सत्यमेव जयते
Government of India

towards a knowledge society

Three Years of the
National Knowledge Commission

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Demography
Disparity
Development

Realizing Demographic Dividend
Reducing Social Disparities
Sustaining Economic Development

National Knowledge Commission
Compilation of Recommendations
on Education

Foreword

Constitution of the National Knowledge Commission in June 2005 was a critical component of our Prime Minister Dr. Manmohan Singh's vision of transforming India into a global knowledge hub. The Commission was entrusted with the task of preparing a blueprint for reform of our knowledge related institutions and infrastructure. We focused on five key areas of enhancing access to knowledge, reinvigorating institutions where knowledge concepts are imparted, creating a world class environment for creation of knowledge, promoting applications of knowledge for sustained and inclusive growth and using knowledge applications in efficient delivery of public services. To address these core areas of the knowledge paradigm, the Commission has submitted over 200 recommendations on 24 focus areas till 2008.

We see three areas in which NKC recommendations will have a far reaching impact – demography, disparity and development. Our demographic profile, with 550 million below the age of 25, has the potential to constitute one-fourth of the global workforce by 2020. We need a focused agenda for education and skill development to harness this. In today's world, access to knowledge is the source and manifestation of disparity. NKC's recommendations which focus on expansion in educational opportunities and special provisions for the disadvantaged, specifically seek to create an inclusive society. Finally, to accelerate the course of development in the country, efforts have to be made to nourish innovation, entrepreneurship and to address the skill requirements of a growing economy. Further, e-governance platforms have to be created for the efficient delivery of public services to enhance citizen-government interface.

Our recommendations, also accessible through the web, have been widely distributed, discussed, debated and are at various stages of implementation in the government. We are excited about the UPA government's commitment to knowledge initiatives in the XIth Plan which places high priority on education as a central instrument for achieving rapid and inclusive growth with specific emphasis on expansion, excellence and equity. This is reflected in the proposed allocation of Rs. 3 trillion, a five fold increase over the Xth Plan.

The focus of our work has been on ensuring that while the Central government designs appropriate strategies supported by financial allocations to implement our recommendations, we engage simultaneously with diverse stakeholders to build up a groundswell of favourable opinion and assist preparation of implementing strategies at the grassroots. An extremely successful engagement has been with the State Governments.

We are working with 26 states. Of these, five are in the final stages of preparing blueprints for state level knowledge initiatives. The real challenge now is to create an appropriate environment to engage and empower local communities and various other stakeholders and at the same time build effective models of collaboration including public-private partnerships and partnerships between academia, industry and local communities at large to bring about generational changes in our knowledge institutions and infrastructures needed to respond to the opportunities for growth and prosperity in the 21st century for all our people.

SAM PITRODA

Contents

Three Years of the National Knowledge Commission

An Overview

1.1 Introduction

For India to be globally competitive in the 21st century, a critical factor would be our ability to harness our knowledge potential. With 550 million people below the age of 25, our human capital is our greatest asset. To best utilize this bourgeoning potential the country needs a knowledge oriented paradigm and focused capacity and quality building in the field of education. The potential is tremendous, but the task of realizing it is daunting too. Keeping this scenario in mind, the National Knowledge Commission (NKC) has proposed a blueprint for reform of our knowledge related institutions and infrastructure which will enable India to meet the challenges of the future.

The Commission focused on five key aspects of knowledge: enhancing **access** to knowledge, reinvigorating institutions where knowledge **concepts** are imparted, creating a world class environment for **creation** of knowledge, promoting **applications** of knowledge for sustained and inclusive growth and using knowledge applications in efficient **delivery of public services**. Specific focus areas were identified to realize each of these objectives. NKC carried out wide stakeholder consultations, in particular engaging non-government organizations and experts in the form of working groups, while formulating recommendations. Till date, recommendations have been submitted on 24 focus areas in the form of letters to the Prime Minister. These were widely disseminated in two compilations: Report to the Nation 2006 and 2007. The recommendations, also accessible through the NKC website, have been widely debated. NKC has also reached out to state governments after the recommendations have been submitted. This volume outlines NKC's recommendations on education.

Provision of universal access to school education is the minimum essential for the development of a true knowledge based society. Recent statistics, however, show that of the 200 million children in the 6-14 age group, around 30 million remain un-enrolled and about 85 million drop-out. Another problem is the lack of vocational skills. NSS data (61st round 2004-05) indicates that of the individuals in the labour force aged 15-29, only two per cent have received formal vocational training and another eight per cent reported to have received non-formal vocational training. This figure is far higher in developed countries: 96 per cent in South Korea, 80 per cent in Japan, 75 per cent in Germany, 68 per cent in UK and even developing countries, 28 per cent in Mexico, 22 per cent in Botswana. A part of the unemployment problem emanates from the mismatch between the skill requirements of the market and the skill base of the job seekers.

While primary and vocational education create the base, higher education is critical as it provides the cutting edge. The higher education sector in India currently faces major

challenges of expansion, excellence, and inclusion. The Gross Enrolment Ratio for higher education (percentage of the 18-24 age group enrolled in a higher education institution) is around 8 to 10 per cent whereas it is 25 per cent for many other developing countries. The quality of education in the higher education sector is uneven with large segments, both in the government-financed and private unaided sector, showing very poor standards. In the public-funded sector, these problems are largely related to the number and quality of teachers and availability of infrastructure. Further, the higher education system is ill equipped to face the challenge of inclusion. There are large disparities in enrolment rates across states, urban and rural areas, sex, caste and poor-non-poor.

The following key recommendations of NKC address these issues:

1. There is a need for a central legislation affirming the **Right to Education**. This must entail a financial provision requiring the central government to provide the bulk of the additional funds needed for realising the Right to Education. The legislation should also lay down minimum standards of quality in school education and for it to be effective, the responsibility of the government, at different levels, must be recognized and made justiciable.
2. Making access to good **school education** a reality will require major expansion at the secondary and elementary levels and improvement in the quality of schools. NKC has therefore proposed generational changes in the school system which would encourage local autonomy in management of schools, decentralization and flexibility in disbursal of funds. To improve quality and generate accountability, NKC has also recommended improving school infrastructure and revamping school inspection with a greater role for local stakeholders and greater transparency in the system. Further, wherever feasible, Information and Communication Technology should be made more accessible to teachers, students and the administration. NKC has also emphasized the need for reforms in the curriculum and examination systems by moving away from rote learning to a critical understanding of concepts and improvement in faculty. NKC has also recommended revamping teacher training by improving both the pre-service and in-service training of school teachers including both expansion and greater flexibility.
3. In the current scenario, an understanding and command over the English **language** has emerged as an important determinant of access to education, employment possibilities and social opportunities. NKC therefore recommends that the teaching of English as a language should be introduced, along with the first language (either mother tongue or the regional language) of the child, starting from Class I. Further, NKC has also focused on the need to reform the pedagogy of English language teaching and learning, to reduce the disproportionate emphasis on grammar and focus on creating meaningful learning experiences for the child. Further, given that language learning is contingent on the environment, all available media including audio visual and print should be used to supplement traditional teaching methods.

4. To improve **vocational education and training** (**VET**), NKC's recommendations focus on increasing the flexibility of VET within the mainstream education system. NKC has also emphasized the need to expand capacity through innovative delivery models, including robust public private partnerships. Given that only seven per cent of the country's labour force is in the organized sector, enhancing training options available for the unorganized and informal sector will be critical for enhancing the productivity of the bulk of our working population. It is necessary to ensure a robust regulatory and accreditation framework, along with proper certification of vocational education and training. This will allow easier mobility into higher education streams, enhancing the value of such training.
5. NKC has recommended increasing GER in **higher education** to 15 and above by 2015. In addition to increased public spending, this would involve diversifying the sources of financing to encourage private participation, philanthropic contributions and industry linkages. To bring about this expansion, NKC has suggested the creation of 1500 universities by 2015, partly by restructuring the existing ones. Of these, 50 new national universities may be established to provide education of the highest standard. As exemplars for the rest of the nation, these would train students in a variety of disciplines. In order to reduce the current barriers to entry, NKC has recommended setting up an Independent Regulatory Authority for Higher Education (IRAHE) which would be at an arm's length from all stakeholders and would accord degree granting power to universities. To ensure quality, NKC has called for reform of existing universities to ensure frequent curricula revisions, introduction of course credit system, enhancing reliance on internal assessment, encouraging research, and reforming governance of institutions. Further, there is an urgent need to restructure the system of affiliated undergraduate colleges which no longer provides a viable model for quality higher education. NKC has also suggested creating models for community colleges that provide credit and non credit courses leading to two year associate degrees. These would include general education programmes as well as employment oriented programmes, creating the flexibility for students to pursue higher education later in life. NKC believes that all deserving students should have access to higher education, irrespective of their socio-economic background. While the government heavily subsidises university education by keeping fees low, there is better value created for this subsidization by ensuring well funded scholarships and affirmative action that takes into account the multi-dimensionality of deprivation.
6. To invigorate research and development in the country, NKC has recommended steps to improve the **quality of Ph.Ds**. It has suggested massive investment in education and research at all levels, together with renovation and reform of the university system, and the fostering of a global outlook in research. Further, steps have to be taken to rejuvenate the doctoral programme across disciplines and develop vigorous industry-academia interaction.
7. To rejuvenate science education and research in the country, NKC considers it crucial to attract **more students in science and maths**. To encourage this, NKC has recommended

launching a massive science outreach programme, upgrading available infrastructure, revitalizing the teaching profession and revamping teacher training at all levels.

8. The **professional education** streams are plagued by the problems similar to the higher education system. NKC has recommended that the present regime of regulation in all professional education streams including medical, legal, management and engineering education, be replaced by sub-groups on different streams under the proposed independent regulator. This would have to be accompanied by independent multiple accreditation agencies that provide reliable ratings. Other measures for improving professional education include allowing greater autonomy to institutions, reforming the current examination system, developing contemporary curricula and encouraging research.
9. Development of **open and distance education** and **open educational resources** is imperative to achieve the objectives of expansion, excellence and inclusion in higher education. More than one-fifth of the students enrolled in higher education are in the ODE stream. NKC recommendations on distance education focus on creating a national ICT infrastructure, improving regulatory structures, developing web based common open resources, establishing a credit bank and providing a national testing service. To supplement this, NKC also recommends that the production of quality content & leveraging global open educational resources needs to be focused on in a comprehensive manner. We also need to encourage open access for all material-research papers, books, periodicals etc.
10. The key to successful research today demands live consultations, data sharing and resource sharing. Towards this end, NKC has recommended the establishment of a high-end **national knowledge network** connecting all our knowledge institutions in various fields and at various locations throughout the country, through an electronic digital broadband network with gigabit capacity.

Government's commitment to take this agenda forward is reflected in the **Eleventh Five Year Plan** (2007-2012) which places high priority on education as a central instrument for achieving rapid and inclusive growth with specific emphasis on expansion, excellence and equity. This is evident from the proposed allocation of Rs. 3 trillion, a five-fold increase over the Xth Plan. The share of education in the total plan will accordingly increase, from 7.7 per cent to 20 per cent.

Initiatives to improve school education in the Plan include reorienting Sarva Shiksha Abhiyan with a strong rights focus to make Right to Education a reality. Under the Scheme for Universal Access and Quality at the Secondary Stage, 6000 new high quality model schools are to be set up, with at least one school in each block. The first stream will consist of 3500 public funded schools (3000 in KVs and 500 in NVs template) to be launched in the Educationally Backward Blocks which have a significant SC, ST, OBC and minority population. The second stream of about 2500 schools would be set up through Public

Private Partnership in other Blocks with emphasis on geographical, demographic, gender and social equity.

To strengthen vocational education, a new Skill Development Mission under the supervision of the Prime Minister with an outlay of Rs. 31,200 crore will aim at opening 1600 new Industrial Training Institutes (ITIs) and polytechnics, 10,000 new vocational schools and 50,000 new Skill Development Centres. A Skill Development Corporation will also be created by the Government with the active participation of the private sector to give special training to young men and women, workers and technicians.

In Higher and Technical Education, the focus of the Eleventh Plan is on expansion, inclusion and rapid improvement in quality by enhancing public spending, encouraging private initiatives and initiating the long overdue major institutional and policy reforms. The Eleventh Plan aims at expansion with the establishment of 30 new universities. Further, 8 new IITs, 7 new IIMs, 20 new IIITs, 5 new Indian Institutes of Science, 2 Schools of Planning and Architecture, 10 NITs, 373 new degree colleges and 1000 new polytechnics will also be set up. In establishing these institutions the scope for Public Private Partnership will be explored. The Plan also recognizes the need for the review of regulatory institutions such as the UGC, AICTE, MCI and BCI. Subsequently, a High Level Committee has been set up to suggest a specific reforms agenda in this context. A provision of Rs. 5,000 crore has been made in the Eleventh Plan for an 'Education Mission through ICT' which would include operationalizing the first phase of the National Knowledge Network where 1000 institutions would be linked up.

1.2 Terms of Reference and Organization

The National Knowledge Commission was set up in 2005 as a high level advisory body to the Prime Minister under the Chairmanship of Mr. Sam Pitroda to provide a blueprint for reform of our knowledge related institutions and infrastructure. The vision for NKC was articulated by Dr. Manmohan Singh, Prime Minister of India, in the following words:

"The time has come to create a second wave of institution building, and of excellence in the fields of education, research and capability building."

The Terms of Reference of NKC also reflect its overarching aim to transform India into a vibrant knowledge-based society:

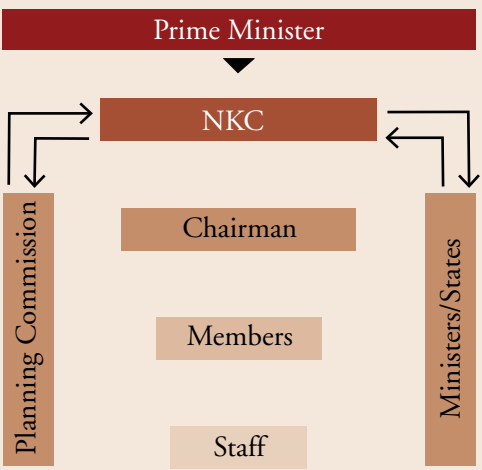
- Build excellence in the educational system to meet the knowledge challenges of the 21st century and increase India's competitive advantage in the fields of knowledge.
- Promote creation of knowledge in Science & Technology laboratories.
- Improve the management of institutions engaged in Intellectual Property Rights.
- Promote knowledge applications in Agriculture and Industry.
- Promote the use of knowledge capabilities in making government an effective, transparent and accountable service provider to the citizen and promote widespread sharing of knowledge to maximize public benefit.

Organization

NKC consists of seven Members, including the Chairman.

The Members are assisted in their duties by a small Technical Support Staff headed by an Executive Director seconded to the NKC by the government. The Commission is also free to co-opt experts to assist in the management of its tasks.

The Planning Commision is the nodal agency for the NKC for planning and budgeting purposes as well as for handling Parliament submission or responses.



1.3 Members

Mr. Sam Pitroda (Chairman)

Mr. Pitroda has spent four decades in the world of telecommunications, having pioneered its use as a means to expedite the process of development and nation building, and in bridging the global communications divide. His professional career has been divided between the three continents of North America, Asia and Europe, and he has received international acclaim for using telecommunications as a tool for national development.

As Adviser to Prime Minister Rajiv Gandhi, Mr. Pitroda helped to build India's telecommunications and information technology infrastructure. He was the founding Chairman of the Telecom Commission in India and headed the National Technology Missions on Drinking Water, Literacy, Immunization, Oilseeds and Dairy. In these roles, he made a notable contribution to India's developmental planning and policy approaches. Mr. Pitroda has owned and run several companies in the United States and Europe; as an inventor he owns more than 75 patents worldwide.

Dr. Ashok Ganguly

Dr. Ganguly is the Chairman of Firstsource Ltd. and ABP Pvt. Ltd., and a Director on the Central Board of the Reserve Bank of India, since November 2000. He heads his own consulting company, Technology Network India Pvt. Ltd. He also currently serves as a non-executive director of Mahindra & Mahindra, Wipro Ltd, Tata AIG Life Insurance Co. Ltd, and ICICI Knowledge Park.

He is a member of the Prime Minister's Council on Trade and Industry as well as the Investment Commission. Dr. Ganguly's professional career spanned 35 years with Unilever Plc/N.V. He was the Chairman of Hindustan Lever Ltd. from 1980 to 1990 and a member of the Unilever Board from 1990 to 1997, with responsibility for worldwide research and technology.

He was member of the Science Advisory Council to the Prime Minister of India (1985-89) and the UK Advisory Board of Research Councils (1991-94). A recipient of the Padma Bhushan and an Honorary Professor at the Chinese Academy of Science, Dr. Ganguly has authored three books – *Industry and Liberalization*, *Strategic Manufacturing for Competitive Advantage* and *Business Driven R&D - Managing Knowledge to Create Wealth.*

Professor P. Balaram

Professor P. Balaram is a Professor of Molecular Biophysics and currently the Director of the Indian Institute of Science, Bangalore. Prior to this, he was Lecturer (1973-77),

Assistant Professor (1977-82), Associate Professor (1982-85), Chairman, Molecular Biophysics Unit (1995-2000) and Chairman, Division of Biological Sciences (2002-05) at the Institute. His main research interests are in bio-organic chemistry and molecular biophysics. He is the author of over 370 research papers. He received his M.Sc. from IIT Kanpur (1969) and Ph.D in Chemistry from Carnegie-Mellon, Pittsburgh, USA (1972).

Professor Balaram is a Fellow of the Indian Academy of Sciences, Indian National Science Academy and the Third World Academy of Sciences, Trieste, Italy. He has received many awards and honours in recognition of his work, including the Shanti Swarup Bhatnagar Prize, CSIR (1986), Alumni Award for Excellence in Research, IISc (1991), TWAS Award in Chemistry (1994), G.D. Birla Award for Scientific Research (1994) and the Padma Shri awarded by the Government of India (2002).

Professor Balaram currently serves on many committees of the Government of India, and is a Member, Science Advisory Committee to the Union Cabinet, Board of Research in Nuclear Science of DAE, Advisory Board of CSIR and Scientific Advisory Council to the Prime Minister. He has been the Editor of *"Current Science"* for over 10 years.

Dr. Jayati Ghosh

Dr. Ghosh is a Professor of Economics and Chairperson of the Centre for Economic Studies and Planning, School of Social Sciences, Jawaharlal Nehru University, and is an alumna of Delhi University, Jawaharlal Nehru University and the University of Cambridge. Her research interests include globalization, international trade and finance, employment patterns in developing countries, macro-economic policy, and issues related to gender and development.

Her published works include *Crisis as a Conquest: Learning from East Asia, The Market that Failed: A Decade of Neoliberal Economic Reforms in India* and *Work and Well-being in the Age of Finance* (co-authored with Prof. C.P. Chandrashekhar*).* She was the principal author of the West Bengal Human Development Report 2004 which received the UNDP Award for excellence in analysis, and numerous academic papers. She is a regular columnist for leading journals and periodicals. Dr. Ghosh is involved in managing several public information websites, a founder of the Economic Research Foundation, and is the Executive Secretary of International Development Economics Associates (IDEAS), an international network of heterodox development economists. She chaired the Andhra Pradesh Commission on Farmers' Welfare in 2004, and continues to be closely involved in working with progressive organizations and social movements.

Dr. Deepak Nayyar

Dr. Nayyar is a Professor of Economics at Jawaharlal Nehru University, and has taught at the universities of Oxford and Sussex, and the Indian Institute of Management, Calcutta. He was the Vice Chancellor of the University of Delhi from 2000 to 2005. He served

as Economic Adviser in the Ministry of Commerce, Chief Economic Adviser to the Government of India and Secretary in the Ministry of Finance.

A graduate of St. Stephen's College, University of Delhi, he became a Rhodes Scholar and obtained a D.Phil in Economics from Balliol College, Oxford. He has received the VKRV Rao Award for his contribution to research in Economics. His books include *India's Exports and Export Policies, The Intelligent Person's Guide to Liberalization, Governing Globalization: Issues and Institutions* and *Migration, Remittances and Capital Flows: The Indian Experience.* Dr. Nayyar is an Honorary Fellow of Balliol College and Chairman of the Advisory Council for the Department of International Development, Queen Elizabeth House, University of Oxford. He is the Vice President of the International Association of Universities, Paris and Chairman of the Board of Governors of the World Institute for Development Economics Research, Helsinki. He served as a Member of the World Commission on the Social Dimension of Globalization.

Mr. Nandan Nilekani

One of the founders of Infosys Technologies Ltd., Mr. Nilekani is the Co-Chairman of the Board of Directors. He has formerly held the post of Managing Director, President and Chief Operating Officer at Infosys. Mr. Nilekani co-founded India's National Association of Software and Service Companies (NASSCOM). He is the Vice Chairman of The Conference Board, Inc., an international research and business membership organization and Member of the London Business School's Asia-Pacific Regional Advisory Board. He has served as the Chairman of the Government of India's IT Task Force for the power sector. He was a member of the insider trading sub-committee of the Securities and Exchange Board of India (SEBI), and of the Reserve Bank of India's Advisory Group on corporate governance. He is also a member of the review committee of the Jawaharlal Nehru National Urban Renewal Mission and serves on the Board of Reuters as a non-executive member.

His many honours include Fortune magazine's 'Asia's Businessmen of the Year 2003' award (along with Infosys Chairman Mr. N. R. Narayana Murthy), the Corporate Citizen of the Year Award at the Asia Business Leader Awards (2004) and Padma Bhushan (2006). In 2002 and 2003, he was named among the 'World's Most Respected Business Leaders' in a global survey by Financial Times and PricewaterhouseCoopers. Mr. Nilekani became one of the youngest entrepreneurs to join 20 global leaders on the prestigious World Economic Forum (WEF) Foundation Board in January 2006.

Dr. Sujatha Ramdorai

Dr. Ramdorai is a Professor at the School of Mathematics, Tata Institute of Fundamental Research (TIFR). She has held visiting positions in several universities and research institutions around the world. Currently she is a visiting Professor at the Chennai Mathematical Institute.

Dr. Ramdorai is a recipient of the Shanti Swarup Bhatnagar Award and the ICTP Srinivasa Ramanujan Medal awarded by the Norwegian Academy of Science and Letters for her research in algebraic number theory. She has been involved with issues related to education and research, especially research in the Pure Sciences in India. She has authored several research papers in internationally reputed journals and has collaborated widely in her research work. She is the co-author (with Prof. J. Coates) of *Cyclotomic Fields and Zeta Values*.

Prof. Amitabh Mattoo

Professor Mattoo is a Doctorate in International Relations from the University of Oxford, United Kingdom. He became the Vice Chancellor of the University of Jammu in November 2002. Until then, he was the Professor of International Relations at Jawaharlal Nehru University and concurrently Director of the Core Group for the Study of National Security. Professor Mattoo is on the Governing Council of the Pugwash Conference on Science and World Affairs, on the Board of the India-Afghanistan Foundation and the President of the Jammu and Kashmir chapter of SPIC-MACAY.

Professor Mattoo has been on the Governing Council of the Nuclear Science Centre; a member of the Standing Committee of the Association of Indian Universities; and on the Executive Council of several Universities. He has been the recipient of several national and international awards and was, till recently, a member of India's National Security Council's Advisory Board. In 2008 he was conferred the Padma Shri by the Government of India.

The Commission is supported by a lean Secretariat as follows:

Advisors

Mr. S. Regunathan, former Chief Secretary of Delhi Government
Dr. Kiran Datar, former Dean of Colleges, Delhi University and Principal, Miranda House
Dr. Kumud Bansal, former Secretary to Government of India, MHRD
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Support Staff

Deepti Ayyanki
Aashima Seth

1.4 Methodology

- Identification of key focus areas
- Identification of diverse stakeholders and understanding major issues
- Constitution of Working Groups and organizing of workshops/seminars, extensive consultations with concerned experts and stakeholders
- Consultation with administrative Ministries & the Planning Commission
- Discussion in NKC to finalize recommendations in the form of letter to the PM from the Chairman
- Letter to PM containing key recommendations, first steps, financial implications etc. supported by the relevant explanatory documents by NKC
- Dissemination of recommendations to state governments, civil society and other stakeholders
- Initiating the implementation of the recommendations under the aegis of the Prime Minister's Office
- Coordinating and following up implementation of proposals

Working Groups:

Libraries, Language, Agriculture, Health Information Network, Undergraduate Education, Medical Education, Legal Education, Management Education, Engineering Education, Traditional Health Systems, More Students in Maths and Science, Open and Distance Education, Using Knowledge for Enhancing Quality of Life, Aqua Foods

Workshops/Seminars:

Literacy, Translation, Networks, School Education, Muslim Education, Vocational Education, Open and Distance Education, Intellectual Property Rights, Science and Technology, Agriculture, Open Education Resources, Aqua Foods, Portals, Quality of Life, More Quality Ph.Ds

Surveys:

Innovation, Health Information Network, Traditional Health Systems Entrepreneurship, More Quality Ph.Ds

1.5 NKC Snapshot

Recommendations submitted in 2006

- Libraries
- Translation
- English Language Teaching
- National Knowledge Network
- Right to Education
- Vocational Education & Training
- Higher Education
- National Science and Social Science Foundation
- E-governance

Recommendations submitted in 2007

- Health Information Network
- Portals
- Open Educational Courseware
- Legal Education
- Medical Education
- Management Education
- Open and Distance Education
- Intellectual Property Rights
- Innovation
- Traditional Health Systems
- Legal Framework for Public Funded Research

Recommendations submitted in 2008

- School Education
- Engineering Education
- More Students in Maths and Science
- Entrepreneurship

Works in Process

- Portals (Biodiversity, Health)
- More Ph.Ds
- Knowledge Applications in Agriculture
- Aqua Foods
- Quality of Life

Towards A Knowledge Society

NKC Recommendations on Education

2.1 Right to Education Bill

NKC believes that providing universal access to quality school education is a cornerstone of development and a minimum necessary condition for any progress towards making India a knowledge society. NKC is in the process of extensive consultations and will make detailed recommendations on various issues relating to school education at a later date.

However, at this point NKC would like to respond specifically to the recent initiative of the central government of sending a model Right to Education Bill to the Secretaries of State Education Departments, with incentives for the state governments to enact this bill. NKC has perused the bill and consulted with a wide range of experts and educationists. It feels that the model bill is flawed for a number of reasons, and most importantly that such legislation must be enforced by the central government following upon the commitment made in the Constitutional Amendment Article 21A.

NKC recognizes that there may be concerns about federalism, since school education is dominantly the responsibility of the state governments at present. However, it feels that this matter can be resolved through an appropriate central legislation which takes into account the following proposals:

1. Central legislation

Legislation at the national level is required to affirm the Right to Education, which is a fundamental right mandated by Article 21A. Since it cannot be dependent upon which state a citizen lives in, a model bill sent to be enacted individually by State Governments is not adequate to meet the constitutional responsibilities of the Government of India. Therefore, a central legislation should be enacted along the lines of the Panchayati Raj (Amendment) Act, requiring the states to enact Right to Education Bills within a specified time period, and with the primary financial responsibility for this resting with the central government.

2. Financial commitment

The Central Government must provide the bulk of the additional funds required to ensure the Right to Education. Therefore there must be financial provision in the central legislation, requiring the central government to share the revenues of the Prarambhik Shiksha Kosh with state governments and to provide additional resources as required to meet the requirement of ensuring the right to all children. Estimates for the additional resources required to achieve the goal of universal elementary education currently range from 0.8 per cent to 2.5 per cent of GDP, depending on the criteria used. However, the

required financial resources are likely to be at the lower end of these estimates, since there is already close to universal provision in several states and there has been recent progress in providing more access through the Sarva Shiksha Abhiyan in other states.

