuals with special attributes as they reach the top of the education pyramid and this would eventually lead us to achieve high level of well-being of people of this country and enhanced quality of life. The financial support to deserving candidates in the form of fellowships is something that is absolutely necessary and public spending on higher education should be increased substantially. A new national policy on higher education involving different aspects of access, retention, quality, content and social justice is the most important task and its effective implementation will be the basis of coordination of different educational activities across the country. We have to create well-balanced contemporary and exclusive educational content in each of the higher education programs that will enhance unique and enjoyable learning experience and promote practices building core competence, participative leadership, world-class institutions and professional happiness. With better access to higher education, increased use of technology, development opportunities, integrated resource planning, sustainable roadmaps, balancing mechanisms, environmental protection and policy regulations in a judicious blend provides a balanced approach to sustainable development. Such integrated development model must be beneficial to billions of people at the bottom of the pyramid, impacting their entire lives while focused industrial activities and technological innovations woven into social fabrics would help in creating sustainable solutions.

The fine balance of dioxygen, dinitrogen, carbon dioxide and water, operated and maintained by multiple biochemical processes of nature help prevent ecological degradation to a large extent. Sustainability requires that ecological load does not exceed carrying capacity and hence reducing ecological load and rebuilding carrying capacity without causing loss of biodiversity. This is possible through political support for rebuilding the environment which can in turn drive decisions that would have a deep impact on scientific and technological progress in the context of current inevitable realities. Awareness must be created to build a social environment in nurturing the environment and meaningful transformation through champions of change by motivating and instilling the necessary confidence in young minds will have a far reaching effect on them. Some examples of specific actions include use of renewable resources and energy efficient devices, photochemical storage and fuel cells, use of ecofriendly products, technology adoption and skill development, improvement and further innovation, and building human relationships based on cooperation and sharing. Socially conscious individuals and energetic and engaged community in cosmopolitan ambience working in a

coherent manner with sensitivity towards environment can overcome various technical, economic and policy constraints with a scientifically sound and sustainable management plan. Technical education imparted on an extensive scale can eventually raise the standard of living of our masses. It will enable us to convert raw materials into profitable products and enhance industrial productivity. To fulfil our environment regeneration responsibilities and to reach the green goals safely, healthy growth and evolution of individuals through thought modifications is absolutely essential.

Concluding observations

The entire essence of higher education reforms makes us internally vibrant with logical, creative and imaginative thinking capabilities that helps in influencing public opinion, policies and catalyzing change to varying degrees and have much of a bearing on initiating collective social ventures for upward mobility. It is indeed a journey with perspectives and conclusions based on hard facts and empirical evidence to proceed beyond borders and make a mark in India's education destination. Public intellectuals must express their opinion in a particular context such as infrastructure development, industrial promotion initiatives, skill development ecosystem, productive employment, business friendly environment and industrial grievance redressal system. There is a need to give contemporary touch of technology to the teaching art to make it more appealing to tech-savvy young learners. Always, a good content and well-told story have incredible influences on critical perspective, systematic plan, problem-solving methodology, experimental observation and subsequent interpretation. It has plenty of scope to extend the central concern of exciting educational experience of the learners and certain lessons learnt in the journey can help us to lead a sustainable way of life with scientific temperament and power-packed performance delivery. At the same time, it is important to attract people to teaching profession by providing meaningful financial and intrinsic rewards. The key ethical principles such as tolerance, compassion, caring, consideration for others and responsible use of knowledge would lead youngsters to the next level of moral and aesthetic development. In summary, twelve potentially transformational pathways that energize higher education system in India and enhance its effectiveness to deliver services to have significant social, economic and overall impact include: (i) providing accessible, affordable and appropriate higher educational programs to assist the development of relevant experiences and higher cognitive abilities; (ii) using technology-enhanced, cross-disciplinary approaches to education and training to deliver exciting learning experience; (iii) opening of several postgraduate centers at district level institutional settings to ensure responsible and relevant infrastructure development; (iv) conducting a multilevel 'training the trainer' program on educational core ideology, basic principles and national issues to build a team of active faculty members; (v) encouraging higher education by single window scholarship scheme through national level eligibility examination in different scientific streams; (vi) providing robust support systems through new higher education policies to foster sustainable social development with minimum

impact upon the environment; (vii) providing management responsibilities and distributed leadership positions depending on certain specific tasks to those with relevant experience and track record to facilitate smooth transformation; (viii) creating research institutions to understand and manage educational research activities leading to relevant solutions that will provide progressive pathway for sustainable growth; (ix) initiating industry-institute partnerships in academic activities and interdisciplinary research areas that help enrich education experience and enhance innovation at research activities; (x) maintaining conducive academic environment to perform their educational functions and bring about lasting improvements in educational delivery process; (xi) strengthening the mechanisms to hold universities responsible and accountable for their actions; (xii) maintaining high standards of academic excellence, content interesting to the current generation, and relevant to academic and industrial job market needs that help in moving to the next higher level of intellectual growth and professional development.

Indeed, it is essential to build strong systems with external evaluation of the impact of all the educational programs in different streams at all academic levels. Funding is a critical component in building an education ecosystem and educating, sensitizing and increasing the level of awareness forms an integral part of effective higher education system. The bottom-line is that entire range of parameters from funds to functions must be managed in our journey in the direction of greater decentralization and benchmarking performance. As a part of inclusive growth, integrated rural development initiatives, incorporating innovative technologies, local recycling programs and waste disposal mechanisms, local-level conservation plans and a number of efficient and integrated service delivery models will have a direct bearing on development landscape and successful outcomes in different fields of activity. From India's perspective, we have to maximize the positive impact on both the educational entrepreneurship and dynamic result-oriented research. The power of ideas and the enthusiasm to take them forward with conviction on a wide range of issues from excellent higher education to addressing health issues, from science and technology research to social reform, and from merit-based employment to scientific achievements help us to achieve the sustainable development. A key long-term challenge for modern technology development is the higher education of younger generation in the multidisciplinary perspectives and continual development of their ability to apply subject knowledge at the highest level using experience and wisdom. We envision a promising future in which a combination of high-impact teaching-learning interactions and proper pluri-disciplinary subject content could foster outstanding performance and a culture of research excellence leading to economic, social and overall success of a country while maintaining health of the natural ecosystem. It is really important to make systematic and dedicated efforts in leading the country in a progressive path with commitment to excellence in higher education to improve the society and maintain 'close educational contacts' to deliver a much greater service as technology becomes more refined. The challenge is to keep learners engaged, have a multi-pronged education plan and change through multidimensional efforts with profound impacts. A balanced, neutral

and polychromatic view on different aspects of economic, social and scientific evolution will ensure better outcomes in future. It remains to be seen whether the breadth, range and depth of engagements will result in an effective mechanism leading to shared prosperity and a more intense and a larger footprint that will eventually enable us to contribute towards peace and justice at the global level and attain sustainability from education facilitation to a wide spectrum of targeted solutions.

NOTES

1. https://en.wikipedia.org/wiki/Listofemergingtechnologies
2. http://www.ugc.ac.in/oldpdf/pub/report/12.pdf
3. www.ncert.nic.in/oth_anoun/npe86.pdf
4. https://www.globalinnovationindex.org/
5. www.sciencedirect.com/science/article/pii/S1470160X13003919
6. http://www.conference.pixel-online.net/science/NPSE 2016

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✉ **Prof. B.H.S. Thimmappa**
Department of Chemistry
Manipal Institute of Technology
Manipal University
576104 Manipal, India
E-mail: bhs.thims@manipal.edu