3. Time frame

The state-level legislation should specify the period within which universal education of reasonable quality is sought to be achieved, preferably within three years. The model bill does not provide any time frame for adoption and implementation of the provisions.

4. Schedule of norms and standards

To ensure a minimum quality of education, it is important to have a schedule of norms for all schools to follow. The model bill does not have such a schedule of norms, and there is no specification of the minimum quality of education that schools should provide. There is only a reference to 'equitable quality' without defining the parameters of quality. While ensuring quality is a complex matter, certain norms regarding infrastructure, number of teachers per school and per student, teaching methods and other facilities, must be adhered to as necessary conditions.

5. Specification for teachers

Since teachers are critical to ensuring the quality of education, it is particularly important to lay down well-defined but flexible norms for the minimum qualifications of teachers. The model bill has no specification of a teacher, or the qualifications and in-service training needed for the position. A teacher is only defined as a person who teaches in the classroom. It is necessary to specify norms for teacher qualification and training.

6. Justiciability

Any right, including the Right to Education, is only meaningful if it is justiciable. However, in the model bill sent to state governments, the onus is placed on parents or guardians of the child. The responsibility of the Government, at different levels, must be recognized and made justiciable. The example of the National Rural Employment Guarantee Act (NREGA) could be used in this context.

7. Redressal mechanism

To ensure justiciability, a redressal mechanism should be outlined and an appropriate procedure must be set in place for students or parents in case the right is not upheld.

8. Universal schooling

School education must be provided to all. This necessarily also requires that children of the disadvantaged, landless and minority communities must also be integrated, along with children with disabilities or special needs. There should be no distinction made in terms of the type of schooling provided within the government system for children from different

social, economic and cultural backgrounds. The model bill has the potential of creating a parallel and discriminatory system of schooling which can result in stratification of the education system for children from disadvantaged communities and backgrounds, because it requires only provision of non-formal education in such cases, rather than mandating the provision of regular schooling.

Obviously, in all cases, the school system should be flexible enough to cater to particular needs of students.

NKC can offer detailed explanations on these points. Continuing to consult with stakeholders and examine other issues in relation to school education, it is focussing in particular on the questions of how to ensure better quality across the board; the institutional structures and forms of control by local communities that could contribute to improved quality of schooling; issues related to common schooling and neighbourhood schools; ensuring adequate quantity and quality of school teachers, especially in specified areas.

NKC will make a broader set of recommendations on school education in the near future.

In a subsequent letter to Prime Minister, NKC reiterated that the proposed central legislation on RTE must include a financial commitment on the part of the central government. NKC believes that the potential expenditure on this is probably less than has been estimated earlier. The Kapil Sibal Committee that had prepared the CABE draft had estimated an expenditure of Rs.2,20,643 crore for the period 2008-2012. However, this was based on population projections for the future that have since been revised downwards by the Census of India. For example, current population projections suggest that there will be at least 6 million less children in 2011-12 than the earlier projections used by the Sibal Committee had indicated. This in turn means a significant reduction in the estimated costs for universal schooling. Using the same per capita spending with the new population projections gives a total cost for the five year period 2008-2012 of Rs. 1,51,273 crore, based on 50:50 division of SSA. This amounts to an average of just above Rs. 30,000 crore per annum, which is much less than 1 per cent of GDP and also less than 8 per cent of total central government spending.[1]

In this connection, NKC would also like to express its concern about the recent decision of the central government to reduce the central funding for the Sarva Shiksha Abhiyan from 75 per cent to 50 per cent. There is a fear that this may lead to a sharp curtailment of progress towards universal school education, especially in the more backward states where

[1] If the centre provides 75 per cent of the spending for SSA, the additional cost would be Rs. 37,000 crore over the 11th Plan period, that is around Rs. 7,000 crore per annum.

the gap is greater. It is worth noting that state governments are already incurring the bulk of school education expenditure.[2] NKC strongly recommends that, in addition to 50 per cent of SSA, the Centre should provide all the necessary funding to ensure the Right to Education in those states where the state government is already spending at least 15 per cent of its total budget on school education.

[2] Currently, the ratio of central government to state government spending for school education, including SSA, is 12:88. If mid-day meals are included, it is 20:80.

2.2 School Education

Ensuring quality school education to all is the foundation upon which any further advances towards a knowledge society must be based. Noting the crucial importance of school education, the National Knowledge Commission (NKC) held a series of workshops and consultations around the country involving a very wide range of stakeholders, to discuss issues of quantity, quality and access in school education.

NKC recognizes that the primary responsibility for school education is borne by the state governments, and therefore any policy changes must be with the full participation and involvement of the states. Nevertheless, NKC believes that positive changes in systems of schooling will require the active involvement of the central government as well as state governments, not only in the matter of providing resources but also in promoting organizational and other changes.

NKC has a number of suggestions and recommendations covering the different aspects of school education, but the essential thrust can be summarized in terms of **more resources, more decentralization and more flexibility.**

1. Central legislation for the Right to Education, backed by financial commitment

NKC endorses the speedy enactment of a central legislation that will ensure the right of all children in the country to good quality school education up to Class VIII, supported with financial commitments of the central and state governments. This obviously requires substantially increased public spending for both elementary and secondary school education, which must be seen as a priority area for spending. Currently school education is highly segmented, even in government-run institutions, as a result of the parallel track of "education centres" in some states. These separate systems must be integrated to give all children access to schools of acceptable quality, which will obviously require additional spending.

2. More flexibility in disbursal of funds

However, there is a strong case for changes in the manner in which such expenditure is incurred. The current norms for central government disbursal to states of funds for (including for Sarva Shiksha Abhiyan (SSA)) the planned SUCCESS programme for secondary education and other central schemes, are too rigid and must be made more flexible. NKC strongly recommends a system of funds transfer and accounting that will allow for regional and other differences as well as changing requirements over time,

and thereby allow state governments to use the resources in the most effective way. There should also be greater flexibility in disbursing funds down to the school level and a greater degree of autonomy of local level management in the use of funds. The norms and rules should allow schools to adapt to local conditions and meet particular requirements of their students.

3. Decentralization and greater local autonomy

Community participation is an important instrument to ensure accountability and improve the day-to-day functioning of schools. This in turn means that the management of schools, including the use and management of funds, should be decentralized to local authorities as far as possible, whether they be panchayats, Village Education Committees or municipalities, and to School Boards that have representation of all stakeholders including parents.

4. Expansion of functional literacy

NKC would like to stress the continuing importance of a focus on expanding functional literacy among the population. Illiteracy remains a major problem, even among the age-group 15-35 years, and therefore literacy programmes must be expanded rather than reduced, and given a different focus that is directed towards improving life skills and meeting felt needs, especially (but not only) among the youth.

5. Planning for school infrastructure

It is important to remember that land is an essential requirement of schools, and this requirement is likely to increase in the near future given the expansion implied by demographic changes and need to ensure universal schooling. Therefore, urban master plans and local development plans must explicitly incorporate the physical requirements for schooling, including provisions for playgrounds and other school facilities.

6. Enabling and regulating mechanisms for private schools

Since private schools play an important role in the provision of education, there is need for both enabling and regulating mechanisms to be developed and strengthened for them. There should be transparent, norm-based and straightforward procedures for the recognition of private schools, to reduce harassment and bureaucratic delay. There should also be transparent criteria as for the disbursement of aid from the government to some self-financing schools, especially those which cater to underprivileged children, and clear norms with respect to the ability of school managements to raise resources from other sources. The monitoring of private schools, in terms of ensuring a transparent admissions process, regulation of fee structures, as well as meeting minimum set standards for quality of teaching and infrastructure, also requires attention. The possibility of greater exchange between schools, including mentoring of one school by another, should be allowed and encouraged.

7. Database on school education

Educational planning and monitoring are made much more difficult because of the lack of comprehensive and accurate data on schools, school-age children and actual attendance of both students and teachers. The collection and speedy dissemination of accurate and current data on schooling must be made a priority. It is necessary to create a complete database on schools and school-age children so as to track the actual coverage and quality of schooling at different levels, and to make it widely available in a timely manner. Such data collection may be made an essential part of the fund allocation for school education, with appropriate institutional mechanisms.

8. More co-ordination between departments

The multiplicity of management structures and government departments that currently governs schooling creates confusion, unnecessary replication and possibly inconsistent strategies across different schools. There must be greater co-ordination between different departments of government on school education policy, even while ensuring more autonomy to the local management of schools.

9. National evaluation body for monitoring quality

Educational administration also needs to be more conscious of actual learning outcomes at different levels, which will determine both policy and functioning. NKC therefore proposes a national evaluation body to monitor the quality of both government and private schools, using a results-based monitoring framework based on a short list of monitorable criteria that include both process and outcome indicators.

10. Revamping school inspection

The system of school inspection needs to be revamped and revitalized, with a greater role for local stakeholders and greater transparency in the system. The solution does not lie in simply expanding the system – rather, we need to develop systems to ensure meaningful monitoring, including provision of greater facilities to school inspectors, a separation of inspection of qualitative and administrative aspects, transparency in the criteria of inspection, and greater involvement of local stakeholders.

11. Teachers and teacher training

Teachers are the single most important element of the school system, and the country is already facing a severe shortage of qualified and motivated school teachers at different levels. It is urgent to restore the dignity of school teaching as a profession and provide more incentives for qualified and committed teachers. Non-teaching official duties such as electoral activities should not be allowed to interfere with the teaching process. Forums that allow and encourage teachers to exchange ideas, information and experiences, including a web-based portal, should be developed.

At the same time, there should be transparent systems for ensuring accountability of school teachers. As far as possible, teachers should be recruited to particular schools.

The training of teachers is a major area of concern at present, since both pre-service and in-service training of school teachers is extremely inadequate and also poorly managed in most states. Pre-service training needs to be improved and differently regulated in both public and private institutions, while systems for in-service training require expansion and major reform that allows for greater flexibility.

12. Reforms in the curriculum and examination system

Curriculum reform remains a critically important issue in almost all schools. School education must be made more relevant to the lives of children. There is need to move away from rote-learning to understanding concepts, developing good comprehension and communication skills and learning how to access knowledge independently. This also requires substantial changes in the examination system, especially at Board level but also earlier.

13. Use of Information and Communication Technology

Wherever feasible, ICT should be made more accessible to teachers, students and administration for learning, training, research, administration, management, monitoring, etc. This requires the provision of more facilities such as computers as well as connectivity and broadband facilities. Computer-aided learning also requires training of teachers and other staff in order to make the best use of technology.

14. English language teaching

Proficiency in English is widely perceived as an important avenue for employment and upward mobility, which also greatly facilitates the pursuit of higher education. The incorporation of English into the curriculum through the teaching of English as a language in Class I and teaching of one other subject in English medium in later classes requires making pedagogical changes to contextualize language learning, increasing the availability of English language teachers and providing more bilingual and supplementary teaching materials. At the same time, mutlilinguality must be promoted and language issues must be explicitly taken on board in designing school curricula and methods of pedagogy.

15. Interventions to ensure access of educationally deprived categories

Special interventions are necessary to ensure greater access to education of educationally deprived categories, and some proposals for this are developed in more detail in the accompanying Note. Obviously, specific measures are required to ensure greater enrolment and retention of girl students. Education of SC children must be a priority, which necessitates both flexibility of approach and avoidance of discrimination. The access of children from Scheduled Tribes requires more flexible and sensitive schooling

strategies. Language issues must be explicitly taken on board in designing school curricula and methods of pedagogy. Special strategies are required to ensure greater access to schools for children in backward regions, remote locations and difficult terrains. Official strategies for ensuring better access of Muslim children to schooling are excessively focused on madrasas which cater to only a tiny minority of such children; the emphasis should be on creating enabling conditions for Muslim children in the general school system. Children of seasonal migrants require special conditions and efforts to ensure continuous access to schooling. Similarly, labouring children require incentives and bridge courses. The needs of physically disadvantaged children, as well as teachers, have to be factored in more thoroughly in provisions for school education.

There is wide diversity across states in terms of progress towards achieving universal elementary education, and also diversity within states with respect to the quality of school education. But NKC believes that these proposals, which require the active involvement of the central government as well as state governments, will go some way in terms of ensuring universal access to elementary education, wider access to secondary education as well as better quality and greater relevance of all schooling. Given the strong synergies between this and other areas such as libraries, translation, knowledge networks, etc, these suggestions should be seen in conjunction with other recommendations that have already been made in these other areas, as part of a systematic set of knowledge initiatives for the young.

2.2 (a) Note on School Education

The Prime Minister has repeatedly emphasised that ensuring quality school education to all is one of the most important priorities of the government, and the National Knowledge Commission has also recognized the crucial significance of this as the foundation upon which any further advances must be based. NKC has held a series of workshops around the country, addressing issues of quantity, quality and access in school education, and tried to involve a very wide range of stakeholders in the consultations.

NKC recognizes that the primary responsibility for school education is borne by the state governments, and therefore any policy changes must be with the full participation and involvement of the states. Also, there is wide diversity across states in terms of progress towards achieving universal elementary education, and also diversity within states with respect to the quality of school education. Nevertheless, NKC believes that positive changes in systems of schooling that will ensure universal access to elementary education, wider access to secondary education as well as better quality and greater relevance of all schooling, will require the active involvement of the central government as well as state governments. Such involvement is necessary not only in the matter of providing resources but also in promoting organizational and other changes. NKC has a number of suggestions and recommendations covering the different aspects of school education, but the essential thrust can be summarized in terms of **more resources, more decentralization and more flexibility**. Outlined below are the most important areas of possible intervention. NKC is aware that while some proposals are new, other recommendations have found expression in different ways in previous reports and studies. However, NKC has chosen to reiterate them because they are still crucial and relevant.

NKC would also like to emphasise that there are very strong synergies between these recommendations for school education and other proposals of NKC with respect to libraries, translation, networks, language in schools and vocational education. These suggestions should therefore be seen in conjunction with the other recommendations that have already been made in these areas, as part of a systematic set of knowledge initiatives for the young.

1. Quantity and Resources

1.1 Substantially increased public spending is required for both elementary and secondary education.

NKC strongly endorses the speedy enactment of a central legislation that will ensure the right of all children in the country to good quality school education up to Class VIII. We

also believe that this should be extended to cover universal schooling up to Class X as soon as possible. NKC has emphasized that a vibrant, good quality and universally accessible government school system is the basic foundation upon which the schooling system in the country must rest.

Therefore this must be supported with a financial commitment of the central government, in such a way as to ensure that the right to quality school education is provided to all children of the country, regardless of which state they are residing in. This necessarily requires a significant expansion of the resources to be provided to elementary school education. While the government has increased allocations for school expenditure, the amounts are still far below what is required to achieve universal school education of reasonable quality for all. This is even more true because of the need to upgrade the "Education Centres" that are operating in many states to proper schools that meet all the norms in terms of trained teachers, minimum facilities, etc. Therefore NKC strongly recommends a substantial increase in central government allocation.

NKC has already expressed concern on the recent decision of the central government to reduce the central funding for the Sarva Shiksha Abhiyan (SSA) from 75 per cent to 50 per cent. This may lead to a sharp curtailment of progress towards universal school education, especially in the more backward states where the gap is greater. It is worth noting that state governments are already incurring the bulk of school education expenditure. NKC strongly feels that, in addition to 50 per cent of SSA funds, the Centre should provide all the additional funding required to ensure the Right to Education in those states where the state government is already spending at least 15 per cent of its total budget on school education.

At the same time, the importance of increased spending on secondary education is greater than ever before. There is a huge shortage of middle and secondary schools, which is one of the important reasons for the low rates of retention after Class V. Currently, secondary education is massively under-funded, which in turn creates not only absolute shortages but also problems of inadequate quality in many government secondary and higher secondary schools. The aim should be to reach universal secondary school education within a maximum of 10 years. Given the demographics, this implies that expenditure on secondary schooling must be increased by several multiples within the next two years, indeed by at least five times the current level if the CABE estimates are used. Currently, many primary schools are being upgraded to secondary school status, without provision of sufficient teachers, rooms and other pedagogical requirements, which severely comprises on the quality of such secondary education. The norms for secondary schools, which include not only provision for specialized subject teachers but also for science labs, counselling etc, must be strictly adhered to when new schools are created and when primary schools are upgraded.

1.2 Urban planning and local planning must explicitly incorporate the physical requirements for schooling, including provisions for playgrounds and other school facilities.

It is important to remember that land is an essential requirement of schools, and this requirement is likely to increase in the near future given the expansion required by demographic changes and the need to ensure universal schooling. In the context of rapid urbanization, it has been found that urban conglomerations often come up without adequate provision for ensuring the physical space required for schools in the vicinity. This is particularly a problem in new settlements with quickly increasing density of population, not only in large cities but also in smaller towns and fast growing villages. This makes it difficult to establish schools where required, and to ensure that schools are able to provide all the necessary facilities including sports fields, etc. It is essential that the urban land use policies and regulations in all states and municipalities explicitly factor in the physical requirements of schools in areas of a certain population density.

Similarly in rural areas, there must be adequate provision for land for setting up schools in areas that surpass a certain population density. In rural areas with low population density, difficult terrain or extreme climatic conditions, the government may consider setting up residential schools, which could also address the problem of migrant labourers and nomadic populations.

1.3 The norms for central government disbursal to states of Sarva Shiksha Abhiyan (SSA) funds and other central schemes for school education are too rigid and must be made more flexible.

The current system of funds transfer and the accounting rules create unnecessary rigidities that often do not allow the state governments to use the money in the most efficient or desirable way, and also lead to less than complete utilization of the budgetary allocation.

Some of these problems include:

- very rigid norms on unit costs and what is allowed in terms of spending, that do not recognize the diverse requirements of different states or particular regions;
- inadequate financial provisions for infrastructure such as buildings etc, especially for some states and cities, which leads to the creation of poor quality infrastructure;
- an inflexible accounting system that does not allow transferring funds across heads to meet particular or changing requirements, and therefore inhibits full utilization and also prevents synergies from developing;
- insufficient allocation for repair and maintenance of infrastructure;
- treating rural and urban schools in the same manner even though the requirements are often very different (for example, urban government schools may require different infrastructure and facilities in order to attract students); and
- treating all districts and geographical areas in the same manner regardless of the

degree of backwardness, topographical conditions, etc. (This is especially a problem for schools in hilly or heavily forested areas or those with poor physical connectivity, for which per capita allocations are the same as for other more accessible areas);

- problems in the timing of fund transfer, as well as uncertainties in fund provision created by the insistence on matching funds and the fact that plan ceilings keep changing every year.

NKC strongly recommends a less rigid and more flexible system of funds transfer and accounting that will allow for regional and other differences as well as changing requirements over time, and thereby allow state governments to use the resources in the most effective way. This recommendation is both for the SSA and for the planned SUCCESS programme for secondary education, and also for other centrally sponsored schemes relating to school education.

1.4 There should be greater flexibility in disbursing funds down to the school level and a greater degree of autonomy of local level management in the use of funds.

Even within the states, the norms for fund disbursal and the requirements are often very time consuming and breed delays and unnecessary rigidities. There should be recognition of differences in per capita resource requirement according to particular criteria, such as geographical and spatial characteristics, the presence of children with special needs, seasonality and other features.

In addition, there is a strong case for providing greater autonomy to local level management of schools, including locally elected bodies, school boards, Village Education Committees, etc., in the use and management of funds, subject to some overall criteria. Within the stipulated norms for expenditure, there should be scope for greater flexibility in the use of funds in response to local needs and local innovation.

1.5 There should be transparent, norm-based and straightforward procedures for the recognition of private schools, as well as for the disbursement of aid from the government to self financing schools and the ability of school management to raise resources from other sources.

Private schools play a significant role in dispensing school education. It is estimated by NUEPA that around 15 per cent of schools in the country are privately owned and managed, while in some urban areas, private schools cater to a very large proportion of school going children. Their role must be recognized, and those providing quality education should be encouraged, especially when they cater to less privileged children.

However, many private schools have identified the time consuming procedures for renewal of recognition from the government, which have to be undertaken at relatively frequent

intervals, as a source of harassment. It is necessary to simplify the rules and reduce the multiplicity of clearances required for private schools, by developing a modality for co-ordinated point of clearance as far as possible. There is also a case for increasing the time period for which recognition is granted to such schools, especially those with a proven track record. Transparency in dealings between the government and private schools will also be aided if the information on rules and criteria for registration and the results of all school applications for granting of recognition are made public in an accessible form, including by making the relevant information available on websites.

Those charitable schools that provide quality education to children from underprivileged and marginalized sections of society deserve encouragement, and may be considered for receipt of government resources, according to transparent and norm-based procedures. However, all mechanisms of government aid disbursement to privately run schools should be transparently conducted and according to defined norms.

There is a widespread perception that government rules currently reduce the ability of school managements to raise resources from other sources for the expansion of infrastructure or to provide other facilities. This varies across states, but in general in most states the current system does allow schools to raise funds from donations, resources extended from the panchayat and other sources. However, it is important to ensure that the available flexibility for school management to raise resources should be widely known and publicized. In addition, innovative methods of raising additional resources could be allowed and encouraged. For example, schools, particularly in urban areas, could use assets such as buildings during non-school hours to generate additional funds to improve the quality of facilities.

1.6 Illiteracy remains a major problem, and therefore literacy programmes cannot be ignored or given less importance. Expenditure on the National Literacy Mission (NLM) must be expanded rather than reduced, and given a different focus.

The shift in policy focus from the National Literacy Mission (NLM) to the Sarva Shiksha Abhiyan has led to a declining emphasis on the need to ensure universal functional literacy. However, according to the 2001 Census, a significant proportion of the population – nearly half of all females and one-quarter of males – remains functionally illiterate. According to the NSSO, a significant proportion of households in 2004-05 (more than a quarter in rural India and nearly 10 per cent in urban India) have no literate member. The lack of functional literacy is much more marked among women, those residing in backward areas and those from marginalized social groups. Also, a significant proportion of young people – around 30 per cent of the age-cohort of 15-35 years – is functionally illiterate, since they were too old to benefit from the SSA and also slipped through the net of the literacy programmes. This is of great concern because such people will continue to be

active citizens for the next half century and therefore, must not be denied the capacities and opportunities that come from being literate.

NKC therefore recommends the following measures for literacy:

- Ensure greater funds for the NLM, including provision for more pedagogical resources including not only ICT but also locally generated teaching material as well as local hiring of temporary staff wherever required.
- Encourage the NLM to shift to creating Continuing Education Centres in both rural and urban areas, to impart functional literacy that is of relevance and interest to those who are currently illiterate or recently literate, as well as provide further learning material and other resources and facilities to the newly literate.
- Orient the post-literacy and continuing education programmes to the emotional, physical and psychological needs of adults rather than children, incorporating issues regarding citizens' rights, human rights, sex education, health and livelihood government programmes, etc.
- Use a variety of methods to ensure functional literacy, which combine more centralized schemes based on ICT and other new technology with continuous work at the local level based on a clear institutional structure. While new technologies such as ICT provide important new methods for imparting literacy in a short time, they necessarily have a limited role. They cannot be seen as stand-alone quick-fix solutions, but must be combined with other methods.
- Move to a sustainable system of literacy generation that does not rely on underpaid "volunteer" labour alone, which therefore involves budgetary provision for better remuneration for literacy workers.
- Create synergies between NLM and the proposed Skill Development Mission, while taking local needs and field requirements into account. For example, in some primarily agrarian economies, undue emphasis on industrial skills in ITIs may be incongruous while horticultural and animal husbandry skills may be more relevant.

1.7 Early childhood education is extremely important and must be universalized.

There are two aspects to ensuring the universalization of early schooling and pre-school education. The first is the systematic extension of balwadis with trained staff to handle child pedagogy. The second is the provision for one year of pre-schooling in all institutions of elementary education. Both of these have implications for resource allocation and recruitment of the requisite staff.

1.8 The collection and speedy dissemination of accurate and current data on schooling must be made a priority. It is necessary to create a complete database on schools and school-age children so as to track the actual coverage and quality of schooling at different levels, and to

make it widely available in a timely manner. Such data collection may be made an essential part of the fund allocation for school education, with appropriate institutional mechanisms.

India has an extensive and regular mechanism of data collection for primary education. However, its methodology and use leave much to be desired. For example, at present there is no reliable method for establishing which children are in schools. Data collection is too extensive, time-intensive and done almost entirely by teachers, rather than by independent and specialized personnel. There is minimal cross tabulation, coordination and cross referencing of data. The results are typically revealed to administrators, schools etc. too late to be relevant – often several years after the survey takes place. It is immensely difficult even for stakeholders, as well as other concerned citizens, to access the data lying with official sources, despite repeated requests.

It is necessary to have a system to provide reliable school education statistics which must be transparently formulated and freely available to all. This requires mechanisms that are incorporated into the funding for all school education, at central and state government levels. These would ensure data collection and access, provide up-to-date information as rapidly as possible, make it more relevant for planning and implementation and more accessible for everyone. The following goals are relevant in this context:

- The process of data collection must be streamlined, made less time consuming and more relevant.
- A comprehensive mapping is required of schools and children of school-going age, so as to have accurate information on which children in which localities are enrolled, and attending which schools, as well as those not enrolled. This would also map out localities where there are high rates of drop out and/or non-enrolment.
- A tracking mechanism for all school children should be set up, to track their individual school going status, and progress in school. This tracking should cover both government schools and private schools. This would ensure universal access for children in all locations, as well as for girls and specific categories. A tracking mechanism will also facilitate checking for drop outs and related problems, and allow for speedy intervention to address such problems. It should be noted that there are already ongoing initiatives in this regard in some states, which can be replicated and scaled up.
- Data collected for the purposes of planning must provide all the relevant information. This is also important with respect to information on infrastructure provision: for example, the number of rooms should also mention whether these are electrified; where availability of toilets is described, there should also be information on the availability of water in the toilets.
- Safeguards must be instituted against “creative readjustment” of data, which is a common problem given the structure of incentives and the fact that the data are

most often provided by the teachers or school management. This requires that data should be collected by independent agencies as far as possible, or necessarily subject to frequent and random cross-checks.

- ICT must be integrated for data collation and management, wherever required. A local area network with digital entry provisions could be set up to make it easier for the teachers and others who provide and use the data.
- The data thus collected must be freely available and easily accessible, provided on dedicated websites in addition to the usual means of publication.
- More specialized micro level surveys and research should be commissioned. There should also be attempts to bring together other relevant research for easy access by practitioners.

2. Quality and Management

2.1 Currently school education is highly segmented, even in government-run institutions, as a result of the parallel track of "education centres" in some states. These separate systems must be integrated to give all children access to schools of acceptable quality. This will require additional spending.

In a number of states, funds under various schemes (SSA, EGS and AIE) were used to create "Education Centres" (Shiksha Kendras) rather than proper schools. These typically involve "teachers" who are essentially local women who have just passed Class VIII (or even Class V in some cases) and are paid between Rs. 1000 to Rs. 3000 per month in the different states. They typically receive no training or a two-week training at best, and may have to teach multi-grade classes often in single rooms. The proportion of children in such schools varies widely, but the all India average amounts to around 16 per cent of total enrolment in primary education, according to the Planning Commission. All such children are described in the official statistics as enrolled in schools, even though going to an Education Centre cannot be treated as school enrolment on par with the proper schools, and such instructors do not meet the required norms for teachers. Currently, state governments allow these parallel (and deeply unequal) systems of schooling to continue to be run by different departments – "proper schools" by the Education Department, and education centres under the panchayats and therefore by the Panchayat Department.

The need to integrate these two parallel systems must be explicitly recognized. This requires special budgetary allocations for upgradation and quality improvement of the Education Centres through better infrastructure, as well as intensive training of existing teachers and additional employment of adequate numbers of qualified teachers – all of which will have financial implications.

2.2 At the same time, planning for school education must take into account the ecology of education – the need to adjust school systems to agro-climatic and other local variations.

This requires flexibility with respect to school timings, vacations, teacher recruitment – but without sacrificing quality. Norms for schools must recognize the possibility of regional and local differences as well as the particular requirements of certain communities, such as nomadic groups, tribal communities, short-term migrant households, etc.

2.3 School management must be decentralized as far as possible.

Decentralization of the management of schools, combined with community participation, is the most effective instrument for ensuring accountability, improving the day-to-day functioning of schools and allowing for flexible responses to local requirements. Therefore, there should be devolution of authority to local levels, whether to panchayats, Village Education Committees or municipalities. School Management Committees that include representatives of all stakeholders, including parents and teachers, should be empowered to make many decisions. Social audits of schools should be supported and encouraged.

2.4 There is a multiplicity of management structures and government departments in the administration of school education. This creates confusion, unnecessary replication and possibly inconsistent strategies across different schools. There must be greater co-ordination between different departments of government on school education policy, even while ensuring more autonomy to the local community in matters of day-to-day management of schools.

Currently schools are run or funded and monitored not only by the central and state governments, but also by different departments within state governments – the Education Department, the Panchayat Department, the Department for Tribal Welfare, the Department for Minority Welfare, etc. This creates overlapping and conflicting structures of authority, an excess of bureaucratic tangles, unnecessary replication of some activities (and even replication of enrolment in some cases!), different guidelines and differential standards for acceptable quality and other sorts of confusion. For example, in the rural areas of several states, the local Panchayati Raj Institution (PRI) runs parallel to the SSA-run Village Education Committee (VEC). The exact remit of each is not clear and the policy intentions of both become diluted in the process.

It is necessary to make systematic efforts to integrate or at least co-ordinate the activities of these separate management structures. The precise roles and responsibilities of each local level and state level department should be clearly specified, but even more than that, there should be some sort of pressure for these different bodies to work together as far as possible and provide a common and equal schooling. Education policy must be part of the integrated framework of decentralized planning.

In the day-to-day management of schools, it is also necessary to work towards segregating teachers from managers in the school administration. At the same time, as noted above in point I.4, the decentralization of authority is critical in improving and maintaining the quality of education. Therefore, the local level management of schools, including locally elected bodies, school boards, Village Education Committees, must be allowed a significant degree of autonomy in handling matters relating to their schools, including not only the exact allocation of funds, but also other matters relating to school functioning and monitoring of teachers, etc.

2.5 There is need for a national body to monitor the quality of both government and private schools, to ensure that minimum standards are met in terms of learning outcomes.

Currently there is no systematic and continuous feedback on the actual impact and outcome of various educational schemes and initiatives, or the actual quality of education imparted in schools. There is a strong case for a testing body at the national level for quality assessment of schools. A results-based monitoring framework with due process indicators and outcome indicators needs to be evolved. This should be based on a short list of monitorable criteria. These should include fixed infrastructural requirements, enrolment and attendance, as well as outcome indicators such as learning levels achieved in certain basic areas such as language skills and numeracy, etc. Such a process of assessment needs to be applied to all schools – both public and private. However, the testing of students must not involve topics or questions that provide any incentives for rote-learning. The tracking mechanism should ideally be concerned with the profile of skill attainment of each student.

Since school education is largely a state subject, but it is also important to achieve minimum schooling norms at the national level, the institutional framework for this could be at the national level with state subsidiaries. The role of this testing body will simply be to provide information on the results of its assessments, with the state governments free to act upon this information. The results of such regular tests must be made publicly available in a format accessible to all, including websites.

The monitoring of private schools, in terms of ensuring a transparent admissions process, regulation of fee structures, as well as meeting minimum set standards for quality of teaching and infrastructure, also requires attention. There is currently no exact data on the numbers and enrolment of unrecognized private schools in the country, their fee structure or admissions policy, or their standards of infrastructure and quality. Private schools should become the subject of regulation and inspection within a set framework which is universally applicable.

2.6 The system of school inspection needs to be revamped and revitalized in most states, with a greater role for local stakeholders.

The current inspection system is overburdened and inadequate, with a small number of inspectors required to cover a large number of schools, often spread over wide physical areas. The solution does not lie in simply expanding the system – rather, we need to develop systems to ensure meaningful monitoring. NKC recommends that the strategy for the revitalization of the school inspection system should include the following:

- Local stakeholders should be involved in the monitoring of schools, whether in the form of Village Education Committees, parent associations, or other such bodies.
- The number of inspectors needs to be increased in many states, and they must be provided the facilities to undertake their activities properly, such as transport, communications devices, etc.
- The inspectors themselves must be accountable to the stakeholders of the area, through appropriate checks and balances.
- The criteria for inspection, the dates on which inspection of particular schools has taken place and the results should be made publicly available, including by posting on websites.
- The monitoring and inspection of schools must be separated from school administration, as the two functions require completely different orientations.
- The criteria for inspection should include not only infrastructure, facilities and teacher presence but also minimum standards for quality.

2.7 The dignity of school teaching as a profession must be restored, and at the same time there should be transparent systems for ensuring accountability of school teachers.

Teachers constitute the basic foundation of the school education system. However, there is a general decline in morale among school teachers, especially those in primary schools, and consequently it is no longer seen as an attractive profession for qualified young people. Two types of public perceptions, also propagated in the media and among officialdom, contribute to the low morale among school teachers: first, that anyone can teach and no particular pedagogical skills or training are required; second, that in any case most teachers do not work much and are frequently absent from school. While the latter may be the case for a relatively small minority of teachers, most school teachers are committed to their profession even if they have to function under very difficult conditions. However, they are also subject to many other pressures such as political pressure and obligations to perform non-teaching duties, which can prevent them from fulfilling their teaching duties adequately.

It is essential to ensure that qualified teachers are hired and provided with the necessary incentives to enable them to work better. The professional status of teachers should not be diluted, and all drives at recruiting untrained teachers must be checked, although it is important to allow for flexibility in recruitment of teaches for specific subjects such as art,

craft and livelihood skills. The use of para-teachers must be treated as a strictly transitional measure until proper schools are established.

The imposition of a wide range of non-teaching duties, such as that of manning poll booths and collecting data for surveys etc., cuts into the available teaching time and also undermines the professional status of teachers. These activities should be shared out among a wider range of public employees or even those hired specifically for the purpose, and the burden of such work on teachers must be reduced. Specifically, unemployed local youth and recently retired people may be considered for such activities as far as possible.

The recruitment of teachers from the locality has many advantages, as they can become accountable to the community, and have added stakes in improving the quality of education in their schools. In cases where local language or dialect is different from the state language, teachers familiar with the local language are likely to make better teachers.

NKC proposes that teachers should be recruited to particular schools as far as possible. At the very minimum, school teachers should be appointed to a particular location for a minimum fixed term of at least five years, since a major problem cited by many teachers in the government school system is that of frequent transfers. (The specific case of attracting teachers to remote and backward areas is considered below under Access.)

There should be increased attempts to improve public recognition of the contribution of school teachers, through various incentives such as more local, state-level and national awards, etc.

It is necessary to monitor the emoluments and working conditions of teachers in private schools, which vary substantially, and prevent exploitation of teachers by private school employers as far as possible.

However, in addition to improving the working conditions of teachers, it is also necessary to institute measures to provide greater accountability of school teachers not only to their superiors, but to students, parents and the local community. Currently, any mention of increasing teacher accountability is viewed with hostility and suspicion by teachers themselves. Such an outlook needs to be changed. There is clearly a need for greater accountability of teachers to the community and the school, and this will be facilitated by greater decentralization of school management to local stakeholders as has been suggested above. This should be accompanied by recognition of the concerns of teachers and allowing them more space to be active in school management and school activities. The actual administrative arrangements whereby this is done should be left to be decided at the state and local level. Systems of self-evaluation and peer evaluation of teachers should be encouraged.

2.8 The training of school teachers is extremely inadequate and also poorly managed. Pre-service training needs to be improved and regulated, while systems for in-service training require expansion and major reform in all states.

Both pre-service and in-service teacher training programmes face major problems at present, at the national level and in almost all states. With respect to pre-service training, there is a proliferation of private colleges awarding the B.Ed. degree, and these are inadequately monitored or regulated. A significant proportion of those who receive B.Ed. degrees do so through correspondence or distance learning courses, which involve absolutely no practical exposure. In any case, classroom experience is underplayed in standard B.Ed courses. At the same time, the employment of ad hoc teachers and those without even high school diplomas as teachers in the parallel stream perpetuates the notion that it is not necessary for school teachers to have systematic and prolonged pre-service training.

In-service training shows problems of inadequate quantity, uneven quality, outdated syllabi, and poor management. A very large proportion of school teachers in the country have received no in-service training at all. In any case, many DIETs are currently understaffed, demoralized, and incapable of giving good quality training to teachers. In part, this is because teacher training positions are often occupied by those who have not themselves been school teachers. In many states the administration of DIETs is left to bureaucrats who view this as a punishment posting and have no pedagogical experience. Further, DIETs typically lack adequate infrastructural facilities. Even when in-service training is regularly held, there is no mechanism which can monitor the impact of in service teacher training courses on the subsequent teaching-learning process in the classroom. Most SCERTs themselves hire contract teachers since there are very few qualified and regular teachers and lecturers. These therefore find it difficult to supervise functions at the block level unless their numbers are greatly increased. Funds are needed from the central government for human resource development at this level.

NKC therefore suggests the following for teacher training:

- Institutions providing pre-service teacher training and granting B.Ed degrees should be subject to the same regulatory authority, and there should be adequate monitoring of the training provided by private organizations.
- The budgetary allocation for teacher training needs to be enhanced and made explicit, and central government provisions are required for this.
- There has to be greater flexibility in the modalities of teacher training. Diverse strategies such as greater use of ICT, Visiting Trainers and empowering local trainers who would visit schools should be encouraged.
- State-level teacher training needs to be revamped in most states. The system of DIETs needs to be restructured. In some smaller states, there is a strong case for one state-level

institution for teacher training. In other states, the DIETs need to be strengthened and undergo structural changes. The faculty of SCERTs, SIEs and DIETs must be expanded, and include experienced school teachers. The use of contract teachers must be kept to a minimum. In addition, the link between university departments and school teaching needs to be strengthened.

- The administrative hierarchies within DIET and SCERT have to be restructured, so that there is a clear separation of personnel engaged in administrative and academic activities. (This distinction is currently blurred in most states.)
- The teacher training course should not be seen in terms of a finite period of time, but as a process by which the quality of teaching and learning in the classroom can be regularly improved, in a context that fosters an attitude of lifelong learning. Therefore, there should be a mechanism for feedback and subsequent interaction between teachers and the training institutes, especially for pedagogical techniques that are new or require more continuous innovation from the teacher.
- Currently in-service training is offered through pre-determined themes which trivialize the role of personal meaning while upholding requirements dictated by educational reform agendas. Greater freedom of choice would help to increase personal initiative and absorption of training inputs. NKC therefore, suggests the provision of short term in-service courses (in both contact and distance mode) that teachers can choose from. These could include courses developed outside the DIET/SCERT structure, subject to a thorough review of quality.
- In addition to being made more flexible, in-service teaching courses need to be incentivized, possibly by making attendance at and completion of such courses pre-requisites to professional advancement.
- There is need for curricular reform in both pre-service and in-service teacher training. The curriculum should be framed in ways that are directly relevant to teachers and the requirements of particular classroom situations, such as multi grade teaching, special needs of first-generation learners, etc. This means that curricula should be framed with greater inputs from teachers themselves, and their practical requirements in the classroom.
- ICT must be incorporated more fully into teacher training programmes, which in turn leads to ICT being used more freely in the classroom.
- It is necessary to develop content for and access to open educational resources for teacher training.

2.9 It is important to develop and nurture leadership for managing schools.

Even talented individuals who could be suitable for the tasks of school management need to be trained for this purpose. Such capacity building would create a pool of potential principals or heads. There are several ways in which this can be done. State governments

could assign such training to existing institutions such as SCERTs or SIEs, leveraging the expertise available in Navodaya Vidyalayas, Kendriya Vidyalayas, other government schools and private schools. Such training programmes, as well as re-training programmes for existing principals, could also seek the expertise of specialists in management education. Also, individual mentoring programmes for school leaders could be evolved.

2.10 The possibility of greater exchange between schools, including mentoring of one school by another should be allowed and encouraged.

The current system creates many distinctions and prevents interaction between schools. There is a need to constitute mechanisms of exchange and interaction between students and teachers of different schools. In addition, schools that wish to do so should be allowed to exercise the option of being 'mentored' by another school to improve facilities and teaching methods.

2.11 Curriculum reform remains an important issue in almost all schools. School education must be made more relevant to the lives of children. There is need to move away from rote-learning to understanding concepts, good comprehension and communication skills and learning how to access knowledge independently.

Successive Commissions and Committees set up by the government have emphasized the need to make the curriculum more interesting, relevant, creative and useful for students. The National Curriculum Framework 2005 also clearly articulated such an approach. Nevertheless it appears that in a majority of schools across the country, a significant emphasis on rote-learning and memorizing facts remains the norm. Also, there is evidence of children being overburdened with too much detail and an excess of scholastic requirements at the elementary level.

It is important to orient students towards independent and continuous learning. This makes it essential to make greater efforts to change the attitude to learning and knowledge. It has been noted in several states that learning results have improved considerably upon providing inputs for communication and comprehension in language and basic mathematical skills using activity-based and imaginative pedagogical strategies. The focus of primary schooling in particular must be on good language and communication skills, basic foundation maths and inculcation of self-learning and critical examination through innovative teaching methods. For language teaching in particular, there should be much greater emphasis on communication skills at a practical level.

It is also important to ensure that the curriculum contains locally relevant content that children can relate to their own lives. For example, in certain parts of the country (such as,

but not only, the Northeast) the curriculum at both primary and secondary levels could also include training in disaster management, especially for floods, while in other parts of the country responses to earthquakes may be more relevant. In rural areas, horticulture and pisciculture techniques should be included in the syllabus. Co-curricular reading material should be propagated, such as children's books with local stories and histories to strengthen the linkages between school and home.

To make secondary school education more relevant, and also address the problem of drop outs, NKC recommends the setting up of Livelihood Centres in secondary schools that would impart practical employable skills and provide career counselling to students. All school children should be encouraged to be involved in some practical activities that require working with the hands. These activities should *not* be treated as catering to a parallel stream, but should be provided to all students and integrated with the overall syllabus. Once again, links with the Skill Development Mission should be developed wherever possible.

2.12 Changes in the examination system are required, especially at Board level but also earlier, to ensure that the pressure for rote-learning is reduced.

The current over-emphasis on details, memorizing of facts and similar abilities rather than on understanding and accessing knowledge independently is reflected in the pattern of examinations. Board examinations in which marks are awarded based on the ability to recall lots of details or on rapidity of response or on the ability to do large numbers of sums in a limited period through practice in pattern recognition, are not sufficiently discriminatory and may end up providing misleading results. They also put pressure on schools to ensure that memory and pattern recognition skills are developed at the expense of genuine understanding.

This is also reflected in the pattern of annual examinations which many schools continue to run even in junior classes such as Class III and Class V. Performance in such examinations then becomes the basis for choosing students who will be eligible for scholarships or gain entrance to Navodaya Vidyalayas and similar schools. Forcing children to undergo a large number of examinations in different subjects, with an emphasis on memory rather than comprehension, must be discouraged at the primary level.

For curriculum reform to be successful, it is necessary to make major changes in the examination system. This applies equally to some of the national school boards (such as CBSE) and the state-level boards. It is also crucial to push for such reform in the annual examinations held by schools, where the testing must be focused on language and comprehension, numeric and quantitative skills, and ability to use knowledge creatively.

2.13 New technologies, especially but not only ICT, should be used as much as possible to reduce costs, enable more effective use of resources, and provide wider exposure to students and teachers.

The use of ICT as a teaching and learning device needs to be more firmly incorporated into the classroom. Both teachers and students need to be far more familiar with ICT, and get practical experience of web based research. Therefore ICT should be made more accessible to teachers, students and administration for learning, training, research, administration, management, monitoring, etc. This requires the provision of more facilities such as computers as well as connectivity and broadband facilities. Computer-aided learning also requires training of teachers and other staff in order to make the best use of the technology.

2.14 There is need for a web-based portal for teachers to exchange ideas, information and experiences.

A forum for teachers needs to be developed where they may interact, share experiences and ideas. This needs to be incorporated into teacher training programmes, and also provided generally for in-service teachers. A web-based teachers' portal can play an important role as such a networking forum.

3. Access

3.1 Special strategies are required to ensure greater access to schools in backward regions, remote locations and difficult terrains.

There is a tremendous shortage of teachers and also great difficulty in ensuring minimum schooling infrastructure in some areas that have been historically deprived or have difficult topographical conditions. Distance and difficulty of physical access are important reasons for school drop out, especially in such areas. Sometimes it is also the case that such areas are inhabited by particular communities with their own language or dialect that is different from the state language. In order to ensure access to schools for children in such areas, special measures must be taken.

NKC recommends the following measures for such areas:

- Financial norms for schools in such locations must be different from those in more accessible areas, as they will require additional resource allocation based on particular conditions.
- Special incentives, including a financial incentive (such as a "hardship bonus") need to be provided for teachers to take up jobs in such areas. Two different models may be considered – one based on recruiting local teachers on a permanent basis for a job in a particular school without transfer; and another based on a transfer policy that divides locations into hard/middle/easy categories and allows teachers to rotate among them at specified intervals. Ideally, there should be at least one local teacher and one non-

local teacher to ensure some variation, local acceptability and quality.

- Residential arrangements must be made for teachers in such locations, by providing quarters next to or near the school. The cost of building such quarters should be factored into the costs of the school building.
- There are some geographical zones especially in mountainous regions, that are plagued by unique problems due to vast tracts of land, difficult topography, and a sparse and nomadic population. In such areas, well equipped residential schools should be set up instead of insisting on a school in every habitation. These schools must be equipped to look into the needs of very young children living away from their families.

3.2 Measures are required to ensure greater enrolment and retention of girl students.

The high drop out rate of girls especially from Class V onwards is a matter of great concern. One major reason, as noted above, is the sheer lack of secondary schools nearby, as parents are reluctant to send girls to travel long distances to school. However, social conditioning and other constraints also play a role. Some policies to address this include:

- Special incentives for girls in secondary education where these are required (they are not required everywhere), in addition to free textbooks and uniforms, such as bicycles.
- Girls-only schools especially in particular areas.
- An enhanced scholarship scheme especially for girls, with particular emphasis on girls from socially deprived groups.
- The need for separate and functional toilets for girls in all schools, with access to water, is very important, especially but not exclusively in urban areas.

3.3 Language issues must be explicitly taken on board in designing school curricula and methods of pedagogy.

Language has been found to be a highly alienating factor in the education of many school children, particularly amongst minorities, tribal communities with languages without a script, as well as linguistic minorities in most states. Many children resent the imposition of the state language as the medium of instruction, or as second language in school.

More teachers for teaching minority languages must be appointed in government schools to increase the intake of children from minority language communities. Qualified teachers from the local community and therefore speaking the same language must be recruited on a larger scale, as a means of encouraging retention amongst those who feel marginalized, as well as a means of bringing greater community control in the school. This would also act as a boost to confidence, and provide role models to students from disadvantaged backgrounds.

3.4 The teaching of English should be introduced along with the first language, starting from Class I in school.

Proficiency in English is widely perceived as an important avenue for employment and upward mobility, which also greatly facilitates the pursuit of higher education. The incorporation of English into the curriculum, through the introduction of English as a language in Class I and the teaching of one other subject in English medium in later classes, requires pedagogical changes to contextualize language learning, increasing the availability of English language teachers and those who can teach at least one subject in English, as well as bilingual and supplementary teaching materials.

At the same time, school education must commit to promoting multilinguality, given the multilingual nature of our country.

3.5 There is need to re-orient official strategies for ensuring better access of Muslim children to schooling.

Areas with Muslim majority population have tended to be overlooked in the implementation of government educational schemes. In addition, with a few exceptions, there has been less private initiative in this regard. As a consequence, Muslims as a community, have access to fewer government schools, girls schools, and higher educational institutions. It is important to rectify this gap and ensure adequate public expenditure to ensure that the physical and social infrastructure for schooling is made available. This means that the government should have a minority component in all its school development schemes and budget outlays, which should be in proportion to the minority population.

The strategy cannot be based solely on more public resources provided to madrasas for their modernization, as according to the Sachar Committee Report, 96 per cent of Muslim children do not attend madrasas for schooling. Indeed, if the modernization of madrasa education is the only policy for increasing access for Muslim school children to modernized education, it will only result in their being further isolated.

It is important to ensure that children from all minorities and socially deprived groups are not discriminated against in the process of attending school. This must be an active and concerted campaign, in which syllabi and curriculum are checked to avoid prejudice, teachers are sensitized and instances of discrimination are punished. This also requires grievance redressal mechanisms at the school level and also at higher levels.

3.6 The access of children from Scheduled Tribes requires more flexible and sensitive schooling strategies.

Tribal children face problems of inadequate geographical access, discrimination at school and issues of language, which have been discussed earlier but are especially relevant in these cases. Tribal students have to compete with SC students, often at a disadvantage to

the former. All of these must be addressed at the local level as well as at the district and state level.

Every state should have an education policy for tribal and minority education, with a long term vision of eventual integration into the mainstream.

Rather than setting up separate schools for those who have dropped out because they felt discriminated against, teachers should be better sensitized to the needs of students from such communities, as well as the particular needs of first generation learners.

The issue of language is particularly important in areas with tribal population, and care must be taken to find and train teachers who can deal with children in their own language, rather than forcing them to adjust to the regional language.

3.7 Education of SC children must be a priority, but with the required flexibility and avoidance of discrimination.

The points made earlier with respect to discrimination are especially valid also for SC children, and must be addressed in similar ways.

In addition, scholarships should be increased and provided to much larger numbers of Dalit children, along with other provisions such as free textbooks up to Class X and other incentives.

3.8 Children of seasonal migrants require special conditions and efforts to ensure continuous access to schooling.

Seasonal and short-term migration is a major cause for early drop outs and non enrolment. In order to ensure that such children have access to a quality and complete education, their economic insecurity has to be taken into account while formulating educational schemes. Tent schools and mobile schools must be made a part of the urban landscape for migrant children, while rural schools also have to be made aware of the need to admit migrant children. This requires a significant change in the way that school admissions and enrolment are carried out, as well as greater sensitivity, flexibility and effort on the part of the school administration, all of which require hard and soft resources. It is necessary to identify good practices in this regard which can serve as a model to be emulated elsewhere.

3.9 Labouring children require incentives and bridge courses.

Some sort of monetary stipend may have to be paid to labouring children to bring them into schools. In addition, synergies must be created with NREGA to look into school education concerns of labouring children. Pre-school systems like balwadis and anganwadis must be strengthened, so that a school going habit can be ingrained, as well as providing a space for small children to be cared for, while their elder siblings may go to school.

Alternative Centres for Education must be utilised specifically to provide bridge courses aimed at different age groups and classes for drop outs. However, the use of Alternative Centres for Education must be no more than in a transition capacity. AIE should not become the only option for access to poor school children for a school education.

Study Centres must be provided for first generation learners and seasonal migrants as a space which is more conducive to learning than what may be available at home. These may also be used as community centres, libraries, etc.

3.10 The needs of physically disadvantaged children, as well as teachers, have to be factored in more thoroughly in provisions for school education.

The goal in all schools should be inclusive education, which means that all systems must be oriented to allow the greatest possible access to children with different needs and abilities. This requires substantial changes in both infrastructure and pedagogical methods. School buildings must have provisions for access and navigation for the visually impaired, the physically handicapped, etc. Teachers must be trained, sensitized and empowered to deal with children with different abilities in the classroom situation.

While this is the ultimate goal, it must also be recognized that current schooling patterns are not always conducive to bringing out the full potential of physically disadvantaged children, and therefore, there is still a case for special schools. There is a perception that government mechanisms may not be best suited to provide sustained and sympathetic support for learners with special needs and severely disabled children (such as the blind). In this context, it may be better to identify appropriate and willing institutions outside the government who may become partners.

2.3 Language

The National Knowledge Commission has emphasized the importance of an inclusive society as the foundation for a knowledge society. NKC has also recognized the significance of language, not only as a medium of instruction or a means of communication but also as a determinant of access. An understanding and command over the English language is a most important determinant of access to higher education, employment possibilities and social opportunities. School-leavers who are not adequately trained in English as a language are always at a handicap in the world of higher education. More often than not, teaching is in English. Even if it is not, in most subjects, books and journals are available only in English. And those who do not know English well enough find it exceedingly difficult to compete for a place in our premier educational institutions. This disadvantage is accentuated further in the world of work, not only in professional occupations but also in white-collar occupations overall.

This reality is not lost on our people, who recognize that the English language is a critical determinant of access to, and opportunities for a better life. Available information suggests that middle-income or lower-income households spend a large proportion of their modest income on sending their children to relatively expensive English medium schools. Such educational opportunities for children are a priority that is almost at par with health care for the family. But there are a very large number of people who simply do not have the resources for such investment. The outcome is exclusion. We believe that inclusion is possible through public provision.

There is an irony in the situation. English has been part of our education system for more than a century. Yet English is beyond the reach of most of our young people, which makes for highly unequal access. Indeed, even now, no more than one per cent of our people use it as a second language, let alone a first language.

These realities cannot be changed overnight. But NKC believes that the time has come for us to teach our people, ordinary people, English as a language in schools. Early action in this sphere, would help us build an inclusive society and transform India into a knowledge society. In just 12 years, it would provide the country's school-leavers with far more equal access to higher education and, three to five years thereafter, much more equal access to employment opportunities.

The Commission engaged in informal consultations on this subject with a wide range of people in government, academia, media and industry. It consulted some Chief Ministers in the states. It consulted Members of Parliament. It consulted people in professions such

as medicine and law as well as civil society organizations. There was unanimity that this can and should be done. A Working Group was constituted to work out the modalities in terms of first steps. The report submitted by this group was used as an input in NKC's deliberations.

NKC recommends that the teaching of English as a language should be introduced, along with the first language (either the mother-tongue or the regional language) of the child, starting from Class I in school. This phase of language learning should focus on using both languages to create meaningful learning experiences for the child without disproportionate emphasis on grammar and rules.

NKC recognizes that nine States (of which six are in the north-east) and three Union Territories have already introduced English as a compulsory subject from Class I onwards. In addition, as many as 12 States and three Union Territories have made English a compulsory subject, at different stages in primary school, by Class V at the latest. However, the implementation is slow and the quality of English language teaching is simply not good enough. The support systems, such as the number of teachers or materials for teaching, are neither adequate nor appropriate. NKC is recommending a fundamental change that seeks to introduce, nationwide, the teaching of English as a language from Class I onwards. This is not meant to be a stand-alone, add-on subject, but is meant to be integrated into the school curriculum.

Language learning cannot be separated from, and must be integrated with, content learning. Therefore, English should also be used to teach some non-language, content subjects, starting from Class III in school. The choice of subjects for this purpose can be left to schools depending on the proficiency of teachers and availability of materials. This would, in effect, create multi-medium schools. It would also help reduce the divide between English medium schools and regional language-medium schools.

The pedagogy of language learning as well as teaching should be suitably contextualized, to lend meaning to real situations and daily lives. Moreover, assessment should be based on proficiency rather than specifying achievement targets that reward mastery of single texts acquired through rote learning. To this end, a National Testing Service (NTS) for certification of language competence as well as recruitment of language teachers should be set up.

In order to meet the requirement for a large pool of English language teachers, graduates with high proficiency in English and good communication skills should be inducted without formal teacher-training qualifications. They could be selected through an appropriate procedure developed by the National Testing Service and then given a short–term orientation. The nearly four million school teachers all over the country, regardless

of their subject expertise, especially teachers at the primary level, should be trained to improve their proficiency in English through vacation training programmes or other short-term courses. Most teacher training programmes are not based on a real assessment of needs of teachers. Thus, the entire teacher training system catering to pre-service and in-service training that exists today, including training for language teaching, needs to be thoroughly reviewed, recognizing the centrality of language in the curriculum.

A multiplicity of English textbooks should be made available to address the diversity of English language environments in the country. However, to ensure that certain standards are maintained, benchmarks may be laid down for the content of textbooks at each stage. For this purpose, an expert group should be set up to develop pedagogically sound English textbooks for every level, from Class I to XII. These should be used as models by states and made freely available on the web to allow easy access. While the State Council for Educational Research and Training (SCERT) may continue to be a nodal agency for textbook development for state board schools, the writing of textbooks needs to be further decentralized. To make the exercise more collaborative, civil society organizations with expertise in the domain should be involved in developing textbooks.

Since language learning takes place not only through direct instruction but also through assimilation from the environment, the classroom needs to be equipped with appropriate supplementary audio-visual and print material. Resource libraries could be set up in every classroom, comprising of a collection of books, magazines, newspapers, audio-visual material and posters, appropriate to the age of the students, on a variety of subjects. Language learning opportunities should also be created outside the classroom through specific bi-lingual radio and TV channels, which could be introduced for formal and informal teaching and learning of English. Knowledge clubs could be formed to discuss and disseminate knowledge as well as extend the use of English outside the classroom. Given that language learning requires extensive resources, a centrally sponsored scheme of financial assistance for developing English language resources (teachers and materials) should be instituted to address this requirement.

State governments would need to be equal partners in the implementation of this idea. NKC therefore proposes that the Prime Minister discuss this matter with all Chief Ministers at the National Development Council, to formulate a National Plan for the teaching of English as a language, in addition to the regional language, starting in Class I. This would also ensure that at the end of twelve years of schooling, every student is proficient in at least two languages.

2.4 Vocational Education and Training

NKC considers Vocational Education and Training (VET) to be an important element of the nation's education initiative. In order for VET to play its part effectively in the changing national context and for India to enjoy the fruits of the demographic dividend, there is an urgent need to redefine the critical elements of imparting vocational education to make them flexible, contemporary, relevant, inclusive and creative. The Government is well aware of the important role of VET and has already taken a number of important initiatives. Through consultations with industry groups, academics, civil society and practitioners, NKC has deliberated on ways and means to strengthen these initiatives and recommends the following long and short-term strategies.

1. **Place Vocational Education entirely under the Ministry of Human Resource Development (MHRD):** In view of the role of VET in human resource development and importance of its linkages with other streams of education, the Government may consider placing all aspects of VET under MHRD. Currently, VET falls under the purview of MHRD as well as the Ministry of Labour, which leads to fragmented management of the VET framework. MHRD may consider setting up a National Institute of Vocational Education Planning and Development to formulate strategy, advise the Government, and undertake research and development in areas pertaining to technology and workforce development.

2. **Increase the flexibility of VET within the mainstream education system through the following steps:**
   i. Aspects of general education (such as numeracy skills) should be retained in VET as far as possible, to enable students to return to mainstream education at a later stage.
   ii. Courses in training institutes and polytechnics should have distinct tracks for students of different educational attainments.
   iii. Entry requirements for certain trades should reflect the requirement of the trade (as appropriate, for instance the entry requirement of Class X could be relaxed to Class VIII in some cases). Students should be permitted multiple entry and exit options in the vocational education stream.
   iv. Links should be established between the vocational education stream and school education as well as higher education.
   v. Courses devoted to certain skills training at the primary and secondary level should be introduced in all schools.

vi. Vocational training should be made available in various literacy and adult education schemes.
vii. Schemes for lifelong skill up-gradation, through short training programmes, should be introduced.
viii. There should be a provision for generating a cadre of multi-skilled persons.

3. **Quantify and monitor the impact of vocational education:** Data should be collected periodically and analyzed in order to assess the impact of training on employability. Empirical evidence on wage premium or other advantages enjoyed by VET graduates, seat utilization in training institutes, nature of employment post-training, and the efficacy of various schemes is essential for continuous improvement. A detailed exercise of manpower analysis is a necessary step to understanding the nature and quantum of demand for VET and the mismatch between the skills of VET certificate holders and the requirements of the labour market. This exercise may be undertaken by the proposed National Institute of Vocational Education Planning.

4. **Increase resource allocation to vocational education:** In per capita terms, vocational education costs more than general education, however public expenditure on vocational education has been extremely low, as compared to general secondary education. Given the demand for skilled manpower in manufacturing and services, the Government should aim to spend at least 10-15 per cent of its total public expenditure on education, on vocational education. Some options that may be considered for raising additional funds to finance a modernized VET scheme are:
   i. Enhancing fees, coupled with student loan schemes. This would also make VET institutions more responsive to market needs.
   ii. Raising funds through a cess on employers (for instance two per cent of salaries of all employees, as in Singapore).
   iii. Making it obligatory for companies to finance public vocational education and training programmes (as in Korea).

5. **Expand capacity through innovative delivery models:** In order to meet the burgeoning requirements of skilled and unskilled labour, a massive increase in quantity of training is needed. The Government could explore new delivery models to increase capacity such as public private partnerships, decentralized delivery, distance learning and computerized vocational training. At the same time, the Government must introduce certain minimum standards as a measure of quality, and ensure that all public and private VET institutions adhere to these.

6. **Enhance the training options available for the unorganized and informal sector:** The greatest challenge lies in providing training for potential entrants in the unorganized/informal sector, which accounts for the largest proportion of employment. Systematic efforts need to be made to impart the skills required by the unorganized sector. These should be formally introduced in the curricula and in practical training courses. In order to achieve this, the Government should act as a facilitator and provide financial support. This aspect of VET is critical for the success of the system as a whole.

7. **Strengthen the current institutional structure:** The existing Industrial Training Institutes (ITIs) and Industrial Training Centres (ITCs) are widely recognized to face problems such as poor quality trainers, lack of flexibility, and outdated infrastructure. Measures to improve the existing institutions are as follows:
   i. Extent of functional autonomy must be increased, ITIs should be given more power to strengthen and adapt their training programmes to better meet local market needs.
   ii. Indicators of internal and external efficiency should be developed (by the proposed National Institute) to incentivize good performance.
   iii. Modules on literacy, numeracy, communication skills, entrepreneurship and other general skills relevant to workplace requirements must be introduced in all courses.
   iv. Different tracks within courses for different levels of specialization should be introduced.
   v. Students should be offered incentives such as tools, membership of trade associations, etc, as part of their degree or diploma.
   vi. Industry and trade involvement should be enhanced not only at the internship stage, but also at the time of examinations and placements.
   vii. Curricula should be constantly monitored and updated.
   viii. The skills and courses offered should be reviewed periodically. The number of skills currently offered needs to be increased.
   ix. Teaching should be conducted in English as well as local languages.
   x. Infrastructure should be regularly upgraded.
   xi. Quality of teaching should be drastically improved.

8. **Ensure a robust regulatory and accreditation framework:** In order to achieve the desired modernization and expansion, a critical aspect will be to regulate entry of new institutions and accreditation of all institutions. NKC therefore recommends that an independent regulatory agency for VET be established.

This body would license accreditation agencies and prescribe standards for certification. The procedures and methodologies adopted by the body would need to be simple and transparent to ensure unhindered growth in the sector.

9. **Ensure proper certification:** At present, the process of certification is handled by the National Council for Vocational Training (NCVT), in association with State Councils for Vocational Training (SCVTs). Clear demarcation between the roles of the NCVT, the SCVTs and the Directorate General of Employment and Training is essential for the proper functioning of the certification process. In order to ensure recognition of certification by employers, both in India and abroad, an electronic database of certified training providers as well as electronic identification for certified workers should be introduced. Electronic identification should contain information regarding skills and qualifications (and eventually other relevant information as well) about certified individuals and can be used to facilitate mobility of workers, encourage bank linkages and entrepreneurial initiatives.

10. **Undertake a re-branding exercise:** It is widely recognized that a crucial problem with vocational training in India is a negative association with manual labour. In order to match the modern requirement of the skills and competitiveness of the workforce, a massive re-branding exercise is of the highest priority. This could be the prime task of the recently announced National Skills Mission. Initiatives such as replacing the use of terms like 'vocational education' by 'skill development' are a step in the right direction. Training institutes should try to chart out a career path for their students and introduce entrepreneurship training modules.

It is crucial to significantly increase public and private investment in VET. However, a detailed analysis of manpower requirements in terms of numbers, skills and competitiveness is essential before formulating a master plan and deciding the quantum of expenditure in the XIth Plan. A robust framework put in place as a visible and dedicated resource in the MHRD is a pre-requisite to ensuring quality and facilitating significant private investment and participation. Most importantly, the quality as well as the image of VET needs to be actively promoted in order for it to be viewed as comparable to general secondary education, and as relevant.

2.5 Higher Education

Higher education has made a significant contribution to economic development, social progress and political democracy in independent India. But there is serious cause for concern at this juncture. The proportion of our population, in the relevant age group, that enters the world of higher education is about 7 per cent. The opportunities for higher education in terms of the number of places in universities are simply not adequate in relation to our needs. Large segments of our population just do not have access to higher education. What is more, the quality of higher education in most of our universities leaves much to be desired.

Foundations are critical. NKC believes that an emphasis on expansion and reform of our school system is necessary to ensure that every child has an equal opportunity to enter the world of higher education. It is engaged in consultations on school education and will submit recommendations in this crucial area in due course. In this recommendation, it focuses on higher education.

NKC has engaged in formal and informal consultations on the issue with a wide range of people in the world of higher education. In addition, it consulted concerned people in parliament, government, civil society and industry. Concerns about the higher education system are widely shared. There is a clear, almost unanimous, view that higher education needs a systematic overhaul, so that India can educate much larger numbers without diluting academic standards. Indeed, this is essential because the transformation of economy and society in the 21st century would depend, in significant part, on the spread and the quality of education among our people, particularly in the sphere of higher education. It is only an inclusive society that can provide the foundations for a knowledge society.

The objectives of reform and change in our higher education system must be expansion, excellence and inclusion. NKC recognizes that meaningful reform of the system, with a long-term perspective, is both complex and difficult. Yet, it is imperative.

I. Expansion

1. Create many more universities

The higher education system needs a massive expansion of opportunities, to around 1500 universities nationwide, that would enable India to attain a gross enrolment ratio of at least 15 per cent by 2015. The focus would have to be on new universities, but some clusters of affiliated colleges could also become universities. Such expansion would require major changes in the structure of regulation.

2. Change the system of regulation for higher education

The present regulatory system in higher education is flawed in some important respects. The barriers to entry are too high. The system of authorizing entry is cumbersome. There is a multiplicity of regulatory agencies where mandates are both confusing and overlapping. The system, as a whole, is over-regulated but under-governed. NKC perceives a clear need to establish an Independent Regulatory Authority for Higher Education (IRAHE). The IRAHE must be at an arm's length from the Government and independent of all stakeholders including the concerned Ministries of the Government.

- The IRAHE would have to be established by an Act of Parliament, and would be responsible for setting the criteria and deciding on entry.
- It would be the only agency that would be authorized to accord degree-granting power to higher education institutions.
- It would be responsible for monitoring standards and settling disputes.
- It would apply exactly the same norms to public and private institutions, just as it would apply the same norms to domestic and international institutions.
- It would be the authority for licensing accreditation agencies.
- The role of the University Grants Commission (UGC) would be re-defined to focus on the disbursement of grants to, and maintenance of, public institutions in higher education. The entry regulatory functions of the All India Council for Technical Education (AICTE), the Medical Council of India (MCI) and the BCI would be performed by the IRAHE, so that their role would be limited to that of professional associations.

3. Increase public spending and diversify sources of financing

The expansion of our system of higher education is not possible without enhanced levels of financing. This must necessarily come from both public and private sources.

- Since government financing will remain the cornerstone, government support for higher education should increase to at least 1.5 per cent of GDP, out of a total of at least 6 per cent of GDP for education overall.
- Even this would not suffice for the massive expansion in higher education that is an imperative. It is essential to explore other possibilities that can complement the increase in public expenditure.
- Most public universities are sitting on a large reservoir of untapped resources in the form of land. It should be possible to draw up norms and parameters for universities to use their available land as a source of finance.
- It is for universities to decide the level of fees but, as a norm, fees should meet at least 20 per cent of the total expenditure in universities. This should be subject to two conditions: first, needy students should be provided with a fee waiver plus scholarships to meet their

costs; second, universities should not be penalized by the UGC for the resources raised from higher fees through matching deductions from their grants-in-aid.

- India should nurture the tradition of philanthropic contributions through changes in incentives for universities and for donors. At present, there is an implicit disincentive in both tax laws and trust laws. These laws should be changed so that universities can invest in financial instruments of their choice and use the income from their endowments to build up a corpus.
- Universities should also seek to tap other sources such as alumni contributions and licensing fees. There is need to create supportive institutional mechanisms that allow universities to engage professional firms for this purpose.
- It is essential to stimulate private investment in education as a means of extending educational opportunities. It may be possible to leverage public resources, especially in the form of land grants, to attract more (not-for-profit) private investment.

4. Establish 50 National Universities

NKC recommends the creation of 50 National Universities that can provide education of the highest standard. As exemplars for the rest of the nation, these universities would train students in a variety of disciplines, including humanities, social sciences, basic sciences, commerce and professional subjects, at both the undergraduate and post-graduate levels. The number 50 is a long-term objective. In the short run, it is important to begin with at least 10 such universities in the next three years. National Universities can be established in two ways, by the Government, or by a private sponsoring body that sets up a society, charitable trust or Section 25 company.

Since public finance is an integral constituent of universities worldwide, most of the new universities shall need significant initial financial support from the Government. Each university may be endowed with a substantial *allocation of public land*, in excess of its spatial requirements. The excess land can be a subsequent source of income generation. Exceptions need to be made in existing income tax laws to encourage large endowments. There should be no restriction on the utilization of income in any given period or in the use of appropriate financial instruments. These universities should have the autonomy to set student fee levels and tap other sources for generating funds.

The National Universities, NKC proposes, will admit students on an all-India basis. They will adopt the principle of *needs-blind admissions*. This will require an extensive system of scholarships for needy students. Undergraduate degrees in the National Universities, in a three-year programme, should be granted on the basis of completing a requisite number of credits, obtained from different courses. The academic year will therefore be semester-based and students will be internally evaluated at the end of each course. Transfer of credits from one National University to another would also be possible. An appropriate

system of appointments and incentives is required to maximize the productivity of faculty in these National Universities. Strong linkages would be forged between teaching and research, universities and industry, and universities and research laboratories. The National Universities shall be department-based and shall not have any affiliated colleges.

II. Excellence

5. Reform existing universities

The endeavour to transform higher education must reform existing institutions. Some essential steps are:

- Universities should be required to revise or restructure curricula at least once in three years.
- Annual examinations, which test memory rather than understanding, should be supplemented with continuous internal assessment which could begin with a weight of 25 per cent in the total to be raised to 50 per cent over a stipulated period.
- NKC proposes a transition to a course credit system where degrees are granted on the basis of completing a requisite number of credits from different courses, which provides students with choices.
- Universities must become the hub of research once again to capture synergies between teaching and research that enrich each other. This requires not only policy measures but also changes in resource allocation, reward systems and mindsets.
- There must be a conscious effort to attract and retain talented faculty members through better working conditions combined with incentives for performance.
- The criteria for resource allocation to universities should seek to strike a much better balance between providing for salaries or pensions and providing for maintenance, development or investment. It should also recognize the importance of a critical minimum to ensure standards and strategic preferences to promote excellence.
- The elements of infrastructure that support the teaching-learning process, such as libraries, laboratories and connectivity, need to be monitored and upgraded on a regular basis.
- There is an acute need for reform in the structures of governance of universities that do not preserve autonomy and do not promote accountability. Much needs to be done, but two important points deserve mention. The appointments of Vice-Chancellors must be freed from direct or indirect interventions on the part of governments, for these should be based on search processes and peer judgment alone. The size and composition of University Courts, Academic Councils and Executive Councils, which slow down decision-making processes and sometimes constitute an impediment to change, need to be reconsidered on a priority basis.
- The need is for smaller universities which are resposive to change and easier to manage, and these should be created.

6. Restructure undergraduate colleges

The system of affiliated colleges for undergraduate education, which may have been appropriate 50 years ago, is no longer adequate or appropriate and needs to be reformed. There is an urgent need to restructure the system of undergraduate colleges affiliated to universities.

- The most obvious solution is to provide autonomy to colleges either as individual colleges or as clusters of colleges, on the basis of criteria that have been stipulated. However, this would provide a solution for a limited proportion, or number, of undergraduate colleges.
- Some of these affiliated colleges could be remodelled as community colleges, which could provide both vocational education and formal education.
- A Central Board of Undergraduate Education should be established, along with State Boards of Undergraduate Education, which would set curricula and conduct examinations for undergraduate colleges that choose to be affiliated with them. These Boards would separate the academic functions from the administrative functions and, at the same time, provide quality benchmarks.
- New undergraduate colleges could be established as community colleges and be affiliated with the Central Board of Undergraduate Education or State Boards of Undergraduate Education, or with some of the new universities that are established.

7. Promote enhanced quality

The higher education system must provide for accountability to society and create accountability within. An expansion of higher education which provides students with choices and creates competition between institutions is going to be vital in enhancing accountability.

- There should be stringent information disclosure norms for all educational institutions such as their financial situation, physical assets, admissions criteria, faculty positions, academic curricula, as also their source and level of accreditation.
- Evaluation of courses and teachers by students as well as peer evaluation of teachers by teachers should be encouraged.
- There must be a focus on upgrading infrastructure, improving the training of teachers and continuous assessment of syllabi and examination systems.
- It is particularly important to enhance the ICT infrastructure. Websites and web-based services would improve transparency and accountability. A portal on higher education and research would increase interaction and accessibility. A knowledge network would connect all universities and colleges for online open resources.
- It may be necessary to rethink the issue of salary differentials within and between universities along with other means of attracting and retaining talented faculty members. Such salary differentials between and within universities could be effective without being large.

- It is necessary to formulate appropriate policies for the entry of foreign institutions into India and the promotion of Indian institutions abroad, while ensuring a level playing field for foreign and domestic institutions within the country.
- The system of higher education must recognize that there is bound to be diversity and pluralism in any system of higher education, and avoid a uniform 'one-size fits-all' approach. This sense of pluralism must recognize, rather than ignore or shy away from, such diversity and differentiation.

III. Inclusion

8. Ensure access for all deserving students

Education is the fundamental mechanism for social inclusion through the creation of more opportunities. It is therefore essential to ensure that no student is denied the opportunity to participate in higher education due to financial constraints. NKC proposes the following measures.

- Institutions of higher education should be encouraged to adopt a *needs-blind admissions* policy. This would make it unlawful for educational institutions to take into account any financial factor while deciding whether or not to admit a student.
- There must be a well-funded and extensive National Scholarship Scheme targeting economically underprivileged students and students from groups that are historically, socially disadvantaged.

9. Affirmative action

A major aim of the higher education system must be to ensure that access to education for economically and historically socially underprivileged students is enhanced in a substantially more effective manner.

- Reservations are essential, but they are only a part, and one form, of affirmative action.
- Disparities in educational attainments are related to caste and social groups, but are also strongly related to other indicators such as income, gender, region and place of residence. There is need to develop a meaningful and comprehensive framework that would address the multi-dimensionality of differences that still persist. For example, a deprivation index could be used to provide weighted scores to students and the cumulative score could be used to supplement a student's school examination score.

NKC's recommendations require action at three different levels: reforms within existing systems, changes in policies, and amendments in, or the introduction of, new statutes or legislation. The suggested changes would also be implemented at three different levels: universities, state governments and the Central Government.

It is important to recognize that there is a quiet crisis in higher education in India which runs deep. The time has come to address this crisis in a systematic and forthright manner. NKC's recommendations constitute an important beginning; the changes suggested would make a real difference. Of course, the process of reform and change is continuous. There is more to be done, and NKC will continue to think about next steps, but it emphasizes the urgency of the situation, because India's future depends on it. It is important to act here and now.

2.5 (a) Note on Higher Education

1. Introduction

The spread of education in society is at the foundation of success in countries that are latecomers to development. In the quest for development, primary education is absolutely essential because it creates the base. But higher education is just as important, for it provides the cutting edge. And universities are the life-blood of higher education. Islands of excellence in professional education, such as Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs), are valuable complements but cannot be substitutes for universities which provide educational opportunities for people at large.

There can be no doubt that higher education has made a significant contribution to economic development, social progress and political democracy in independent India. It is a source of dynamism for the economy. It has created social opportunities for people. It has fostered the vibrant democracy in our polity. It has provided a beginning for the creation of a knowledge society. But it would be a mistake to focus on its strengths alone. It has weaknesses that are a cause for serious concern.

There is, in fact, a quiet crisis in higher education in India that runs deep. It is not yet discernible simply because there are pockets of excellence, an enormous reservoir of talented young people and an intense competition in the admissions process. And, in some important spheres, we continue to reap the benefits of what was sown in higher education 50 years ago by the founding fathers of the Republic. The reality is that we have miles to go. The proportion of our population, in the age group 18-24, that enters the world of higher education is around 7 per cent, which is only one-half the average for Asia. The opportunities for higher education, in terms of the number of places in universities, are simply not enough in relation to our needs. What is more, the quality of higher education in most of our universities requires substantial improvement.

It is clear that the system of higher education in India faces serious challenges. It needs a systematic overhaul, so that we can educate much larger numbers without diluting academic standards. This is imperative because the transformation of economy and society in the 21st century would depend, in significant part, on the spread and the quality of education among our people, particularly in the sphere of higher education. It is only an inclusive society that can provide the foundations for a knowledge society.

The challenges that confront higher education in India are clear. It needs a massive expansion of opportunities for higher education, to 1500 universities nationwide, that

would enable India to attain a gross enrolment ratio of at least 15 per cent by 2015. It is just as important to raise the average quality of higher education in every sphere. At the same time, it is essential to create institutions that are exemplars of excellence at par with the best in the world. In the pursuit of these objectives, providing people with access to higher education in a socially inclusive manner is imperative. The realization of these objectives, combined with access, would not only develop the skills and capabilities we need for the economy but would also help transform India into a knowledge economy and society.

We recognize that a meaningful reform of the higher education system, with a long-term perspective is both complex and difficult. Yet, it is imperative. And we would suggest the following building blocks in this endeavour. First, it is essential to reform existing public universities and undergraduate colleges. Second, it is necessary to overhaul the entire regulatory structure governing higher education. Third, every possible source of financing investment in higher education needs to be explored. Fourth, it is important to think about pro-active strategies for enhancement of quality in higher education. Fifth, the time has come to create new institutions in the form of National Universities that would become role models as centres of academic excellence. Sixth, the higher education system must be so designed that it provides access to marginalized and excluded groups.

2. Universities

Universities perform a critical role in an economy and society. They create knowledge. They impart knowledge. And they disseminate knowledge. Universities must be flexible, innovative and creative. They must be able to attract the best talent whether teachers or students. They must have the ability to compete and the motivation to excel. We cannot even contemplate a transformation of our higher education system without reform in our existing universities.

There is, however, a serious cause for concern about universities in India. The number of places for students at universities is simply inadequate. The quality of education at most universities leaves much to be desired. The gap between our universities and those in the outside world has widened. And none of our universities rank among the best, say the top 50, in the world. The symptoms are clearly visible, even if we do not wish to diagnose what ails our universities. Of course, every problem does not exist everywhere. And there are exceptions. But the following problems are common enough to be a cause for concern. First, curricula, which have remained almost unchanged for decades, have not kept pace with the times, let alone with the extending frontiers of knowledge. Second, learning and creativity are at a discount in a system of assessment that places a premium on memory rather than understanding. Third, the milieu is not conducive to anything beyond the class room, for it is caught in a 9.30 to 1.30 syndrome. Fourth, the academic calendar is

no longer sacrosanct for classes or for examinations, as there are slip pages in schedules so much so that, at several places, classes in the timetable are not held and results are often declared with a time-lag of 6 to 12 months. Fifth, the infrastructure is not only inadequate but also on the verge of collapse. Sixth, the boundaries between disciplines have become dividing walls that constitute barriers to entry for new disciplines or new courses, while knowledge is developing most rapidly at the intersection of disciplines. Seventh, the importance attached to research has eroded steadily over time. Eighth, the volume of research in terms of frequency of publication and the quality of research reflected in the frequency of citation or the place of publication, on balance, is simply not what it used to be. Ninth, as in most public institutions, there is little accountability, because there are no rewards for performance and no penalties for non-performance. Tenth, structures of governance put in place 50 years ago are not responsive to changing times and circumstances but the system is readily subverted by vested interests.

It is difficult enough to provide a complete diagnosis of what ails our universities. It is even more difficult, if not impossible, to outline a set of prescriptions for our universities. Nevertheless, it is clear that a reform of existing institutions must be an integral part of our endeavour to transform higher education. We recognize that this is easier said than done. Even so, we believe that reforms in the following spheres, along the lines suggested by us, are not only possible but would also make a difference.

Number and size: India has about 350 universities. This number is simply not enough with reference to our needs in higher education, or in comparison with China which has authorized the creation of 1250 new universities in the last three years. Yet, some of our universities are much too large, for ensuring academic standards and providing good governance. We need to create more appropriately scaled and more nimble universities. The moral of the story is not only that we need a much larger number of universities, say 1500 nationwide by 2015, but also that we need smaller universities which are responsive to change and easier to manage.

Curriculum: The syllabi of courses in universities, which remain unchanged for decades, need to be upgraded constantly and revised frequently. The laws of inertia reinforced by resistance to change must be overcome. Universities should be required to revise or restructure curricula at least once in three years. These revisions must be subjected to outside peer review before implementation. The process for such revisions should be streamlined and decentralized, with more autonomy for teachers, through a change in statutes wherever necessary. For existing systems often act as major impediments to a timely or speedy revision of curricula. There should be some mode of censure for departments or universities that do not upgrade their courses regularly. It needs to be recognized that it is very difficult to introduce new courses or innovative courses in universities because

of departmental divides. Appropriate institutional mechanisms should be put in place to resolve this problem.

Assessment: The nature of annual examinations at universities in India often stifles the teaching-learning process because they reward selective and uncritical learning. There is an acute need to reform this examination system so that it tests understanding rather than memory. Analytical abilities and creative thinking should be at a premium. Learning by rote should be at a discount. Such reform would become more feasible with decentralized examination and smaller universities. But assessment cannot and should not be based on examinations alone. There is a clear need for continuous internal assessment which empowers teachers and students alike, just as it breathes life back into the teaching-learning process. Such internal assessment would also foster the analytical and creative abilities of students which are often a casualty in university-administered annual examinations. To begin with, internal assessment could have a weight of 25 per cent in the total but this should be raised to 50 per cent over time.

Course credits: The present system is characterized by too many rigidities and too few choices for students. Universities that are smaller, or run semester-based systems, are obviously more flexible. Even in large universities, however, it is necessary to introduce greater diversity and more flexibility in course structures. This would be the beginning of a transition to a course credit system, where degrees are granted on the basis of completing a requisite number of credits from different courses. Every student should be required to earn a minimum number of credits in his/her chosen discipline but should have the freedom to earn the rest from courses in other disciplines. It is essential to provide students with choices instead of keeping them captive.

Research: We attempted to create stand-alone research institutions, pampered with resources, in the belief that research should be moved out of universities. In the process, we forgot an essential principle. There are synergies between teaching and research that enrich each other. And it is universities which are the natural home for research. What is more, for universities, research is essential in the pursuit of academic excellence. It is time to reverse what happened in the past and make universities the hub of research once again. This would need changes in resource-allocation, reward-systems and mindsets. Substantial grants should be allocated for research. The provisions of these grants should be competitive and the criteria for these grants should be different from the usual criteria for non-plan and plan grants.

Faculty: There must be a conscious effort to attract and retain talented faculty members. This is necessary because talented students who are potential faculty members have choices that are far more attractive in other professions in India or in the academic profession

outside India. It is necessary to provide working conditions in the form of office space and research support combined with housing. But it may not be sufficient. This must be combined with some incentives and rewards for performance. There is, however, another dimension to the problem. Universities do not always choose the best in part because of native-son/daughter policies which leave them to select their own former students. This tends to lower quality and foster parochialization in universities. Therefore, cross-pollination between universities should be encouraged. It may be worth introducing a ceiling, say one-half or even one-third, on the proportion of faculty members than can be hired from within the university. This would almost certainly engender greater competition and more transparency in faculty appointments.

Finances: There is a serious resource crunch in universities which leaves them with little financial flexibility. In general, about 75 per cent of maintenance expenditure is on salaries and pensions. Of the remaining 25 per cent, at least 15 per cent is absorbed by pre-emptive claims such as rents, electricity, telephones and examinations. The balance, less than 10 per cent, is not even enough for maintenance let alone development. Laboratories and libraries languish while buildings crumble. But that is not all. In most universities, plan (investment) expenditure is less than 5 per cent of non-plan (maintenance) expenditure. Such a small proportion of investment in total expenditure can only mortgage the future. It is doing so. The time has come for some strategic thinking on the re-allocation of budgets for universities with some allocation for development grants and on needs other than salaries. The criteria for resource allocation should seek to strike a much better balance between providing for salaries/pensions and providing for maintenance/development/investment.These criteria should recognize the importance of a critical minimum to ensure standards and strategic preferences to promote excellence.

Infrastructure: The elements of infrastructure that support the teaching-learning process, most directly, need to be monitored and upgraded on a regular basis. This means attention, particular attention to libraries and laboratories, in addition to class rooms, sports facilities and auditoriums. It is imperative that universities provide broadband connectivity to all students and teachers in campuses. In parallel, information technology systems should be used for admissions, administration and examinations along with other relevant web services for campus communities. And, as soon as possible, a digital infrastructure for networking universities should be put in place.

Governance: There is an acute need for reform in the structures of governance of universities. The present system is flawed. On the one hand, it does not preserve autonomy. On the other, it does not promote accountability. The autonomy of universities is eroded by interventions from governments and intrusions from political processes. This must be stopped. At the same time, there is not enough transparency and accountability in

universities. This must be fostered. It is exceedingly difficult to provide generalized prescriptions. Some steps, which would constitute an important beginning, are clear. First, the appointments of Vice-Chancellors should be based on search processes and peer judgment alone. These must be freed from direct or indirect intervention on the part of governments. Once appointed, Vice Chancellors should have a tenure of six years, because the existing tenure of three years in most universities and five years in central universities is not long enough. Second, the size and composition of University Courts, Academic Councils, and Executive Councils slows down decision-making processes and sometimes constitutes an impediment to change. University Courts, with a size of 500 plus, which are more a ritual than substance, could be dispensed with. Large Academic Councils do not meet often. Even when they meet, decisions are slow to come. Thus, Standing Committees of Academic Councils, which are representative, should be created for frequent meetings and expeditious decisions. The Vice-Chancellor should, then, function as a Chief Executive Officer who has the authority and the flexibility to govern with the advice and consent of the Executive Council which would provide checks and balances to create accountability. Third, experience suggests that implicit politicization has made governance of universities exceedingly difficult and much more susceptible to entirely non-academic interventions from outside. This problem needs to be recognized and addressed in a systematic manner not only within universities but also outside, particularly in governments, legislatures and political parties.

3. Undergraduate colleges

Undergraduate education, which accounts for about 85 per cent of the enrolled students, is the largest component of our higher education system. It is imparted through colleges where students enrol for first degrees in Arts, Science or Commerce. There are a total of about 17,700 undergraduate colleges. Of these, a mere 200 colleges are autonomous. The rest, as many as 17,500 colleges, are affiliated to, or constituent in, 131 universities. On average, each university has more than 100 affiliated colleges, but there are some universities each of which has more than 400 affiliated colleges.

This system of affiliated colleges for undergraduate education, which may have been appropriate fifty years ago, is neither adequate nor appropriate at this juncture, let alone for the future. It is cumbersome to manage. And it is difficult to ensure minimal academic standards across the board. The problem has at least three dimensions. First, it imposes an onerous burden on universities which have to regulate admissions, set curricula and conduct examinations for such a large number of undergraduate colleges. The problem is compounded by uneven standards and geographical dispersion. Second, the undergraduate colleges are constrained by their affiliated status, in terms of autonomy and space, which makes it difficult for them to adapt, to innovate and to evolve. The problem is particularly acute for undergraduate colleges that are good, for both teachers and students are subjected

to the 'convoy problem' insofar as they are forced to move at the speed of the slowest. There is also a problem for undergraduate colleges that are not so good, or are poor, because universities cannot address their special needs or unique problems. Third, it is difficult to set curricula and assess performance for such a large number of students where there is such a large dispersion in performance at school before entering college. This reality tends to make courses less demanding and examinations less stringent across the board. In fact the design of courses and examinations needs to be flexible rather than exactly the same for large student communities.

There is an urgent need to restructure the system of undergraduate colleges affiliated to universities. In doing so, it is important to make a distinction between undergraduate colleges that already exist and undergraduate colleges that will be established in the future. It is also important to remember that undergraduate colleges are afflicted by problems which are very similar to those that afflict universities.

The most obvious solution is to provide autonomy to colleges, either as individual colleges or as clusters of colleges.

Individual colleges: Colleges with a proven record of academic excellence and efficient administrative functioning can be granted autonomy in terms of academic self-governance. Existing affiliated or constituent colleges should be granted autonomy in phases after due assessment by professional accreditation bodies. A review of performance of these colleges should be institutionalized and they may be granted university status on the fulfilment of stated criteria of academic and administrative performance. The college authorities should be given financial autonomy with regard to internal allocation of resources. However existing methods of financing should be retained. In operational terms, then, the autonomy would be accorded in setting of curriculum and evaluation of students.

College clusters: Autonomy can be provided to clusters of colleges, selected on the basis of criteria such as similar standards or geographical proximity. These colleges could then form a group, complementing each other, offering different courses between them. In time, these clusters could be upgraded to universities. The course-credit system can be implemented in these autonomous clusters, whereby different colleges offer semester-based courses on a credit system and credits can be transferred across colleges. A mechanism for the administration of courses across colleges and for the resolution of problems should be institutionalized with provision for representation in committees.

Such autonomous colleges, or clusters of colleges, would constitute a part of the 1500 universities we propose nationwide by 2015. It must be recognized, however, that this is, at best, a limited solution. There are two discernible problems.

The first problem with the model of autonomous colleges is the principal-agent problem of providing autonomy as an option. It becomes necessary to distinguish between the motivations and the capabilities of colleges. We need to make a distinction between colleges that wish to become autonomous but do not deserve to, and colleges that have the capabilities to be autonomous but do not wish to opt for autonomy. For colleges that wish to become autonomous but may not be suitable, clear cut criteria should be put in place as a filtering mechanism for colleges wishing to attain autonomous status: critical number of faculty and disciplines, governance, track record in terms of students, faculty and research, administrative competence measured by utilization of grants, regularity of audits, office resources and account maintenance, contribution to university processes, infrastructural facilities and ratings, if available, by accreditation agencies. For colleges that can be autonomous but do not wish to be, appropriate incentives have to be designed, especially for the teaching staff to encourage a move towards autonomy. Institutional incentives relating to funding and resource generation and professional incentives for staff including positions of professors, research grants and greater mobility should be provided.

The second problem with the model of autonomous colleges is that it would be able to provide a solution for a limited proportion, or number, of undergraduate colleges. There would be a significant number of undergraduate colleges that would remain because they may not have the capabilities to become autonomous or join an autonomous cluster. The obvious solution would be for this latter group to continue as affiliated colleges with their present universities. In that event, problems will persist not only for these undergraduate colleges but also for their affiliating universities. Nevertheless, a proportion of these undergraduate colleges will continue to be affiliated to their present universities on the basis of stipulated criteria. There are two other possibilities that could be explored.

The first possibility is that some of these affiliated colleges could be remodelled as community colleges. These colleges could provide both vocational education through two-year courses and formal education through three-year courses. This would serve the needs of a particular segment of the student population better. They could focus on promoting job-oriented, work-related, skill-based and life-coping education. These community colleges could provide a unique opportunity to provide holistic education and eligibility for employment to the disadvantaged.

The second possibility is that we establish a Central Board of Undergraduate Education along with State Boards of Undergraduate Education which would set curricula and conduct examinations for undergraduate colleges that choose to be affiliated with them. These Boards would separate the academic functions from the administrative functions and at the same time provide quality benchmarks. Governance would become much simpler. It is possible that some of the existing undergraduate colleges, particularly those

that are at some geographical distance from their parent university, may wish to affiliate themselves to these Boards.

New undergraduate colleges are bound to be an integral part of the expansion of opportunities in higher education. Where would these be located? It would be difficult for them to become autonomous colleges without a track record. It may be possible for some to join a cluster of autonomous colleges but this would be more the exception than the rule. It would not be possible for them to affiliate with existing universities which are already overloaded. Hence, there are three possible options for new undergraduate colleges to come. First, they could be established as community colleges. Second, they could be affiliated with the Central Board of Undergraduate Education or State Boards of Undergraduate Education. Third, they could be affiliated with new universities that are established.

There are, of course, issues related to governance, curricula, examinations, course credits and access which arise in the context of undergraduate colleges. These have been discussed in the context of universities in the preceding section of this note.

4. Regulation

There is a clear need to establish an Independent Regulatory Authority for Higher Education (IRAHE). Such a regulatory authority is both necessary and desirable.

It is necessary for two important reasons. First, in India, it requires an Act of Legislature of Parliament to set up a University. The deemed university route is much too difficult for new institutions. Entry through legislation alone, as at present, is a formidable barrier. The consequence is a steady increase in the average size of existing universities with a steady deterioration in their quality. The absence of competition only compounds problems. Second, as we seek to expand the higher education system, entry norms will be needed for private institutions and public-private partnerships. The institutional framework for this purpose must be put in place here and now.

It is desirable for four important reasons. First, it would minimize conflicts of interest as it would create an arm's-length distance from stakeholders. Second, it would replace the present system which is over-regulated but under-governed, through more appropriate forms of intervention. Third, it would rationalize the existing system where mandates are both confusing and overlapping. Fourth, it would dispense with the multiplicity of regulatory agencies to provide a single-window clearance.

The present regulatory system in higher education is flawed in many respects. The barriers to entry are too high. The system of authorizing entry is cumbersome. And there are extensive rules after entry, as the UGC seeks to regulate almost every aspect of

an institution from fees to curriculum. The system is also based on patently irrational principles. The UGC Act section 3.1.2(a) suggests that permission for receiving grants will be accorded only if the Commission is satisfied that the existing institutions in the state are not adequate to serve the needs of the state. The other regulators, say in the sphere of professional education, are often inconsistent in their adherence to principles. There are several instances where an engineering college or a business school is approved, promptly, in a small house of a metropolitan suburb without the requisite teachers, infrastructure or facilities, but established universities experience difficulties in obtaining similar approvals. Such examples can be multiplied. These would only confirm that the complexity, the multiplicity and the rigidity of the existing regulatory structure is not conducive to the expansion of higher education opportunities in India.

In sum, the existing regulatory framework constrains the supply of good institutions, excessively regulates existing institutions in the wrong places, and is not conducive to innovation or creativity in higher education. The challenge is therefore to design a regulatory system that increases the supply of good institutions and fosters accountability in those institutions. An independent regulator has to be the cornerstone of such a system.

The proposed IRAHE will rationalize the principles on which entry is regulated. There are two aspects to this rationalization: what is to be regulated and what are the principles used for regulation.

In higher education, regulators perform five functions: (1) Entry: licence to grant degrees. (2) Accreditation: quality benchmarking. (3) Disbursement of public funds. (4) Access: fees or affirmative action. (5) Licence: to practice profession.

India is perhaps the only country in the world where regulation in four of the five functions is carried out by one entity, that is, the UGC. The purpose of creating an IRAHE is to separate these functions. The proposed IRAHE shall be responsible for setting the criteria and deciding on entry. It would, in addition, license agencies to take care of accreditation. The role of the UGC will be limited to disbursing public funds. Issues of access will be governed by state legislation on reservations and other forms of affirmative action. And, professional associations may, in some institutions, set requirements to determine eligibility for conducting a profession. All other regulatory agencies such as the AICTE will need to be abolished while the MCI and the BCI will be limited to their role as professional associations. These professional associations could conduct nationwide examinations to provide licences for those wishing to enter the profession.

The second aspect of regulation is the principle used to regulate. The IRAHE will determine eligibility for setting up a new institution based on transparent criteria rather than discretionary controls. Its main role would be to exercise due diligence at the point it

approves a licence to grant degrees. In doing so, it would assess the academic credibility and the financial viability of the proposed institution on the basis of information submitted in accordance with the stipulated criteria. It will apply exactly the same norms to public and private institutions, just as it will apply the same norms to domestic and international institutions.

The IRAHE would be constituted as follows. It would have a Chairperson and six Members. The tenure of the Chairperson would be six years. The tenure of the Members would also be six years. One-third of the Members of the Authority will retire every two years. The Chairperson would be a distinguished academic from any discipline with experience of governance in higher education. The Members would be distinguished academics drawn from the following sets of disciplines: physical sciences, life sciences, social sciences, humanities and professional subjects such as engineering, medicine, law or management. The IRAHE could have some part-time members or standing committees drawn from academia to advise the Authority in each of the aforesaid sets of disciplines. The Chairperson and the Members of the IRAHE would be appointed by the Prime Minister based on the recommendations of a Search Committee.

The IRAHE would have to be established by an Act of Parliament. It would be the only agency that would be authorized to accord degree granting power to higher education institutions. It would also be responsible for monitoring standards and settling disputes. It should also be thought of as the authority for licensing accreditation agencies. The IRAHE must be at an arm's-length from the government and independent of all stakeholders including the concerned Ministries of the Government. The Acts of the UGC, AICTE, MCI and BCI would have to be amended. The role of the UGC would be re-defined to focus on the disbursement of grants to, and maintenance of, public institutions in higher education. The entry regulatory functions of the AICTE, the MCI and the BCI would be performed by the IRAHE, so that their role would be limited to that of professional associations. These professional associations could conduct nationwide examinations to provide licenses for those wishing to enter the profession.

5. Financing

The expansion of our system of higher education, which is both necessary and desirable, is not possible without financing. For an increase in supply of quality education depends upon an increase in investment which, in turn, requires financial resources. There are several sources of such financing.

Government support: There is no system of higher education in the world that is not based upon significant public outlays. And government financing will remain the cornerstone of any strategy to improve our system of higher education. The present support for higher education, at 0.7 per cent of GDP, is simply not adequate. In fact, over the past decade,

in real terms, there has been a significant decline in the resources allocated for higher education, in the aggregate as also per student. In an ideal world, government support for higher education should be at least 1.5 per cent, if not 2 per cent of GDP, from a total of 6 per cent of GDP for education. This is easier said than done. But the government should endeavour to reach these levels by 2012. Even this magnitude of state financing, however, would not suffice for the massive expansion in higher education that is an imperative. Therefore, it is essential to explore a wide range of possibilities which can be complements to the increase in public expenditure.

Better asset management: Most public universities are sitting on a large reservoir of untapped resources in the form of land. In effect, with some imagination, many of our universities can be converted into institutions that are similar to land grant universities. Each university should thus have an innovative asset management plan. Such plans should be in consonance with objectives of universities. At the moment, however, universities have no strategy in this sphere. And there is considerable room to think in strategic terms about the use of physical assets in the possession of universities. It should be possible to draw up norms and parameters for universities to use their land as a source of finance.

Rationalization of fees: On an average, fees constitute less than 10 per cent of total expenditure in our universities. And, in most universities, fees have remained unchanged for decades. In theory, universities have the freedom to decide on fees. In practice, however, universities have not exercised this freedom in part because of some genuine concerns about access but in larger part because of the rhetoric and populism in the political process. The problem has been compounded by the UGC method of providing grants-in-aid to bridge the difference between income and expenditure. Consequently, there is no incentive for universities or colleges to raise income through higher fees as that sum would be deducted from their UGC (or State government) grants. The low fees in public universities, without any means test, have meant unquantifiable benefits for unintended beneficiaries. But private players and foreign institutions have not been restrained in charging fees that the market can bear. The time has come to rethink, as we have no choice but to rationalize fees. It is for universities to decide the level of fees but, as a norm, fees should meet at least 20 per cent of the total expenditure in universities. In addition, fees need to be adjusted every two years through price indexation. Such small, continuous, adjustments would be absorbed and accepted far more easily than large, discrete changes after a period of time. This rationalization of fees should be subject to two conditions: first, needy students should be provided with a fee waiver plus scholarships to meet their costs; second, universities should not be penalized by the UGC for the resources raised from higher fees through matching deductions from their grants-in-aid.

Philanthropic contributions: It is clear that we have not exploited this potential. In fact, the proportion of such contributions in total expenditure on higher education has declined from more than 12 per cent in the 1950s to less than 3 per cent in the 1990s. It should be possible to nurture this tradition of philanthropy through changes in incentives for universities and for donors. In the present system, there is an explicit disincentive. If universities mobilize resources from elsewhere, they are in effect penalized through a matching deduction in their grant-in-aid. What we need to do is exactly the opposite. Universities which mobilize resources through contributions should be rewarded with matching grants-in-aid. At present, there is also an implicit disincentive in both lax laws and trust laws. Endowments of universities can only be placed in specified securities where rates of return are low and barely keep up with rates of inflation. What is more, trusts must spend 85 per cent of the income stream from the endowment in the same year, so that only 15 per cent of the income stream can be used to build up the corpus in the endowment. These laws should be changed so that universities can invest in financial instruments of their choice and use the income from their endowments to build up a corpus.

Other sources: Obviously, universities must not be driven by commercial considerations. But it would be both prudent and wise to tap other sources such as alumni contributions, licensing fees, or user charges (for facilities in universities used by people from outside). We need to create supportive institutional mechanisms that allow universities to engage professional firms for this purpose. Mobilizing resources, even from former students, is a task that cannot be performed by academics because it needs specialized talents and experience. Current UGC practice also penalizes universities for any resources mobilized with a matching deduction from the grants-in-aid provided to the institution. Rather than penalizing universities for raising resources, the UGC should incentivize them. In addition, universities must have the autonomy and flexibility to mobilize resources from elsewhere by creating or using appropriate institutional mechanisms.

Private investment: In three professions – engineering, medicine and management – there has been a *de facto* privatization of education so that two-thirds to three-fourths of the seats are in private institutions. But private investment in university education, where more than 70 per cent of our students study, is almost negligible. It is essential to stimulate private investment in higher education as a means of extending educational opportunities. We must recognize that, even with the best will in the world, government financing cannot be enough to support the massive expansion in opportunities for higher education on a scale that is now essential.

Public-private partnerships: It might be possible to leverage public funding, especially in the form of land grants, to attract more (not-for-profit) private investment. The present system of allotment of land, where political patronage is implicit, discourages genuine educational

entrepreneurs and encourages real estate developers in disguise. In principle, it should be possible to set up new institutions in higher education, not just more IITs and IIMs but also more universities, as public-private partnerships where the government provides the land and the private sector provides the finances. Such public-private partnerships which promote university- industry interface would also strengthen teaching and research.

International students: India is not an attractive destination for international students, not even as much as it used to be 30 years ago. It is time for us to make a conscious attempt to attract foreign students to India for higher education. This would enrich our academic milieu. This would enhance quality. This would be a significant source of finance. Even 50,000 foreign students charged fees at an average rate of US$ 10,000 per annum would yield US$ 0.5 billion: the equivalent of Rs 2,300 crore per annum in current prices at current exchange rates. The other side of the coin is perhaps even more important. Estimates suggest that there are about 160,000 students from India studying abroad. If their average expenditure on fees and maintenance is US$ 25,000 per student per year, Indian students overseas are spending US$ 4 billion: the equivalent of Rs 18,400 crore per annum in current prices at current exchange rates. This has an enormous potential as a source of finance for higher education in India, if only we could crate more opportunities for students with increased places and enhanced quality in our system.

6. Quality

The introduction of an independent regulator in higher education, the reform of existing public universities and the creation of national universities, taken together, would contribute to enhancement of quality in higher education. But this needs to be supported with some pro-active steps that would foster quality in higher education.

Accountability: The quality of higher education depends on a wide range of factors. But accountability, at every level, is a critical determinant. The higher education system must, therefore, provide for accountability *vis-à-vis* the outside world and create accountability within the system. Accountability of universities must not be confused with control of the state. Institutional mechanisms, based on checks and balances, constitute the most effective system for this purpose. The essential objective of accountability to society must be to empower students to take decisions rather than simply increase the power of the state. Stipulated performance criteria or inspections are forms of control. We need to create systems that enable students, or their parents, to choose between and assess universities.

Competition: The supply constraint on higher education is an impediment to accountability. When students have relatively few choices, institutions have greater power over them. An expansion of higher education which provides students with choices and

creates competition between institutions is going to be vital in enhancing accountability. Such competition between institutions within India is, of course, essential. But the significance of competition from outside India, more qualitative than quantitative, must not be underestimated. For this purpose, we must formulate appropriate policies for the entry of foreign institutions into India and the promotion of Indian institutions abroad. Such policies must ensure that there is an incentive for good institutions and a disincentive for sub-standard institutions to come to India. The present regime does the opposite: sub-standard players rush in while premier universities stay away as they care more about their autonomy and wish to set benchmarks for themselves. However, a level playing field should be ensured and all rules that apply to domestic institutions should also be applicable to foreign institutions. At the same time, policies must encourage rather than discourage Indian institutions to create campuses abroad not as business opportunities but as competition opportunities in their quest for academic excellence. Of course, expansion abroad should not be at the cost of domestic provision, either at present or in the future.

Accreditation: So far, we have sought to create accountability by increasing the powers of government regulators. Yet, it has done little to improve the quality of higher education. Consider, for example, the National Accreditation and Assessment Council (NAAC). This system has three characteristics which significantly erode its credibility. First, it grants one institution, the NAAC, monopoly power over accreditation. Second, NAAC itself does not have the capacity to rate all the institutions. It has rated just about 10 per cent of the total number so far. Third, the methodology of NAAC is much too discretionary. Instead of vesting one institution created by the state with monopoly power, the IRAHE may be empowered to license a number of accreditation agencies, public and private, to do the ratings. In doing so, the regulator would set standards for them. This will need to be accompanied by stringent information disclosure norms for all educational institutions, including the source and level of their accreditation. The rapid growth in higher education, particularly in the private sector, has created a strong need for empowering students and parents with reliable information from a credible accreditation process. This system can be supplemented with the creation of self-regulatory bodies in the higher education system and the freedom to seek recognition from global accreditation systems.

Internal systems: In most universities, the main stakeholders, students, are minimally part of any mechanism for accountability. Obviously, student evaluations need to be used with care. Even so, they can be part of a baseline set of accountability measures which could at least establish whether classes scheduled in the timetable are held. But that is not all. Evaluation of courses and teachers by students is also needed, just as much as we need peer evaluation of teachers by teachers. Such internal systems of evaluation would strengthen accountability in the teaching-learning process. These must be combined with institutional mechanisms for accountability in other dimensions of university systems.

Information: Almost everywhere, information in the public domain is an important source of accountability. Higher education should be no exception. There should be disclosure norms for universities and institutions imparting higher education. They should be required to place basic information relating to their financial situation, physical assets, accreditation ratings, admissions criteria, faculty positions, academic curricula, and so on, in the public domain. This would empower students and parents and enable them to make informed choices. Information, along with competition, fostered by increased supply, will close the accountability loop.

Incentives: Even if we cannot introduce penalties for non-performance, it is necessary to introduce rewards for performance. We must, of course, recognize that universities are different from the hierarchical worlds in governments and corporate structures. The web of incentives is far more subtle. Even so, the time has come to think of salary differentials within and between universities as a means of attracting and retaining talented faculty members. The salary differentiation among teachers within the same university needs to reflect the opportunity costs for teachers in some departments. This will help retain talent in some disciplines where remuneration in the market is much higher than in other subjects. Salary differentiation may enable some universities to develop centres of excellence in some disciplines. At the same time, it is important to ensure that disciplines which are essential for a good liberal education such as social sciences and humanities, as well as basic sciences which are not necessarily rewarded by the market, are given appropriate incentives to attract both teachers and students. Such salary differentials between and within universities could be effective without being large. Indeed, there is a good reason to stipulate a maximum ratio for differences in salaries between faculty members so as not to threaten the identity of the professoriate. Obviously, universities cannot compete with salaries elsewhere, but they should endeavour to provide a comfortable minimum for all, with some premium for those who perform. It is also important to think of other incentives, such as housing, good facilities for teaching and research and some flexibility for non-teaching professional activities so long as these do not impinge on the primary responsibilities to the institution.

Differentiation: We have to recognize that there is bound to be diversity and pluralism in any system of higher education. Therefore, in a country as large as India, we cannot afford to adopt the principle that one-size-fits-all. We must allow diversity to blossom. This could have many dimensions: curriculum, specialization, institutional architecture, students' composition, and so on. Similarly, differentiation is inevitable if not natural. Even if we do not wish to recognize it, such differentiation is a reality. Students and parents have clear preferences, possibly implicit rankings, based on their perceptions derived from available information. Our sense of pluralism must recognize, rather than ignore or shy away from, such diversity and differentiation. It is characteristic of every higher education system in

the world. For higher education is about a quest for excellence. It is, at least in part, about distinction and not always about levelling. The institutions which excel are the important peaks that raise the average. They are also role models others seek to emulate. And institutions that become such role models could mentor and guide other selected institutions.

7. National Universities

We need to create substantial additional capacity in higher education for achieving a quantum jump in the gross enrolment ratio for a rapidly expanding population of young people. It would be expeditious to do so by simply expanding on our existing educational infrastructure. A fundamental paradigm shift in our understanding of quality and standards in higher education, however, requires creating completely new institutions that operate unconstrained by the current institutional and regulatory framework. We recommend the creation of up to 50 National Universities that can provide education of the highest standard. As exemplars for the rest of the nation, these universities shall train students in a variety of disciplines, including humanities, social sciences, basic sciences, commerce and professional subjects, at both the undergraduate and post-graduate levels. The number 50 is a long term objective. In the short run, it is important to begin with at least 10 such universities in the next three years. It is worth noting that the National Universities need not all be new universities. Some of the existing universities could also be converted into National Universities, on the basis of rigorous selection criteria, to act as exemplars. We recognize that there could be a human resource constraint if faculty members are not available in adequate numbers to establish these universities. But, for such centres of academic excellence, it should be possible to attract talent from among those who choose other professions in India or the academic profession outside India.

National Universities can be established in two ways, by the government, or by a private sponsoring body that sets up a Society, Charitable Trust or Section 25 Company. Since public finance is an integral constituent of universities worldwide, most of the new universities shall need significant initial financial support from the government. This could be in several forms. Each university may be endowed with a substantial *allocation of public land*, in excess of its spatial requirements. The excess land can be a subsequent source of income generation, its value rising over time due to the growing stature of the university. In the case of privately executed Charitable Trusts, exceptions need to be made in existing Income Tax laws to encourage large *endowments*. In particular, there should be no restriction on the utilization of income in any given time period, the Trusts should be allowed to invest their funds in financial instruments of their choice, and all proceeds from the sale of capital assets should be exempt from capital gains tax. These universities shall have the autonomy to invest in financial instruments of their choice, by employing private fund managers if required. Appropriate mechanisms also need to be put in place for the optimal *management of physical assets*, like laboratories, libraries, classrooms and other

facilities. Finally, these universities shall have the autonomy to set *student fee levels* and tap other sources for generating funds such as industry collaborations, overseas operations, as also commercial use of university facilities and alumni networks.

The National Universities we propose shall admit students on an all-India basis. They shall adopt the principle of *needs-blind admissions*, thereby ensuring that an applicant's ability or inability to pay shall not influence the admission decision made by a university. Further, once admitted, the university should ensure that no student has to forego his/her place due to financial constraints. This will require a host of scholarships, freeships, bursaries and awards for economically disadvantaged students. At the undergraduate level, a nationwide test that objectively measures the verbal, quantitative and analytical abilities of applicants shall be administered by an independent testing body. Admissions shall be based on a combination of Class XII results, scores from the nationwide test, application materials including written work and personal statements, as also interviews. At the postgraduate level, admissions shall be based on a combination of the applicant's academic record, application materials, interviews and academic or professional references that indicate his/her aptitude for further studies in the relevant discipline.

Undergraduate degrees in the National Universities shall have a duration of three years so that these are in conformity with the duration of undergraduate courses elsewhere in India. In the first year, students shall have the opportunity to study foundation, analytical and tools courses before choosing a specific discipline in the second year. They shall also have the option, at the end of the second year, of completing an integrated five-year master's degree. Degrees should be granted on the basis of completing a requisite number of credits, obtained from different courses. Each student shall be required to earn a minimum number of credits in his/her chosen discipline, and shall have the freedom to earn the rest from courses in other disciplines. The academic year shall therefore be semester-based and students shall be internally evaluated at the end of each course. Transfer of credits from one National University to another shall also be possible. A wide variety of courses shall be offered, in traditional academic disciplines, employment-oriented specific areas and cross-cutting competencies. Syllabi shall be revised every year to keep up with changes and current developments in various disciplines. Departments that do not update their syllabus for two consecutive years shall be asked to provide justification. Students shall have the option of taking up internships in private companies or research institutions in lieu of a certain number of credits.

An appropriate system of appointments and incentives is required to maximize the productivity of faculty in the National Universities. There shall be scope for salary differentials between National Universities and also between disciplines. Faculty training will be contingent on periodical reviews of research output and student evaluation. The

most accomplished faculty members shall be encouraged to teach undergraduate courses. There shall be no career advancement schemes and appointments at every level shall be through open competition. The total number of faculty positions may be specified, but there should be complete flexibility in choosing the level at which faculty appointments are made, so that, for talented faculty members, career paths are not constrained by the number of vacancies. In order to maintain the quality of the National Universities, mechanisms should be in place to monitor and evaluate the performance and progress of teachers including peer reviews. The procedures and results of these evaluations will be open and transparent.

The research outputs of these universities shall be vital contributors to India's socio-economic development and progress in science and technology. Strong linkages shall be forged between teaching and research, universities and industry, and universities and research laboratories.

The National Universities shall be department-based and shall not have any affiliated colleges. Each department will administer undergraduate and post-graduate courses. Non-teaching functions should be outsourced wherever possible, and a maximum ratio of 2:1 should be maintained between non-teaching and teaching staff. Each university should appoint an internal ombudsman for the redressal of faculty, staff, student and public grievances. Administrative processes, wherever possible, should be streamlined and made transparent and accountable by the use of information and communications technology.

8. Access

Education is an essential mechanism for inclusion through the creation of social opportunities. It is, therefore, essential that in addition to ensuring that no student is denied the opportunity to participate in higher education due to financial constraints, access to education for economically and historically socially underprivileged students is enhanced in a substantially more effective manner.

Economic barriers to higher education can be addressed by ensuring financial viability for all students wanting to enter the world of higher education. This can be done through two strategies. One is to adopt a *needs blind admissions* policy. This would make it unlawful for educational institutions to take into account any financial factor while deciding whether or not to admit a student. Every institution will be free to use a variety of instruments to achieve this aim: scholarships or cross-subsidies. In addition, academic institutions would be able to set a fee of their own choice subject to the provision that there are at least two banks that are willing to finance the entire cost of education at that institution, without any collateral other than the fact of admission. The cost of education includes not just fees but also reasonable living expenses including costs such as hostel and mess fees and

any other expenses associated with the course of study. Since commercial banks may be wary of funding economically deprived students, especially in non-professional courses, we need a well-funded and extensive National Scholarship Scheme targeting economically underprivileged students and students from historically socially disadvantaged groups, particularly students from rural and backward areas. The success of this proposal depends on generous government support. For instance, the government should endeavour to make available about 100,000 scholarships for such students. These scholarships should be set at a level where students are empowered to go to any institution of their choice.

We also need to undertake more proactive forms of affirmative action to ensure inclusion of marginal and excluded groups. Reservations are essential but they are a part, and one form of, affirmative action. Disparities in educational attainments are related to caste and social groups, but are also strongly related to other indicators such as income, gender, region and place of residence. Access to quality higher education is further limited for students from certain types of schools. Therefore deprivation of educational opportunities is a multi-dimensional problem and attention needs to be paid to different salient levels of deprivation faced by students. A meaningful and comprehensive framework would account for the multidimensionality of differences that still persist. Such a deprivation index could provide weighted scores to students and the cumulative score could be used to supplement a student's school examination score. After adding the score from the deprivation index, all students could compete for admissions.

The indicators need to be easily identifiable and verifiable for the system to work effectively. They should cover the different types of disadvantages that a student could face at the school level, and while applying for admissions to higher education. This system serves the dual purpose of considering various disadvantages and ensuring that a reserved category student who has otherwise enjoyed other benefits does not get great preference at the time of admissions.

Illustrative indicators of backwardness that need to be measured by such an index could include *social background* covering caste (keeping in view regional variations), religion and gender, *family education history*, *family income, type of school* distinguishing between government and private schools and between schools from different locations, the medium of instruction, *place of residence* distinguishing between urban and rural areas and accounting for regional deprivation by sorting districts along an index of infrastructure or access to social benefits and *physical disability*.

2.5 (b) Appointment of Heads of Institutions

The recent measures introduced by the government leading to a major expansion of the higher education sector are probably among the most important steps in making India globally competitive in the long run. Expansion and inclusiveness, drawing larger sections of Indians into the arena of knowledge creation and utilization will be the key drivers to a better future.

The National Knowledge Commission would like to draw attention to the central role of governance structures in allowing these new institutions to grow rapidly, efficiently and productively and also, to review procedures in some of our best existing institutions like IITs, IIMs, Central Universities and AIIMS.

It is imperative to separate governance mechanisms from the day-to-day operations of Ministries, in order to protect functional autonomy, in its fullest sense. NKC would like to draw attention to the following ideas.

1. The appointment of Directors/Vice Chancellors of the new IITs, IIMs, IISERs, Central Universities, AIIMS must be made by a Search Committee that has an independent Chair, capable of exercising the highest quality of judgment. The direct involvement of administrative ministries can result in unfortunate situations.
2. The procedure for appointment of the Chairperson and members of governing Councils/Boards needs to be carefully crafted in order to ensure that institutions have the benefit of the widest inputs from academia and society.
3. The involvement of the Chair of the Governing Board and at least two independent members in the selection of the Director/Vice Chancellor will ensure smooth functioning at later stages of an institution's development.
4. Appointments of heads of institutions must be made well in advance of a vacancy arising, so that a smooth transition is effected. In view of fixed tenures, there is no reason that this cannot be done in all institutions.
5. The proposal for an independent regulatory body for higher education was also advanced by the Commission as an expression of its concern at the deteriorating ambience of institutions of learning in many parts of the country.

In summary, NKC believes, that governance issues may be central to any debate on improving the status of higher education in India.

2.6 More Talented Students in Maths & Science

A strong foundation in the pure sciences is essential to transform India into a knowledge superpower. Unfortunately, as the economy grows, fewer students are opting for the pure sciences. This has led to a talent crunch, seriously impeding the development of the future generation of scientists and teachers. We are aware that this is a worldwide phenomenon, but countries like China and South Korea, having invested prudently in science education, are now beginning to reap rich dividends.

In this context, NKC carried out wide consultations with experts through a series of workshops and interviews. A working group of eminent persons was also constituted to consider all aspects of the problem. Based on these inputs, NKC has formulated a set of recommendations to attract and retain talented students in basic sciences which are summarized in the following paragraphs. NKC has chosen to reiterate some of the proposals which overlap with the views of other expert groups. NKC would like to stress that this matter is extremely urgent and a rapid implementation is now crucial to effect a paradigm change in the field of Science education and research in the country.

1. Invest in upgrading and expanding the existing infrastructure and promote sharing of available resources – University departments and leading undergraduate science colleges should be generously funded to upgrade their staff and facilities. To encourage good departments, 'Centres of excellence' should be identified with comprehensive review and evaluation procedures in place. To create a critical mass of scientists in each science stream undergraduate seats should be increased in good institutes and **undergraduate programmes should be introduced at institutes where only post graduate teaching is currently undertaken**. Innovative methods for sharing resources and faculty between institutes and universities need to be evolved. At the same time, university management at all levels should be made more professional and sensitive towards working in an academic and research environment to promote optimal utilization of resources.

2. Revitalize the teaching profession to attract and retain quality teachers – The working condition of teachers needs to be drastically improved. Rewards and recognition should be publicized and given at all levels. Teachers at the school and college level should be encouraged to develop innovative teaching methods. Research should be promoted in colleges by building linkages between colleges and research institutions. Academic autonomy and flexibility should be encouraged. Further, a mentoring programme for young faculty members should be started in universities and colleges. Many reserved faculty posts remain vacant in the absence of innovative or flexible appointment modes to fill these posts, creating enormous practical difficulties in teaching. **There is a need to**

start a systematic affirmative campaign to rectify this situation. Young students who can eventually fill these posts could be selected from an early age and nurtured and trained carefully to induct them into a career in teaching.

3. Revamp teacher training at all levels and promote development of teaching aids to retain student attention in classrooms – A systemic change in science pedagogy from primary and high school levels is required. There is a need to launch a large scale in-service training programme for all science teachers based on the initiative undertaken by Science academies. At the undergraduate level, the present method of faculty training conducted by Staff Training Institutes/Centres should be reviewed and revamped. In addition, there is a need to provide a platform for life long skill enhancement of teachers. Teacher organizations like the Indian Association of Physics Teachers should be strengthened and financially supported so that they can become leaders in developing new teaching methodologies and make significant contributions to content and evaluation reforms.

4. Restructure masters and graduate degrees to promote career flexibility after graduation – To bring graduate degrees in science at par with other professional streams, a four year Bachelor in Science (flexible and modular in nature) is proposed. This degree course should be aptly branded and devised so that it is significantly stronger than the regular three year programme. It should enable students aspiring for a research career to directly enter a Ph.D programme. For others, it should provide them with measurable value additions like interdisciplinary skills, niche skills required in industry, or rigorous training in science education, science communication, etc. To ensure the success and acceptability of such programmes, the course content must be planned in consultation with diverse expert groups, and implemented at institutions with a proven track record of success. Simultaneously, the existing B.Sc. and M.Sc. courses should be reformed. The integrated five year M.Sc. programme should have the provision to be integrated with the Ph.D programme so that the total effective time spent for a Ph.D is reduced.

5. Reform the science curriculum content in line with the changing world and increase research component at all levels – There is an urgent need to reduce information load of curriculum at the higher secondary level. Courses should be made engaging and the amount of hands-on work at all levels should be increased. Books should be written by teachers who teach the subject and not by curriculum committees. Pedagogy should be modified to impart creativity and global vision training. Avenues for research should be increased at all levels.

6. Radical changes are required in the evaluation system to encourage scientific thinking and promote better understanding of basic science concepts – The system should move from examination based evaluation to more open assessment mechanisms. Memory, comprehension and creativity should be given equal importance in evaluations. Continuous

assessment at the school level will reduce dependence on year-end examinations. To enable the modifications in the evaluation process, teachers need to be trained in new methods of evaluation.

7. Promote access to quality science educational material at all levels – There is a need to disseminate high quality science educational material and self learning aids in local languages to assist students from non-English medium education background. **One important factor which has to be kept in mind while translating into local languages is that the technical/scientific terms should be retained in English.** This will make it easier to migrate to English medium teaching in sciences at higher level for the students. Special teaching aids need to be developed for tribal children and children from rural backgrounds to attract them towards science. Tribal schools should be equipped with teachers who are trained in pedagogical methods suited to the special needs of tribal children.

8. Re-brand and promote careers in basic sciences – Existing careers in sciences, namely teaching and research, should be made more attractive. There is a need to increase salaries in this field to reflect the shortage of skilled manpower and to attract students towards a career in science. Science colleges should collaborate with research institutes and industry for campus placements. More modules/courses could be designed which prepare students for employment in industry. The four year bachelor's course offered by quality institutes should dispel the myth that science bachelors are in any way less employable than graduates from other professional streams. Research institutes should collaborate with professional streams to pursue and create more opportunities. New institutes will create a demand for quality science Ph.Ds and these career opportunities need to be publicized.

9. Launch a massive science outreach programme aimed at students and their parents – A science popularization programme should be launched to effectively cover children across India. This programme should bring all popular science activities under one umbrella for rapid implementation and replication of successful initiatives. A large chain of science talent cells should be created and each school should be funded to open a science club. The effectiveness of mobile labs in reaching the rural students and teachers is very high. Replication of the Agastya International Foundation's mobile lab programme, with possible public private partnership mode for implementation, should be considered for various states.

10. Encourage industry participation in promoting sciences at all levels – As research based industries flourish in India, more and more companies will need employees qualified in basic sciences, thus creating other attractive career opportunities in science. Industry should be encouraged to sponsor students for Masters and Ph.Ds in science and also internships of longer duration in industry for post graduate students. Science undergraduates should be exposed to various applications of science in industry through

seminars and popular science lectures by industry leaders. Academic institutions should develop groups at each institute which specialize in developing novel funding mechanisms involving industry and explore other possible modes of industry participation.

India has a long and rich history attesting to the high talents of Indians in science. To bring back the glory that the pure sciences once held in the minds of the students, an urgent restructuring of the entire system is needed. These recommendations are just the beginning of a systemic overhaul process, requiring great support from the government and committed individuals. The crucial ingredient for ensuring success would be an effective, mission-oriented platform for delivery. Therefore, a National Science and Mathematics Mission is proposed.

2.7 Legal Education

The National Knowledge Commission, while deliberating on issues related to knowledge concepts, recognizes legal education as an important constituent of professional education. The vision of legal education is to provide justice-oriented education essential to the realization of values enshrined in the Constitution of India. In keeping with this vision, legal education must aim at preparing legal professionals who will play decisive leadership roles, not only as advocates practising in courts, but also as academics, legislators, judges, policy makers, public officials, civil society activists as well as legal counsels in the private sector, maintaining the highest standards of professional ethics and a spirit of public service. Legal education should also prepare professionals equipped to meet the new challenges and dimensions of internationalization, where the nature and organization of law and legal practice are undergoing a paradigm shift. Further, there is need for original and path breaking legal research to create new legal knowledge and ideas that will help meet these challenges in a manner responsive to the needs of the country and the ideals and goals of our Constitution. As part of a consultative process, NKC constituted a Working Group of experts, including distinguished members of the Bar, the bench and academia under the chairmanship of Justice M. Jagannadha Rao to suggest necessary measures to improve the quality of legal education in India. Based on further consultations with stakeholders, NKC has proposed the following:

1. Regulatory Reform: A New Standing Committee for Legal Education

A new regulatory mechanism under the Independent Regulatory Authority for Higher Education (IRAHE), vested with powers to deal with all aspects of legal education and whose decisions are binding on the institutions teaching law and on the union and state governments, should be established. The Standing Committee for Legal Education may consist of 25 persons (including eminent lawyers, members of the Bar Council of India/ BCI, judges, academics, representatives from trade, commerce and industry, economists, social workers, students and others) and it must aim at revamping legal education to meet the needs and challenges of all sections of society.

At the time of enactment of the Advocates Act, 1961, it was envisaged that legal education would only produce lawyers for the courts and accordingly the BCI had been entrusted with the limited role of 'promoting legal education and laying down minimum standards of legal education' required for students who 'are entitled to practice'. In the last 50 years, and particularly after liberalization in 1991, the entire concept of legal education has changed considerably. Today, legal education has to meet not only the requirements of the Bar but also the new needs of trade, commerce and industry, in the context of growing internationalization

of the profession. The need for improvement in overall quality to match global standards has become even more salient when viewed from such a perspective. In light of the changed scenario in the last 50 years and the existing gaps and deficiencies in overall quality, it is clear that the BCI has neither the power under the Advocates Act, 1961 nor the expertise to meet the new challenges both domestically and internationally. It is, therefore, necessary to constitute a new regulatory mechanism with a vision both of social and international goals, to deal with all aspects of legal education and to cater to the needs of the present and the future. The BCI would however continue to exercise its powers to recommend minimum standards required for practice in the courts. Further, the BCI would continue to enjoy its powers of discipline so far as the members of the Bar are concerned.

2. Prioritize Quality and Develop a Rating System

There is a need to develop an independent Rating System based on a set of agreed criteria to assess the standard of all institutions teaching law as a mechanism to ensure consistent academic quality throughout the country. The criteria for rating would be evolved by the Standing Committee for Legal Education while the rating would be done by independent agencies licensed by IRAHE for the purpose. Recognition could be either granted or withdrawn on the basis of such ratings. The rating results should be reviewed annually, regularly updated, monitored and made available in the public domain.

3. Curriculum Development

Curriculum should be made contemporary, integrated with other disciplines ensuring regular feedback from stakeholders. Autonomy may be granted to universities, National Law Schools (NLSUs) and other law schools to decide the core and optional courses to be offered. This is a departure from current practice where the BCI largely determines curricula and syllabi. A committee should be formed that includes faculty and practitioners and seeks student feedback to discuss curricula, syllabi and reading material of all core and optional courses, and devise a 'model' syllabus for all core and optional courses. Law schools and universities would be free to use and depart from the 'model' syllabus.

Law teaching must be interwoven with related contemporary issues, including international and comparative law perspectives. The curricula and syllabi must be based in a multidisciplinary body of social science and scientific knowledge. Curriculum development should include expanding the domain of optional courses, providing deeper understanding of professional ethics, modernizing clinic courses, mainstreaming legal aid programmes and developing innovative pedagogic methods. Legal education must also be socially engaged and sensitize students on issues of social justice.

4. Examination System

The prevailing examination systems may be revised and evaluation methods be developed that test critical reasoning by encouraging essential analytical, writing and communication

skills. The end-semester examination should be problem-oriented, combining theoretical and problem oriented approaches rather than merely test memory. Project papers, project and subject viva, along with an end-semester examination to be considered as pedagogic methods imperative for improving quality.

5. Measures to Attract and Retain Talented Faculty

To attract and retain talented faculty, better incentives, including improving remuneration and service conditions may be introduced. It may be necessary to think of salary differentials within and between universities and law schools along with other means of attracting and retaining talented faculty members. Such salary differentials between and within universities and law schools could be effective without being large. This will help retain talent in legal academia where the problem of inadequate remuneration is far more acute than in other disciplines. Salary differentials could be considered as a means to retain quality talent and also promote a culture of excellence.

To foster quality and create better incentives, there is also need to remove fetters on faculty that pertain to opportunities in legal practice (such as consultancy assignments and legal practice in courts). These reforms need to be introduced in a balanced, reasonable and regulated manner to ensure adequate incentivization for faculty without compromising on the maintenance of consistent academic quality. As a further incentive, it is necessary to create better opportunities for active involvement of academia in the shaping of national legal education policy.

There is also need to reconsider existing promotional schemes and avenues to promote meritorious faculty members. Other incentives for faculty include fully paid sabbaticals; adequate House Rent Allowance (HRA); instituting awards to honour reputed teachers and researchers at national and institutional levels; flexibility to appoint law teachers without having an LL.M degree if the individual has proven academic or professional credentials; faculty exchange programmes with leading universities abroad and upgrading existing infrastructure.

6. Developing a Research Tradition in Law Schools and Universities

Creating a tradition of research in law schools and universities is imperative if India has to transform itself from being only a consumer of available legal knowledge to being a leading producer in the world of new legal knowledge and ideas. The following measures are required to develop such a serious culture of research: emphasizing analytical writing skills and research methodology as integral aspects of the LL.B programme; creating excellent infrastructure (including research friendly library facilities, availability of computers and Internet; digitization of case law; access to latest journals and legal databases available worldwide); rationalizing the teaching load to leave faculty members

sufficient time for research; granting sabbatical leave to faculty to undertake research; creating incentives if research results in peer reviewed publications, either through additional increments (beyond the UGC scheme) or in any other appropriate manner; institutionalizing periodic faculty seminars; establishing quality peer-reviewed journals; prescribing research output as one of the criteria for promotion; creating a database of citations to identify the most cited and influential writings as well as considering such data for promotion purposes; establishing prerequisites such as a mandatory dissertation in the LL.M programme, a pre-registration presentation and a course in methodology for M.Phil and Ph.D programmes respectively; and establishing four new centres for advanced legal research.

7. Centres for Advanced Legal Studies and Research (CALSAR)

There is need to set up four autonomous, well networked Centres for Advanced Legal Studies and Research (CALSAR), one in each region, to carry out cutting edge research on various aspects of law and also serve as a think-tank for advising the government in national and international fora. The CALSARs would maintain adequate linkages and institutionalized interaction opportunities with law schools and universities, including continuing legal education for faculty. Some other specific functions and objectives of these centres would include: publishing a peer reviewed journal of international quality; facilitating multi disciplinary approaches to law; institutionalizing arrangements for scholars in residence; organizing workshops and undertaking in-depth research on new and developing areas of law.

Each CALSAR would require an initial investment of around Rs. 50 crore to build an academic complex, conference facilities, a world-class library and other infrastructure. These institutes would also need to be provided with an annual budget to the tune of Rs. 5 crore for salaries, fellowships, administrative expenses and related expenses. The initial investment and the annual budgets should be borne by the central and respective state governments (that would host the CALSAR) respectively, but the CALSARs should gradually aim at financial self-sustenance, through innovative financial methods.

8. Financing of Legal Education

It is for law schools and universities to decide the level of fees but as a norm, fees should meet at least 20 per cent of the total expenditure in universities. This should be subject to two conditions: first, needy students should be provided with a fee waiver plus scholarships to meet their costs; second, universities should not be penalized by the UGC for the resources raised from higher fees through matching deductions from their grants-in aid. The central and state ministries may also be urged to endow chairs on specialized branches of law. State financing can be complemented with endowments from the private sector, including synergistic arrangements such as appropriate public private partnerships. Incentives such as

tax holidays for donations above a high minimum threshold by the corporate sector may be considered. Institutions should be given the autonomy to evolve their own innovative methods of financing to maximize infrastructure and resource utilization.

9. Dimensions of Internationalization

Building world class law schools today will require creatively responding to the growing international dimensions of legal education and of the legal profession, where it is becoming increasingly necessary to incorporate international and comparative perspectives, along with necessary understanding of domestic law. Suggested initiatives to promote such international perspectives include building collaborations and partnerships with noted foreign universities for award of joint/dual degrees; finding ways of evolving transnational curricula to be taught jointly by a global faculty through video conferencing and Internet modes; as well as creating international faculty, international courses and international exchange opportunities among students.

10. Technology for Dissemination of Legal Knowledge

For maximum dissemination of legal knowledge, all information available in the Indian Law Institute ("ILI"), Supreme Court Library, Indian Society for International Law ("ISIL") as well as those of all law schools, universities and public institutions in the country, be networked and digitized. Such networking is in addition to the need for adequate infrastructure such as computers, law journals, legal databases and excellent libraries in the institutions teaching law.

2.8 Medical Education

The quality, the quantity, distribution and availability of human resources for the health sector in India at present, need to be improved substantially to deliver care-driven, rural oriented and equitable health services. Over the years, health related education and training has become more urban oriented, doctor-centric and technology-driven. The environment of medical education needs to be both nationally sensitive and globally competitive. To realize these objectives, our medical education system needs radical reforms.

The National Knowledge Commission therefore considered it imperative to carry out a comprehensive appraisal of the system. For this purpose, a Working Group was constituted which included some of the most distinguished members of the medical profession in India, chaired by Dr. Sneha Bhargava, former Director, AIIMS. Based on the inputs provided by the Working Group and further consultations with concerned stakeholders, NKC recommended the following:

1. Regulation and Accreditation

Regulation

At present, medical education in India is regulated by the Medical Council of India (MCI). This system of regulation is neither adequate nor appropriate to meet the needs of the profession. Therefore, in conformity with NKC recommendations on Higher Education, a Standing Committee within the structure of the Independent Regulatory Authority for Higher Education (IRAHE) may be constituted. The primary function of the Standing Committee will be to ensure that medical practice and teaching are updated and revised regularly and minimum quality standards are maintained. The members of the Standing Committee would include faculty from recognized universities, practising physicians, members of civil society, students and a director from autonomous institutions representing educators. The Chairman and the members of the Standing Committee would be accountable to IRAHE. The Standing Committee would look into manpower planning and development based on disease-profile, doctor-population ratio and skill-mix ratio.

Professional Councils

The Indian Medical Council Act should be amended such that MCI functions only as a professional association, with powers to conduct nationwide examinations, and to provide licenses for those who wish to join the profession. Similar changes are needed for all the other Councils viz. Nursing Council, Pharmacy Council, Dental Council and Rehabilitation Council.

Accreditation

IRAHE should be empowered to license suitable agencies for accreditation. Accreditation agencies could award different degrees of accreditation, such as "Full", "Provisional" or "On Probation" and have the power to de-recognize. Institutions would have to ensure transparency in their admission processes, able and responsible faculties, a multidisciplinary academic learning environment, transparency in assessment of students and close linkages with regional health care and delivery systems, in order to be accredited.

Admission

Policies of admission and fee structure of private colleges have to be regulated, not only to stop them from becoming sources of political and financial power but also to arrest falling standards. There should be only one All India Common Entrance Test for all students who would like to get admission to Self Financing Medical Colleges. Since the CBSE conducted examination for the 15 per cent All India quota in Government Medical Colleges is taken by a very large number of students, this would appear to be the ideal examination whose ambit can be expanded. All self-financing Medical Colleges should announce their fees in their prospectus so that students can make their choice for admission. Information Technology should be used to increase transparency and efficiency in the admission, examination, administration, teaching, content delivery and other related processes.

2. Quality

Curriculum

All institutions must constitute Curriculum Committees that plan curricula and instructional methods, which are regularly updated. The structure and composition of the curriculum must describe the content, scope and sequencing of the courses, including the balance between core and optional courses. Integration of ICT in the learning process is essential. Incorporating new skills like management, disciplines like health economics and frontier areas like bioinformatics should be considered.

Standards test

An independent and standardized National Exit Examination at the end of 4½ years of study, is essential to conduct a national level assessment of skills and knowledge. The National Exit Examination could be conducted immediately after the University examination, and would also serve as a postgraduate entrance exam.

Internship Assessment

The internship year must be assessed to ensure skill development. The current practice of students continuing to study in the internship year without going to clinics needs to be addressed. There must be compulsory rotation from the teaching hospital to the community and district hospital during the internship period. Duration of the

term in the district hospital should be six months, in the Community Health Centre three months and in the tertiary care hospital the remaining three months. Each intern should be assigned a "mentor" at the district hospital and the credits should be based on the assessment by the mentor. The entrance to postgraduate programmes should be based on a summation of the pre- & post-internship examinations.

Continuing Education

There is a need to revamp Continuing Medical Education (CME) based on distance learning. All professionals should be required to undergo a re-certification process every five years, which can be evaluated by credits earned through CME. ICT can be used extensively to provide CME at the convenience of the learner.

3. Faculty Development

Teaching

Attracting and retaining quality faculty should be accorded top priority. Measures such as opportunities to attend international conferences regularly, sabbaticals, dual appointments, rewarding research, fast-track promotions, and dissociating remuneration from government pay scales should be explored. All institutions must clearly lay down exact definitions of what constitutes conflict of interest for faculty members in public medical colleges, who have a private practice in addition to their official duties, and receive a full time teacher's salary. Those who flout these regulations should be penalized.

Research

With a view to encouraging research in medicine, a Mentored Medical Student Research Programme should be set up as a catalyst to introduce medical students to a potential career in patient-oriented/community-oriented research including interdisciplinary research. Two points of entry into Ph.D programmes should be considered: one after MBBS and another after MD depending on the student's interest. The government should facilitate setting up of research centres in medical colleges. Validating Indian Systems of Medicine using bio-sciences tools should form an integral component of the research effort.

Training

Five Regional Centres for teacher training/faculty development should be set up so that teachers from the outlying regions can be sent to these centres periodically for up-gradation of their teaching skills.

4. Post-graduate Education

General Physicians

The medical profession needs to be structured like a pyramid with the base made up of

general physicians. At present there is little if any space for such doctors in post-graduate courses. Therefore, we suggest that adequate representation should be given to general physicians while carrying out expansion of post-graduate seats such that 50 per cent seats are reserved for general physicians. New streams for post graduation should be looked at based on needs.

Admissions

Admission to post-graduate courses should be done on the basis of credits received in the National Exit Examination and pre- and post-internship clinically oriented exams after internship. There is a need to reserve post-graduate seats (up to 20% of total available seats) for graduates who have worked in rural areas for at least three years.

5. Regional Balance

Location Priorities

The number of medical colleges in relation to population in some states is much higher than in other states. The Central Government should aid new colleges in these states to address this regional disparity. For instance, north eastern states require urgent attention in this context. The Central Government can develop a list of priority sites for establishing new colleges where the impact of new clinical facilities would benefit the surrounding rural population.

Role Models

Further at least one institution should be identified in each state that can serve as a centre of excellence and role model for the other institutions of the state. These institutions should have state-of-the-art infrastructural equipment such as research laboratories, teacher training facilities, and libraries, as well as talented faculty of adequate strength to act as a common resource and also to serve as a benchmark of excellence.

Medical education cannot be stand-alone. It requires support in the form of trained nurses, pharmacists, paramedic workers. It must all also serve the essential purpose of delivering health care to the people. Therefore, NKC also set out some recommendations on education for supporting services and public health.

6. Education for Support Services

Nursing

There is a need to create additional capacity for training nursing staff. In addition, every district hospital should have attached to it a nursing school, which offers diploma in nursing specifically to operate primary health centres as nurse practitioners. A career growth pathway should be ensured for nurses after a specific period of primary health

care service. For graduate nurses in city hospitals, specialized courses for family nurse practitioners, nurse anesthetists and in areas of tertiary care are recommended.

Pharmacy

Pharmacy education should be popularized and the number of seats for pharmacy education should be increased substantially. Gradual phasing out of untrained pharmacists should be considered.

Paramedics

The role of Paramedic workers should be expanded. A Paramedical Council needs to be immediately established, which would prepare training programmes for multi skill and speciality technicians and oversee their delivery and quality. Paramedics, such as compounders, dressers, and laboratory technicians can also perform public health functions, such as health education, providing immunization, and first aid. Such a health worker could be trained through vocational training at the higher secondary level followed by a one year diploma. Career paths should be built into their service in order to retain them because international demand is high.

7. Public Health

Education

A three tiered structure consisting of a one year diploma course, a three year B.Sc. course and a three year Master's course may be introduced. These programmes can be attached to departments of Community Medicine in all medical colleges for providing hands on training. All universities, all district hospitals and the Public Health Foundation of India can run them.

ASHA

The role of Accredited Social Health Activists (ASHA) needs to be re-conceptualized within this framework, and ASHA must be viewed as an accessible and effective health worker. The training period of the ASHA needs to be lengthened from its current duration. Steps should be taken to review the system of remuneration and improve the working conditions of the ASHA workers.

2.9 Management Education

Management education has seen phenomenal growth in the past six years with the number of institutions providing undergraduate and post-graduate level courses rising to over 1700. Of these, more than 1000 were added after the year 2000. This has been possible largely due to the entrepreneurial initiative of promoters, taking advantage of the ever increasing demand for management graduates, hence management education. Unfortunately, this has also led to an exploitative and commercial environment with quality being compromised. Regulatory focus only on physical infrastructure rather than research, qualified faculty and relevance of courses has created a mismatch between supply and demand.

As a part of its consultative process, NKC constituted a Working Group of experts from academia and industry under the chairmanship of Mr. P.M. Sinha. Based on the Working Group's inputs and consultations with concerned stakeholders, NKC proposed the following set of initiatives:

1. New Regulatory Framework

NKC advocates good governance rather than the prevalent system of a prior control being exercised by AICTE in this sphere. The current regulatory regime focuses on punitive actions rather than on nurturing institutions. NKC proposes that an autonomous Standing Committee for Management Education be set up under the Independent Regulatory Authority for Higher Education. Its main role would be to exercise due diligence at the point it approves a license to grant degrees/diplomas. In doing so, it would assess the academic credibility and the financial viability of the proposed institution on the basis of information submitted in accordance with the stipulated criteria. It will apply exactly the same norms to public and private institutions, just as it will apply the same norms to domestic and international institutions. It would, in addition, license agencies to take care of accreditation. Other responsibilities of the Standing Committee will be to collate as well as communicate information on Management Educational Entities (MEEs)[1]; set up an information exchange; conduct demand forecasting of managerial manpower and develop and maintain a low cost e-monitoring system.

2. Grading Institutions

The Standing Committee will stipulate grading norms and nominate independent rating agencies to assess and categorize MEEs. Mushrooming private MEEs necessitate a reliable

[1] In view of the variety of institutions delivering management education, MEE is used to cover all educational institutions; Institutes, Departments, Affiliated and Autonomous colleges, Departments in Deemed Universities, Private Business Schools etc.

rating system to help the market function better, enabling students and employers to compare different MEEs. Hence, a two stage rating process is recommended. In the first stage, rating covering infrastructure may be mandated before an MEE can admit students. The second stage would consist of rating of quality (admission process, teaching, research and publications) which shall be conducted every three years to ensure accountability. Grading norms for each of these steps should be established in consultation with experts. CRISIL and ICRA were consulted in the process and they have agreed to undertake rating of MEEs. The Standing Committee shall decide on a fair and transparent mechanism to deal with conflicting points of view between a rating agency and an MEE.

3. Accreditation

For MEEs which wish to go beyond rating, the Standing Committee shall determine the criteria and the processes of accreditation in consultation with experts from academia and industry. Mentoring to help MEEs sustain quality standards should be an integral part of the process. Select international accreditations may also be recognized. Branding of accreditation, similar to international standards such as ISO 9001, may be considered to encourage MEEs to pursue excellence.

4. Improve Access

In addition to the framework of affirmative action already in place, we suggest improving access based on work experience and educational loans. NKC believes that management education can be made available to a much wider student community by adopting a two pronged approach. First, we suggest that more weightage be assigned to work experience in admissions. This would help in overcoming disadvantages faced by prospective students due to lack of proficiency in English. Secondly, steps may be taken to ensure easier access to educational loans through banks. Default concerns can be addressed if the respective MEE and the first employer cooperate with the banks. MEEs must also offer scholarships to socially disadvantaged students.

5. Social Context

It is essential to widen the scope of management studies and enhance its relevance.

- Sensitize management education to our unique socio-cultural situation by including India specific case studies in the curriculum, reflecting our diversity and incorporating traditional wisdom.
- Integrate management with other knowledge sources and increase research funding for management and supporting disciplines. With globalization, the need for management education to pursue a wider scope and realize a more wholesome impact on society has increased. Management departments in universities should therefore draw upon knowledge sources in other departments.
- Encourage MEEs to design and offer executive programmes for government officials,

NGOs and defence personnel. Short term courses for government officials will help them in their role as economic managers.

- Revamp the existing Bachelor's degree in management, the Bachelor's in Business Administration, to cater to the burgeoning need of management graduates. Compulsory apprenticeship in organizations and study of under managed sector areas should be included as part of the programme. The current bookish nature of the curriculum is not sufficient to prepare students for junior management levels.
- Distance learning has considerable potential in this domain. We therefore need to fully realize the potential of Online Management Programmes to bridge the demand-supply gap.

6. Faculty Development

Non availability of adequate proficient faculty is a major constraint for sustainable growth of quality management education in India. An autonomous, financially sound and academically credible institute with active support from the leading management institutes, industry and Government should be set up for faculty development. Standards for curriculum covering the entire spectrum need to be set. Active involvement of MEE faculty in training, conferences, industry engagement and curriculum revision should be encouraged. Given the current demand-supply gap, additional faculty would need to be attracted by appropriate incentives.

7. Mentoring

To achieve excellence in the field of management, NKC recommends that all the leading Management Institutions adopt 3-4 MEEs for mentoring and upgradation of quality. Funding and other modalities can be mutually worked out between the institutions.

8. New Institutions

There is a need for a new wave of management institutions which will focus on entrepreneurship, leadership and innovation. These institutions will enable to launch India into the global arena, without the legacy associated with operating in a protected environment. These institutions should set new standards and become role models for MEEs that have the desire to become leaders in the global market place. Incentives need to be provided to Indian entrepreneurs/corporates to setup institutions of excellence on their own or in collaboration with foreign universities. We could also consider allowing reputed foreign universities to enter this field, regulations for them being at par with private institutions.

9. Autonomy

All existing management institutes excluding management departments in universities should register with the Standing Committee of IRAHE and be accorded independent

status. In the case of MEEs set up by Central and State governments, government should be treated as a promoter. Registered institutes will benefit from the Standing Committee's mentoring and better funding opportunities apart from other advantages associated with autonomy.

10. Governance

NKC recommends a board of governors for all MEEs, consisting of 50 per cent independent members as there are independent directors under Company Law. The key focus of the governing board should be to continuously improve quality of education and research. For this purpose, they would have to maximize the resource/fund inflows and allocate/spend them purposively and efficiently. The Board should encourage faculty to publish reputed journals and publications, obtain regular feedback from students on teaching-learning process, obtain recruiter feedback for improving quality, institutionalize faculty evaluation and management system and encourage faculty to write India based case studies. The appointment of Directors of public MEEs should be freed from direct or indirect interventions on part of the governments, for these should be based on search processes and peer judgement alone. Likewise, the appointment of directors of private MEEs should be based on a transparent selection process. This would of course be accompanied by enhanced accountability based on performance indicators and independent external evaluation.

11. Non-traditional Management Education

The need for better management in education, health, local government, co-operatives, and civil society organizations and so on has often been felt. However, the experience of graduates of Institute of Rural Management and Institute of Forestry Management shows that a lack of advancement opportunities in the Government acts as a barrier to the success of such programmes. There is a need to establish career opportunities in public management, and systematize recruitment and retention policies. Structure of fees for these courses should be formulated in accordance with earning opportunities. We also need to encourage reputed MEEs to develop specialized courses for agri-business, rural banking, public utilities, regulatory agencies and services sector in the coming years as private players entering this space would create demand for the same. The Standing Committee should undertake a study in this field to institutionalize these programmes.

2.10 Engineering Education

Engineering education is among the key enablers of growth for transforming India's economy. The quality of teaching and research in this sphere will play a critical role in the emergence of our country as a global knowledge leader. It will also provide vital inputs for enhancing productivity across sectors. In the past two decades, we have seen an eight-fold increase in the number of institutions imparting engineering education at the undergraduate level. Yet, there are some fundamental issues that need to be addressed.

A glaring regional imbalance has emerged in the availability of engineering education. Two-thirds of the engineering institutions are located in four southern states, plus Maharashtra, even though they account for less than one-third of the population. There is much less access for the youth in under-provided states, particularly because only 15 per cent of the total seats are available for those who come from outside the state. It would be worthwhile to study whether there are any cultural or region-specific factors that influence the choice of engineering as a career in some states and not elsewhere. This could help make the spread of such colleges more even nationwide.

Several recent studies have flagged the problem of unemployability of engineering graduates, largely because curriculum and syllabi are not quite compatible with industry requirements. Further, the standards of a very large proportion of institutions at the bottom of the pyramid have also been found to be abysmal. Even good institutions are plagued by deficiency of quality students at post-graduate and research level. The problems are complex and deep rooted. The situation calls for a new paradigm in regulation, accreditation, governance and faculty development.

As part of its consultative process, NKC constituted a Working Group of experts from academia and industry under the chairmanship of Prof. M.S. Ananth, Director IIT Chennai. The Group has also considered the inputs provided by the earlier committees on this subject chaired by R.A. Mashelkar (1998), U.R. Rao (2003) and P. Rama Rao (2004). The study conducted by Professors Banerjee and Muley of IIT Bombay (2007) has also been taken into account. Based on inputs from the Working Group and consultations with other stakeholders, NKC proposes the following set of initiatives:

1. Reforming the Regulatory Framework

As stated in our earlier recommendations relating to Higher Education, there is a need to establish an Independent Regulatory Authority for Higher Education (IRAHE) to cover all streams. The role of the Standing Committee on Engineering Education under IRAHE would be to exercise due diligence at the point it approves entry for an institution

to grant degrees/diplomas. The members of the Committee should comprise eminent educationists, education administrators and management specialists drawn from industry. The Committee would follow transparent and uniform processes, under the overall supervision of IRAHE. The Committee shall also determine the criteria and the processes of accreditation and license multiple agencies for the same. A mechanism for ranking of institutions to enable students to take informed decisions at the time of admissions by stipulating grading norms and nominating independent rating agencies also needs to be established. These initiatives will enable the All India Council for Technical Education (AICTE) to focus on important issues such as curriculum development, pedagogy, faculty development etc.

2. Improving Governance of Institutions

In order to encourage greater flexibility and autonomy, there is a need to progressively do away with the system of affiliation of engineering institutions/colleges to universities. Where feasible, they should be given full autonomy. To attain greater transparency and accountability, it should be made compulsory for all engineering institutions to display information about their buildings, labs, faculty, intake of students, performance of students, recognition status and placements, on their websites. As emphasised by NKC repeatedly, appointments of Heads of Institutions must be made through the process of a Search Committee that has an independent Chair and is at an arm's length from the government. The direct involvement of administrative ministries in the process can result in unfortunate situations.

3. Attracting and Retaining Faculty

The most serious challenge in engineering education is the dearth of well-qualified faculty. Several measures must be undertaken in this direction:

- Institutions should be encouraged to create adjunct positions and invite professionals from industry and research institutions to participate in the teaching process.
- The criterion of holding a Ph.D for teaching undergraduate students may be relaxed to Master's degrees which are specifically designed with more course work in lieu of thesis. Special efforts should be made at the undergraduate level to identify and motivate those who have the potential as well as the inclination towards teaching.
- Incentives like better salary, modern infrastructure, better living and working environment, possibility of secondment to industry during vacations should be made available.
- Shortage of faculty could also be overcome by innovative use of Information & Communication Technology and Open Educational Resources (OER) by leveraging the content available from the best universities across the world.
- Several initiatives need to be undertaken to improve training and professional development of the faculty. A two-week teacher induction training course should be made compulsory. A one-day regional workshop on teaching/learning processes

should be arranged as a part of the academic calendar. Course development should be made an integral part of the training programmes conducted by Academic Staff Colleges. Better opportunities may be created for continuing education using the distance mode.

4. Curriculum Reform

The current curriculum should be modified to provide greater flexibility, inter-disciplinary perspective and choice of electives. The focus in the teaching/learning process should be on integrating skills such as problem solving and logical reasoning, process orientation, learning ability, English communication and programming fundamentals. Industry participation to discuss real life case studies should be encouraged. Laboratory courses must be revamped to develop a healthy attitude towards experimental work. Environment must be created to encourage students to participate in co-curricular activities.

5. Integrating Sciences and Engineering Education

We have entered a period in history where the distinction between sciences and engineering has all but disappeared. Sciences are at the heart of engineering. To that extent there is no distinction between the two. In order to reduce the perceived gap between sciences and engineering, we need to create mechanisms that allow mobility between the two streams. One option could be to start four year undergraduate programmes in sciences, initially in institutes of excellence where facilities for science programmes already exist. This would enable pursuing doctoral programmes in science and technology, without a Master's degree.

6. Encouraging Research

Several initiatives are necessary to promote research in engineering disciplines:

- Vibrant and well funded Ph.D programmes with opportunities for international exposure should be rolled out to attract students who currently go abroad for Ph.Ds.
- The new academic and research institutions being established should be so located that they can optimize mutual collaboration. Likewise, existing academic institutions with active research programmes should be supported to set up high-tech industrial research parks in the vicinity of their campuses.
- Universities must become the hub of research once again to capture synergies between teaching and research. This will require changes in resource allocation, reward systems and mindsets.

7. Industry-academia interaction

In order to attain greater alignment of engineering education with employment opportunities, frequent dialogue with industry and government through seminars and workshops is necessary. To enhance employability, summer internships should be made an integral part of the curriculum. Restrictive provisions and the elaborate regulatory framework of the Apprenticeship Act 1961 have inhibited industry from adequately using

the apprenticeship scheme for honing the skills of engineering graduates. Clauses need to be incorporated in the Act that will enable training in multiple skills (not just a specific trade) and allow entry to and exit from the scheme at different points in the education and career cycle. Likewise, industry needs to encourage continuing education programmes for their employees by collaborating with appropriate educational institutes. Academia and industry should engage in joint research to encourage innovation and competitiveness in the global economy.

8. Improve access

While the government would need to establish new institutions in the under-provided states, it must be emphasised that the recent proliferation of engineering institutions in the southern states is largely the result of private initiatives. A framework for public-private partnerships should therefore be developed in collaboration with the concerned states to establish new quality institutions.

9. Mentoring

Elite institutions should consider some additional responsibilities such as adopting a few engineering institutions of their choice and helping them raise their standards, creating and making available educational resources in the public domain for use of all students and conducting distance education courses, especially for students at the post-graduate level and working professionals. In particular, the existing IITs could mentor the new ones being established. The latter, in due course, could play a similar role vis-à-vis others. Similarly, National Institutes of Technology and Regional Engineering Colleges could play a mentoring role for selected engineering institutions in their respective regions. Mentoring by its definition is a voluntary activity, but if we can create an atmosphere where institutions of distinction feel a sense of calling in the interest of the larger national good, it would transform our education.

The changes and reforms proposed above are necessary to bring about a qualitative transformation in engineering education to meet present and future needs.

2.11 Open and Distance Education

The National Knowledge Commission (NKC) believes that a radical reform of the system of Open and Distance Education (ODE) is imperative to achieve the objectives of expansion, inclusion and excellence in higher education. The significance is obvious. For one, more than one-fifth of the students enrolled in higher education are in the ODE stream. For another, ODE has an enormous potential to spread higher education opportunities beyond the brick and mortar world. But there are reasons for concern. First, the quality of higher education provided in large segments of ODE, particularly in correspondence courses in universities, leaves much to be desired. Second, it is not sufficiently recognized that ODE provides educational opportunities not only to those who discontinue formal education on account of economic or social compulsions, but also to young school leavers who are simply unable to secure admission in the formal stream at universities. It is time to address these problems. There is a clear need to improve the quality of ODE and to make it more appropriate to the needs of society. It is just as important to expand opportunities in higher education through the use of technology in ODE. It would not be possible to attain a gross enrolment ratio of 15 per cent by 2015 without a massive expansion in ODE. In this endeavour, we must not forget that ODE is seen as inferior to conventional classroom learning. This perception, and the reality, both need change. We must realize that ODE is not simply a mode of educational delivery, but an integrated discipline engaged in the creation of knowledge.

In light of the above, NKC constituted a Working Group composed of distinguished experts in this field, chaired by Prof. Ram Takwale, former Vice-Chancellor, IGNOU. Based on inputs provided by the working group and consultations with stakeholders, NKC recommended the following reforms:

1. Create a National ICT Infrastructure for Networking ODE Institutions

A national Information and Communication Technology (ICT) infrastructure must be set up through government support for networking all ODE institutions. In this regard, we recommend that the digital broadband Knowledge Network proposed by NKC should have provision for interconnecting the major ODE institutions and their study centres in the first phase itself. Eventually, minimum connectivity of 2 Mbps must be extended to the study centres of all ODE institutions. A national ICT backbone would enhance access and e-governance in ODE, and enable the dissemination of knowledge across all modes, that is, print, audio-visual and Internet based multimedia.

2. Set up a National Education Foundation to Develop Web-based Common Open Resources

A National Educational Foundation with a one-time infusion of adequate funds must be established to develop a web-based repository of high quality educational resources. Open Educational Resources (OER) must be created online through a collaborative process, pooling in the efforts and expertise of all major institutions of higher education. The OER repository would supply pedagogical software for various programmes run through ODE and be available for utilization by all ODE institutions. An enabling legal framework that would allow unrestricted access without compromising intellectual authorship must be devised for this purpose.

3. Establish a Credit Bank to Effect Transition to a Course Credit System

Transition to a course credit system must be carried out to enable the learner to undertake programmes across all ODE institutions and disciplines. As a part of this process, an autonomous credit bank must be established for storing and filing credits acquired by every learner. In addition, admission criteria and the system of credits should be as flexible and adaptable as possible. Provisions must be made for multiple entry points and exit points, a flexible time-table and assessment mechanisms for supporting life-long learning.

4. Establish a National Education Testing Service for Assessing ODE Students

An autonomous National Education Testing Service (NETS) must be established through legislation and invested with functional powers and responsibility for assessing all potential graduates in ODE. This unified examination system would test the learners' ability to perform intellectual and practical tasks. All courses, degrees and activities offered through ODE should be certified through this system.

5. Facilitate Convergence with Conventional Universities

The lack of convergence between programmes run by open universities and correspondence courses offered by the distance education wings of conventional educational institutions is a cause of great concern. Rather than function as parallel systems at odds with each other, open universities must forge organizational alignments with conventional universities geared towards common goals and strategies. They must engage each other in the collaborative creation of pedagogical resources via OER and its delivery along shared modes. Programmes and courses offered by each should be subject to the same stringent norms of quality assurance. This implies that the distance education departments operating within conventional universities must be encouraged to put correspondence courses through the NETS for purposes of assessment. At the same time, universities must also ensure that their distance education programmes are not stand-alone, but should benefit from regular interaction

with university departments in concerned disciplines. The aim of such convergence is to eventually enable learners to move freely from one system to the other.

6. Set up a Research Foundation to Support Research Activity in ODE

An autonomous and well-endowed Research Foundation must be established to commission and facilitate multidimensional and multidisciplinary research in ODE. In addition, a favourable environment for research must be created by setting up infrastructure like libraries, digital databases and online journals, holding regular workshops and seminars, granting sabbatical leave for undertaking research, establishing a peer reviewed journal to provide a platform for publication for scholars, and other such measures. A robust research environment is essential to accord ODE value as a discipline, as opposed to it being consigned to a 'mode'.

7. Overhaul Training Programmes for Educators

Training and orientation programmes must be conceptualized to enable educators and administrators to effectively utilize technology to cater to diverse learners' interests. The content of the training modules must promote familiarity with the theories and practices of self-learning. Their delivery should take place through several modes, including web-supported, audio-visual and face-to-face interaction on a regular basis with experts, practitioners and peers. Most importantly, these packages must be updated regularly and administered directly. The B.Ed. curriculum must also be revised, updated and made to emphasize theories and practices of self-learning.

8. Increase Access for Learners with Special Needs

Special Education Committees must be set up in all ODE institutions to address the needs of learners with disabilities as well as senior citizens. These committees must devise mechanisms to ensure their participation and provide effective mechanisms for monitoring, evaluation of policies, and collection of feedback. Admission criteria and time tables must be flexible enough to provide diverse options for meeting programme requirements to differently able learners and senior citizens. Pedagogical tools and components from the open educational resources must be adaptable to alternative formats for special learning needs. This could include, for example, Braille, colour-contrast texts and voice recordings for the visually disabled.

9. Create a New Standing Committee for the Regulation of ODE

At present, the Distance Education Council (DEC) under IGNOU arbitrates standards and disburses funds for ODE institutions across the country. NKC believes that this arrangement cannot provide adequate and appropriate regulation. A new regulatory mechanism must be established by appointing a Standing Committee on Open and

Distance Education under the Independent Regulatory Authority for Higher Education (IRAHE) proposed by NKC. This statutory body would be responsible for developing broad criteria for accreditation as well as laying down standards for quality assurance. It would be accountable to stakeholders at all levels and to IRAHE, and have representation from public, private and social institutions involved in the education and development sectors. These include the central open university, state open universities, private open universities, conventional education institutes, as well as chairpersons of the specialized bodies to be set up to look into infrastructural requirements of ODE.

In addition, two specialized bodies should be established under the aegis of the Standing Committee:

(i) A Technical Advisory Group with representatives from the IT sector, telecom, space and industry should be constituted to provide guidelines, ensure flexibility and track the latest developments in application. The most important function would be to devise common standards for labelling learning content developed by different agencies in order to support indexing, storage, discovery and retrieval of this content by multiple tools across multiple repositories.

(ii) An Advisory Group on Pedagogical Content Management should be set up to provide guidelines on curricular content and development of repositories, exchange of material, access to students and other such issues.

The Standing Committee on Open and Distance Education would also serve as the nodal agency for the National Educational Foundation on open educational resources, the National Education Testing Service (NETS) and the Credit Bank.

10. Develop a System for Quality Assessment

Reliable external assessment is valued by employers, students and other stakeholders in the given context of a market driven economy. In view of this, a rating system to assess the standard of all institutions imparting ODE must be evolved and made publicly available. The Standing Committee would stipulate grading norms and independent rating agencies would be licensed by IRAHE to carry out this function. In addition, it is recommended that every ODE institution has an internal quality assurance cell to ensure that statutory quality compliances are regularly met.

Establishment of the new organizations proposed above, namely, the National Education Testing Service, the Credit Bank, the National Educational Foundation for developing common open resources, the Technical Advisory Group and the Advisory Group on Pedagogical Content Management would initially require financial support from the government. Additional finances for networking ODE institutions and creating access centres, developing training programmes for educators and administrators and providing scholarships and services for needy students would also be required.

2.12 Open Educational Resources

Our success in the knowledge economy hinges to a large extent on upgrading the quality of, and enhancing the access to, education. One of the most effective ways of achieving this would be to stimulate the development and dissemination of quality Open Access (OA) materials and Open Educational Resources (OER) through broadband Internet connectivity. This would facilitate easy and widespread access to high quality educational resources and drastically improve the teaching paradigm for all our students. As a part of its consultative process, NKC constituted a Working Group of experts, including distinguished members from the academia, government, private sector and users to suggest necessary measures to improve the quality of Open Access in India. NKC consultations with stakeholders helped identify a few key reform proposals which are elaborated as follows:

1. Support the Production of Quality Content by a Select set of Indian Institutions

A set of key institutions should be selected and experts representing diverse knowledge areas like agriculture, engineering, medicine, arts, humanities, science, education, etc. should be asked to develop standards-based content, which can be customized to diverse user needs. This should be made available not only to Indian institutions but also for global use. The efforts made through the project of Ministry of Human Resources Development – National Programme on Technology Enhanced Learning (NPTEL) for creation of OER in the areas of Engineering and Technology should be applied in other areas of education also. The content in the repositories should be multimedia, interactive and available in different regional languages. These projects should cover a wide range of subjects mentioned above. To speed up the creation, adaptation, and utilization of OER, it is necessary to launch a 'National *E-content* and *Curriculum* Initiative'.

2. Leverage Global Open Educational Resources

Sustainable development of quality content relevant to India is a difficult and expensive proposition, given the diverse needs of various sectors in our emerging knowledge economy. Emerging international and national initiatives are offering quality educational content as open resources. It is vital for India to leverage these initiatives as they are readily available for adoption and adaptation and to serve as a model for further indigenous content production. NKC found that there are already 200-300 free knowledge repositories available across the world. The National Knowledge Commission is separately disseminating this information through its website.

3. Encourage Open Access

Open Access material stimulates research and helps students, teachers and researchers across the world. Therefore at the policy level, all research articles published by Indian authors

receiving substantial government or public funding must be made available under Open Access and should be archived in the standard OA format at least on his/her website. As a next step, a national academic OA portal should be developed. The government should allocate resources to increase the current digitization efforts of books and periodicals which are outside copyright protection. Separate funding should be allocated to develop a new high quality OCR software package so that new and old fonts in many different Indian languages can be converted into ISCI/ASCI code and OA portals and servers could be upgraded regularly. Appropriate financial resources should be earmarked for these endeavours. This will also facilitate machine translation of these valuable resources.

4. Develop Network-enabled Delivery Infrastructure

Along with the national initiative for content development, we must develop a network-enabled delivery infrastructure with a focus on two primary areas: access and delivery. For access to the network, high bandwidth connections across institutions and a national backbone that provides advanced networking capabilities are major requirements. Additionally, connectivity to global networks is essential. Delivery of the OER content would be done through distributed repositories of educational resources.

5. Create a Faculty and Institutional Development Programme

Faculty development and teacher training is the primary area that needs to be addressed in order to realize the benefits of extended access and improved quality through OER. The training programme must develop domain competencies and teaching skills using new educational technologies. The training will also help developers of new OER and in contextualizing existing educational resources. Centres at specific institutions should be identified so that the faculty of these institutions will eventually own, modify, and expand OER repositories. These must be integrated into university curricula and organizational structures. The availability of learning management systems and other quizzing, authoring and collaborating tools should be increased. The evaluation system should be based on the use of the content and the pedagogy in OER.

To implement and monitor the above recommendations urgently and efficiently, the Government of India may designate a suitable organization or establish a new institution with necessary mandate to achieve the above objectives. This institute may serve the following functions:

- Provide leadership and coordination of network-based open education resources
- Select institutional collaborations for developing content
- Develop adoption support strategies
- Recommend and monitor standards for content development and adoption
- Advise on policy implications vis-à-vis licensing, intellectual property rights, etc.
- Identify and set benchmarks based on global best practices
- Establish relationships with global OA and OER initiatives.

2.13 Knowledge Network

NKC strongly feels that to optimally utilize the potential of institutions engaged in generation and dissemination of knowledge in various areas, such as research laboratories, universities and other institutions of higher learning, including professional institutions, it is important to connect them through a high-speed broadband network. In order to explore the feasibility of establishing broadband connectivity among such institutions, NKC spent six months studying various issues and alternatives. Extensive consultations with experts, potential users, telecom service providers, government officials and various educational and research institutions provided insights on the requirements, implementation issues and benefits of creating an integrated national knowledge network.

The purpose of such a knowledge network goes to the very heart of the country's quest to build quality institutions with requisite research facilities and to create a pool of highly trained persons. Considering the magnitude of the challenge, NKC believes an immediate objective of the network will be to share the existing content, coursework, expertise, ideas, innovations, equipment and facilities available in the limited number of centres of excellence, with a wider group of institutions, educators and students.

Globally, research and development activities and innovations are increasingly multi-disciplinary, and collaborative, and require substantial computational power. The key to successful research today is live consultations, data sharing and resource sharing. Therefore it is essential to provide broadband connectivity to our knowledge institutions to improve access, quality and quantity of R&D activities.

The primary objective is to interconnect all our knowledge institutions in various fields, and at various locations throughout the country, through an electronic digital broadband network with adequate capabilities and access speed to encourage sharing of resources and collaborative research.

NKC commissioned an expert to examine what it would take to create a national knowledge network. NKC also held detailed discussions with the office of the Principal Scientific Adviser (PSA) to the Government of India. The discussions yielded a consensus on the optimal approach to be adopted for setting up such a network, whether it is for a broad range of institutions as envisaged by NKC or a specific community of Science and Technology (S&T) research institutions. Based on the various discussions NKC recommends the following:

1. **National Knowledge Network:** Build a national knowledge network with gigabit capabilities to connect all universities, libraries, laboratories, hospitals and agricultural institutions to share data and resources across the country. This will ultimately require provision of connectivity to around 5,000 nodes covering all major institutions. The actual implementation could be in phases targeting 500 to 1,000 nodes in the first phase. However, the design of the network will have to be based on the final network. The prioritization of the nodes for implementation purposes should be on the basis of the institutions which are most likely to use the network from Day one and which would be able to demonstrate the benefits. Based on a detailed analysis of the country's existing optic fibre infrastructure and technologies available, it is estimated that a 500 to 1000-node network can be commissioned within three to six months.

2. **Options:** Wide consultations with experts and technology providers suggest that there are four possible networking options:

- The first one involves hiring dark fibres that have been extensively laid out by various telecom service providers and lighting them.
- The second involves lit fibres and differs from the first in not requiring transmission equipment procurement and its maintenance.
- The third involves using existing commercial networks, making capital investment in equipment unnecessary. It requires minimum maintenance and operations organization.
- The fourth is a hybrid approach where the Core consists of two layers in which the inner higher-speed layer is wholly owned by the stakeholders while the lower layer is provided by commercial service providers.

From the viewpoint of cost, the third approach based on the utilization of the available commercial networks appears to be most attractive to start with. This is because the capital expenditure is negligible if the operator chosen has a well established network which is being used by a large number of existing customers. However, lack of experience of architectural flexibility and security aspects of virtual private networks (VPN) set up on a commercial basis, do not allow prospective users to be entirely comfortable with this approach. Therefore, NKC recommends that existing commercial networks be utilized. Subsequently, feedback from this exercise could enable a shift to a hybrid network with a central Core, preferably of a relatively few nodes, and an outer network constituted by practically each one of the other operators' networks.

3. **Architecture:** The network should consist of a Core using Internet Protocol (IP) and Multi-Packet Labeled Services (MPLS) technology, an Aggregation or Distribution network, and an Access or Edge network linking the institution's local area network (LAN) to the Core. The Core network could be a single hierarchy or a two-stage

network with a higher speed network at the top to accommodate architecture flexibility and security concerns in a VPN-based commercial Internet Protocol-Multi Protocol Label Switching (IP-MPLS) network. The detailed specification of the network will have to be drawn up with a view to inviting bids for speedy implementation. The network should be implemented in phases. The first phase should cover about 1000 institutions and should be commissioned in three to six months.

4. **Congruence with E-governance:** The question of whether the network for E-governance and the Knowledge Network should be one single network assumes importance and relevance depending upon the approach adopted for the realization of the network. In the recommended approach in the first phase, namely VPNs on commercial MPLS networks on Dense Wavelength Division Multiplexing (DWDM), this question becomes irrelevant because several VPNs can be created on a commercial network and they could be entirely un-correlated, as may be the case with these two networks. This question would assume importance only if the country were to implement a purely owned network on lighted fibres. On the other hand, even in the hybrid approach, the E-governance network with an entirely different geographical spread and much lower bandwidth requirements, can be realized as VPNs and the security and flexibility could be addressed by the inner core. The issue of congruence of the two networks therefore no longer remains important and the two aspects can be totally de-linked.

5. **Security and Privacy:** Methods will have to be evolved both at the time of commissioning of the network as well as during operations, to ensure security of data along with privacy and confidentiality. Access to data from the Data Centre of a given institution should be under the control of the institution being addressed. An arrangement for authentication and authorization, with the participation of the connected institutions is essential to launch the network.

6. **One-time Support for LANs:** The proposed broadband network envisages higher access bandwidth and therefore almost all user institutions will have to upgrade their networks to be able to cater to these speeds. While several institutions may have the resources for doing this, a large number will need one-time capital support to set up Fast Ethernet LAN (FELAN) which includes expenditure on routers, switches and optic fibre cable on the campus.

7. **Costs:** The Knowledge Network initially proposed to be launched on existing commercial networks will therefore involve a recurring cost of Rs 20-40 lakhs per institution connected, amounting to Rs 200-400 crores annually for 1000 institutions in the first phase. In addition, there will be a one-time capital investment in upgrading the LANs of these institutions to a 100 Mbps capability Fast Ethernet LAN. Thereafter,

based on feedback, the installation of the inner core network of 10 Gbps or higher capability will be taken up. This will involve a capital investment of around Rs 1,000 crores on a 7 or 8-node Inner Core network, its Gigabit connectivity to the commercial IP-MPLS networks, as also direct connectivity to a few users who are particularly concerned about the security and internetworking experiments. This expenditure will be incurred over a period of time. There will be an additional recurring expenditure for this Inner Core on hiring large bandwidths from bandwidth service providers. This amount will depend on the number of nodes and the negotiated or bid-based price.

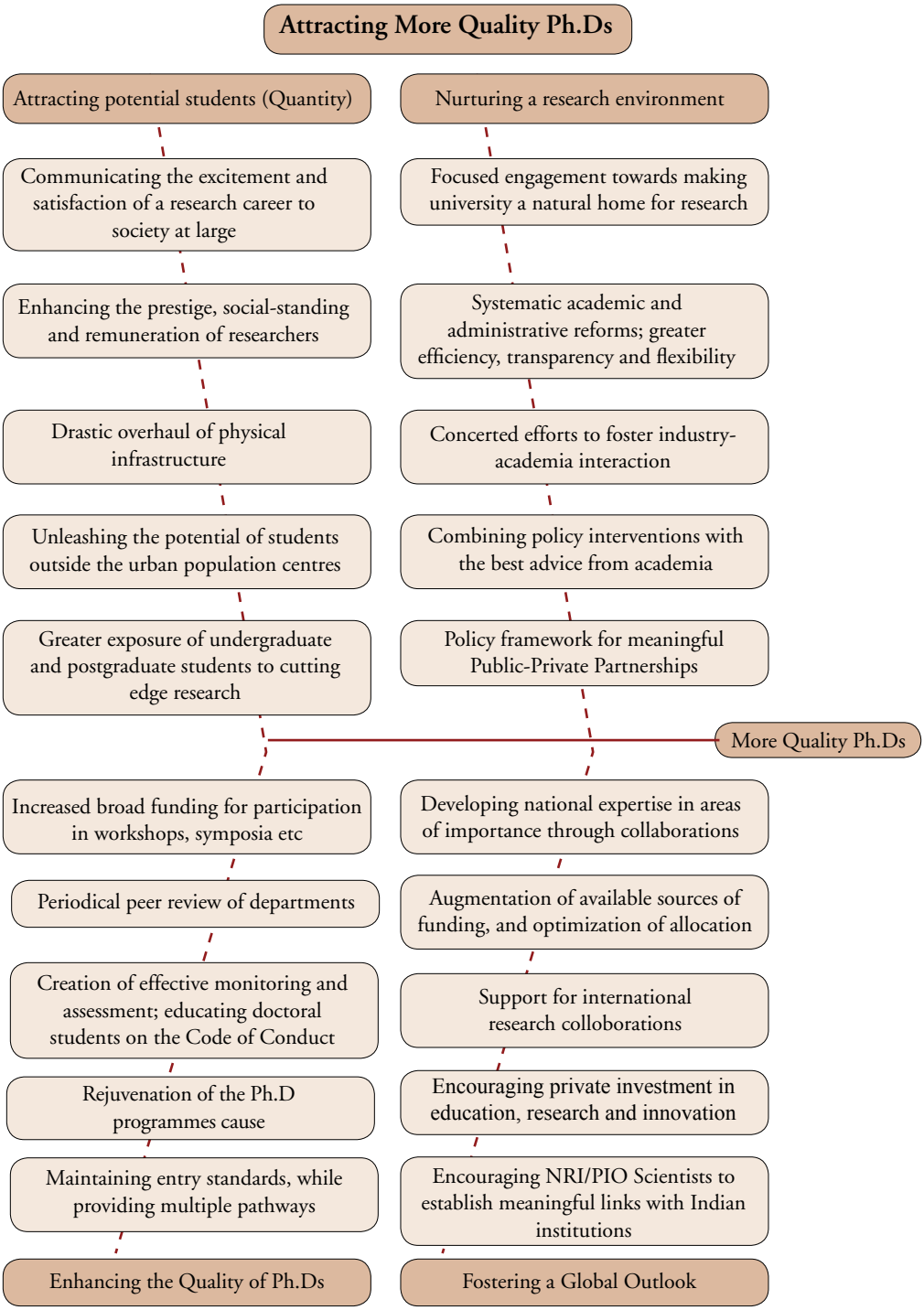
8. **Organization:** To ensure day to day coordination, operation and efficient utilization NKC recommends establishing a Special Purpose Vehicle (SPV) consisting of major stakeholders. Such an SPV should have professional experts pooled from various stakeholder institutions for coordinating and guiding various private vendors for speedy implementation. The policy, security and overall management should be the responsibility of the SPV and the operational support requirements should be met by the industry. One of the compelling reasons for such a mechanism is to provide assurance that the use of cyber space will in no way compromise the security concerns of the country.

9. **Ownership:** The Knowledge Network should be owned by the SPV consisting of major stakeholders. Government ownership is not desirable, despite the fact that substantial funding will be from the Government, because:
   - It is the Government's policy to withdraw from direct operations and maintenance activities in the ICT sector.
   - The type of trained manpower needed, though not large, is in great demand in the market, and therefore will require special remuneration and incentives.

10. **Special Group:** NKC recommends the setting up of a special Working Group of experts to finalize specifications, implementation plans, cost estimates, and network plans, as well as to carry out the actual task of procurement and commissioning of the network. This group will also establish the SPV needed for running the network on a day to day basis.

NKC believes that a National Knowledge Network interconnecting our knowledge institutions and infrastructure with access speeds of 100 mbps and more will give a major push to collaborations and sharing needed to enhance the quality of our education, research and applications and at the same time will empower our people to be competitive in the global economy.

2.14 Attracting More Quality Ph.Ds (Works in Process)



*Recommendations on 'More Quality Ph.Ds' are under finalization

Highlights of Other

Recommendations of NKC

Highlights of other Recommendations of NKC

Libraries

- Set up a National Commission on Libraries
- Prepare a National Census of all libraries
- Revamp Library and Information Sciences education, training, and research
- Re-assess staffing of libraries
- Set up a Central Library Fund
- Promote Information Communication Technology applications in all libraries
- Facilitate donation and maintenance of private collections
- Encourage Public Private Partnerships in LIS development
- Modernize library management, encourage greater community participation in library management

Translation

- Project Indian languages and literatures through high-quality translation
- Provide quality training and education for translators
- Establish a store-house of information on all aspects of translation involving Indian languages
- Create and maintain various tools for translation
- Project Indian languages and literatures within South Asia and outside
- Promote book launches, festivals, fellowships and prizes
- Promote printed as well as virtual publication of translation studies
- Translate pedagogic materials at all levels specifically in Natural and Social Sciences
- Set up a national web portal on translation
- Organize Annual National Conferences on translation
- Set up a National Mission on Translation for this purpose
- Provide impetus for developing translation as an industry

National Science and Social Science Foundation

- Set up a National Science and Social Science Foundation (NS3F) which will look at all knowledge as one seamless entity
- The Foundation to suggest policy initiatives to make India a leader in the creation and use of knowledge, to ensure that science and technology are maximally used for the betterment of the lives of people, and to develop the scientific temper in the country

E-governance

- Re-engineer government processes first, to change our basic governance pattern for simplicity, transparency, productivity and efficiency

- Select 10 to 20 important services that make a critical difference, simplify them and offer them as web-based services
- Develop common standards for services and transactions with citizens
- Make data collected by government agencies available to all agencies
- Provide a nationwide secure broadband infrastructure
- Open source software should be widely used
- Invest 1-2 per cent of national programme budgets to establish new processes and associated e-governance infrastructure
- Establish an organization, in mission mode, to facilitate e-governance reforms
- Establish specialized information technology officers in state and central ministries
- Begin all new national programmes (like Bharat Nirman, Rural Employment Guarantee Scheme, etc.) with well-engineered e-governance implementation and web interface

Portals

- Create national web based portals for basic needs on certain key sectors such as Water, Energy, Environment, Education, Food, Health, Agriculture, Employment, Citizen Rights
- A consortium consisting of representatives from a wide range of stakeholders from the sector should own and manage the portal
- Provide access to government held data
- Encourage collaborative funding

Portals on Water, Energy, Environment and a Portal for Teachers have been launched. The Water Portal has been developed by Arghyam Trust Bangalore, the Energy Portal by The Energy Research Institute Delhi, The Environment Portal by the Centre for Science and Environment Delhi, and the Portal for Teachers by the Azim Premji Foundation Bangalore.

Legislative Framework for Public-funded Research

- Enact a legislation that would give universities and research institutions ownership and patent rights over inventions arising out of government-funded research thereby creating an enabling environment for commercialization of such inventions through licensing arrangements where inventors would also be allowed to receive a share of the royalty
- The proposed enactment should incorporate important safeguards for exceptional circumstances where the government could be given 'march in rights' to protect public good

Health Information Network

- Initiate development of Indian Health Information Network
- Establish national standards for clinical terminology and health informatics

- Create a common Electronic Health Record (EHR)
- Frame policies to promote use of IT in health care
- Create appropriate policy framework to protect health data of citizens
- Medical Informatics to be part of medical and paramedical curriculum
- Create an institutional framework for implementation

Traditional Health Systems

- Transform traditional medicine education by introducing evidence-based approaches into the current educational framework
- Strengthen research by establishing a network of world-class research programmes in different parts of the country
- Strengthen pharmacopoeial standards by creating internationally acceptable pharmacopoeias
- Diversify and expand the Traditional Knowledge Digital Library (TKDL) work
- Initiate a Traditional Knowledge Informatics programme
- Create a suitable Intellectual Property Rights framework in the country for protection of the sources of traditional medical knowledge. Give sufficient incentives for commercialization of traditional medicine
- Support non-government and corporate initiatives for promotion of THS
- Promote international co-operation in exploration of traditional health systems
- Undertake a major re-branding exercise of Indian traditional medicine

Intellectual Property Rights

- Scale up efforts to build a world class IPR infrastructure, including steps to modernize the patent offices with computerization, e-filing, process re-engineering, human resource development, transparency, documentation, accessibility and building global standards
- Intensify IPR training in IP Offices as well as in educational institutions and develop IPR Cells
- Establish new structures such as a separate IPR Tribunal, a national institution for cutting edge IPR policy and a Global Technology Acquisition Fund
- Protect TK, create incentives for TK and also explore mechanisms for identification of key IPR issues in new technology areas

Innovation

- NKC's Innovation Survey reveals that innovation is emerging as one of the key factors in India's economic growth, where both large firms and SMEs have increased innovation-related revenues. The strategic prioritization of innovation has also increased significantly since the start of economic liberalization
- Crucial firm level structures and processes play a key role in innovation but skill shortage arising out of lack of emphasis on experimentation/problem solving in the

curricula is a critical barrier. There is also need for more effective synergies between industry, government, the educational system, R&D environment and the consumer. A comprehensive campaign is needed across the entire economy from the grassroots to the large firm level to make India a global leader in innovation

Entrepreneurship

- Develop a supportive business environment consisting of single window clearance, single composite application form for clearances, a single unique company number
- Create new institutional mechanisms such as commercial courts to settle commercial disputes and limited liability partnerships
- Provide access to financial, statutory, legal, and regulatory information for entrepreneurs through one stop shops, web-based portals and information handbooks
- Develop measures to facilitate access to early stage finance, and provide incentives for seed capital funding
- Develop and put in place a comprehensive policy on Business Incubation for Entrepreneurs
- Enact a uniform legislation for publicly funded research and enable researchers to set up commercial entities
- Make Entrepreneurship a core subject in business schools and explore possibilities of setting up specialized entrepreneurship schools
- Develop an entrepreneurial culture by rewarding and recognizing successful entrepreneurs and entrepreneurial networks and associations

The full text of these recommendations is available at:

www.knowledgecommission.gov.in

Eleventh

Five Year Plan

Knowledge Initiatives in the Eleventh Plan

In view of the critical role that knowledge institutions would play in making India a global leader in the 21st Century and in meeting the growing aspirations of the large component of the young in India's population, there was little doubt that education and related sectors would merit large infusion of resources in the XI Plan. It was also apparent that institutional reform would need to supplement this infusion. NKC was envisaged by the Government as one of the key concurrent processes for the XI Plan: 2007-12. Recommendations of NKC have been key inputs in formulating broad contours of the XI Plan. Some of these are highlighted below.

XI Plan 2007-12

The XI Plan, approved at the meeting of the National Development Council on 19 December 2007, places the highest priority on education as a centred instrument for achieving rapid and inclusive growth. This is reflected in the five fold increase in resource allocation. At Rs. 2.70 lakh crore, it constitutes 20 per cent of the Plan, representing a credible progress towards the target of 6 per cent of GDP. The following paragraphs summarize the major components of the XI Plan relating to the recommendations made by NKC. They appear in the same order as in the Plan.

E-governance for better service delivery etc. (Volume I: Inclusive Growth)

- Process re-engineering to be the most crucial element of the agenda to make delivery of services citizen centric.
- Creation of a common service delivery platform including State Wide Networks, Common Service Centres and Last Mile Connectivity.
- A body with PM as Chair to prescribe deliverables and milestones for the national E-governance Plan.
- Make use of e-governance in implementation of all major flagship programmes.

Vocational Training & Skill Development (Volume I: Inclusive Growth)

Launch a National Skill Development Mission with an outlay of Rs 31,200 crore to increase capacity from 2.5 million to 10 million per annum. The National Skill Development Mission would:

- Encourage Ministries to expand existing public sector skill development infrastructure and its utilization by five fold.

- Modernize existing public sector infrastructure to get into PPP mode with functional and governance autonomy, establish a credible accreditation system and a guidance framework for all accrediting agencies, encourage agencies to rate institutions on standardized outcomes, and establish a "National Skill Inventory" and a "National Database for Skill Deficiency Mapping" on a national web portal.
- Set up a National Qualifications Framework, which establishes equivalence and provides horizontal mobility between various Vocational, Technical and Academic streams at more than one career point and a Trainee Placement and Tracking System for effective evaluation and future policy planning.
- Enlarge the coverage of skill spectrum to 1000 trades, with relevance to our emerging needs while making a distinction between structural, interventional and last mile unemployability and correspondingly set up programmes for 24 months, 12 months and 6 months duration. "Finishing Schools" will be encouraged to take care of last mile unemployability.
- Create a "National Skill Development Fund" imposing a universal skill development obligation on industry to invest in skill development of SCs/STs/OBCs/Minorities/ others candidates from BPL families – as their contribution to affirmative action combined with matching Government contribution.
- Facilitate repositioning of employment exchanges as outreach points of the Mission for storing and providing information on employment and skill development and to function as career counselling centres.
- Enlarge the 50,000 Skill Development Centres programme eventually into a "Virtual Skill Development Resource Network' for web based learning.

Innovation (Volume I: Inclusive Growth)

- Put in place a National Innovation Policy which encourages competition among enterprises, greater diffusion of knowledge and increased support to early stage technology development initiatives and grassroot level innovators.
- Foster increased collaboration among the R&D institutes, Universities and private sector enterprises and leverage upon their cumulative strengths in designing and implementing various innovation programmes.
- Create new interface structures to forge partnerships between academia and industry.

School Education (Volume II: Social Sector)

- Reorient Sarva Shiksha Abhiyan bringing in a strong rights focus to make Right to Education a reality: ensure basic learning conditions, special focus on Math, Science & English, Common Syllabi and Curriculum and Pedagogy.
- Gradually reduce Central Government's funding over the Plan period rather than move immediately to 50:50.

- Ensure minimum standards and norms for public and private schools and address systemic issues of accountability and decentralization of decision-making, teacher recruitment, teacher training, learning outcome measurement, teacher motivation.
- Recognize and encourage the role of private providers.
- Special focus on disadvantaged groups and educationally backward areas.
- Scheme for Universal Access and Quality at the Secondary Stage; set up 6000 Model Schools one in each Block, upgrade 15000 primary schools to secondary level, additional infrastructure and additional teachers, hundred per cent trained teachers.
- Use ICT based pedagogy and learning aids, provide broadband connectivity to all the Government and Government-aided secondary schools.
- Strengthen teacher training and professional development.

Higher & Technical Education (Volume II: Social Sector)

- Expansion, inclusion and rapid movement in quality by enhancing public spending, encouraging private initiatives and initiating the long overdue major institutional and policy reforms, will form the core of the XI Plan effort.
- Improve quality: work on a detailed reforms agenda including: a) admission, curriculum and assessment; b) accreditation & ratings; c) teachers competence and motivation; and d) restructure affiliated colleges and research for policy formulation.
- An apex, independent regulatory mechanism accompanied by greater autonomy and internal accountability; establish a High-level committee to suggest specific Reforms
- Quantitative expansion through establishment of new government and private-funded institutions and increased intake in existing institutions.
- Reduce disparities based on gender, caste, region etc. through differential support.
- Establish 30 new Central Universities, 16 in States where they do not exist and 14 as World Class Universities (all-India admissions, course credits, regular syllabi revision, incentives for faculty, strong linkage with industry and research institutions, no affiliated colleges, outsource non-teaching functions).
- Provide flexibility to universities to raise fees accompanied by scholarships, fellowships and student loans.
- Establish a National Science & Engineering Research Board for rejuvenation of research in Universities.
- Launch a National Mission in education through ICT coverage in all the Universities and colleges; broadband connectivity through National Knowledge Network and requisite nodes within institutions; to be implemented through an Empowered Committee.
- Revitalize and reform polytechnics through industry linkage and teacher development, establish 210 community colleges and 700 polytechnics.
- Strengthen Open Universities and reform statutory bodies, scale up SAKSHAT as the education portal for 50 crore people.

Libraries (Volume II: Social Sector)

- Develop Public Libraries including Rural Public Libraries.
- Special collections and technological support for visually challenged and hearing impaired.

Translation (Volume II: Social Sector)

- A National Translation Mission for promoting translator education including specialized courses in translation technology.
- Translate at least five good literary works in every language into all other major languages.

Legislative Framework for Public Funded Research (Volume II: Social Sector)

There is a need for an appropriate legislative framework for incentivizing innovators and commercialization of public-funded R & D where the Government, the recipients of funds, the inventor as well as the public benefit from the protection and commercialization of IP.

Traditional Health Systems (Volume II: Social Sector)

The Plan recognizes that no single system of health care has the capacity to solve all of the society's health needs. It lays special thrust on strengthening professional education, strategic research programmes, promotion of best clinical practices, technology upgradation in industry, setting internationally acceptable pharmacopoeial standards, conserving medicinal flora, fauna, metals and minerals, utilizing human resources of AYUSH in the national health programmes and strengthening IPRs with the ultimate aim of enhancing the outreach of AYUSH health care in an accessible, acceptable, affordable and qualitative manner.

Intellectual Property Rights (Volume III: Economic Sector)

- Undertake the second phase of modernization of IP offices to address the needs of human resources development, training and awareness and also infrastructure besides regular updating of the IT facilities.
- Indian IPO would be made an International Searching Authority and an International Preliminary Examining Authority under the Patent Co-operation Treaty of WIPO

With one of the youngest populations in the world, India is estimated to have the capacity to create 500 million skilled and trained technicians by the year 2020 and claim a fourth of the global workforce. Education and skill development can be India's global opportunity.

- Dr. Manmohan Singh, Prime Minister of India at the Presentation of National Awards to Micro, Small and Medium Enterprises, 30th August, 2008, New Delhi

Our Government's effort has been to create the next big wave of investment in higher education and the XIth Five Year Plan, now under implementation, is basically a knowledge investment plan.

- Dr. Manmohan Singh, Prime Minister of India at IIT Guwahati, 26th August, 2008

Our future prosperity depends upon the policies, programmes and people that can foster continuous generation and application of knowledge in the pursuit of learning.

- Mr. Sam Pitroda, Chairman, National Knowledge Commission